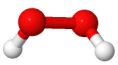
National Library of Medicine
National Center for Biotechnology Information

COMPOUND SUMMARY

Hydrogen Peroxide

PubChem CID	784
Structure	 2D  3D  Crystal
Chemical Safety	 Oxidizer Corrosive Irritant Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	H_2O_2
Synonyms	hydrogen peroxide 7722-84-1 oxydol perhydrol Interox View More...
Molecular Weight	34.015 g/mol *Computed by PubChem 2.2 (PubChem release 2021.10.14)*
Dates	Create: 2004-09-16 Modify: 2024-01-27
Description	Hydrogen peroxide is a colorless liquid at room temperature with a bitter taste. Small amounts of gaseous hydrogen peroxide occur naturally in the air. Hydrogen peroxide is unstable, decomposing readily to oxygen and water with release of heat.

Although nonflammable, it is a powerful oxidizing agent that can cause spontaneous combustion when it comes in contact with organic material. Hydrogen peroxide is found in many households at low concentrations (3-9%) for medicinal applications and as a clothes and hair bleach. In industry, hydrogen peroxide in higher concentrations is used as a bleach for textiles and paper, as a component of rocket fuels, and for producing foam rubber and organic chemicals.

- Agency for Toxic Substances and Disease Registry (ATSDR)

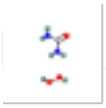
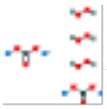
Hydrogen peroxide, aqueous solution, stabilized, with more than 60% hydrogen peroxide appears as a colorless liquid. Vapors may irritate the eyes and mucous membranes. Under prolonged exposure to fire or heat containers may violently rupture due to decomposition. Used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

- CAMEO Chemicals

Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary) appears as colorless aqueous solution. Vapors may irritate the eyes and mucous membranes. Contact with most common metals and their compounds may cause violent decomposition, especially in the higher concentrations. Contact with combustible materials may result in spontaneous ignition. Prolonged exposure to fire or heat may cause decomposition and rupturing of the container. Used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

- CAMEO Chemicals

View More...

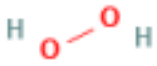
See also:  Carbamide Peroxide (active moiety of);  Magnesium peroxide (active moiety of);  Sodium percarbonate (active moiety of) ... View More ...

1 Structures

1.1 2D Structure

Structure Search | Get Image | Download Coordinates

Chemical Structure Depiction



PubChem

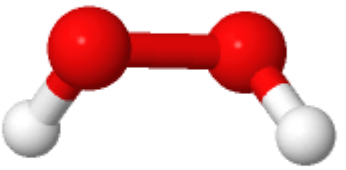
1.2 3D Conformer

PubChem

1.3 Crystal Structures

1 of 2 View All

COD Number	1008189
Associated Article	Busing, William R.; Levy, Henri A.. Crystal and molecular structure of hydrogen peroxide: a neutron-diffraction study. Journal of Chemical Physics 1965;42(9):3054-3059. DOI: 10.1063/1.1696379

Crystal Structure Depiction	
Hermann-Mauguin space group symbol	P 41 21 2
Hall space group symbol	P 4abw 2nw
Space group number	92
a	4.06 Å
b	4.06 Å
c	8.00 Å
α	90 °
β	90 °
γ	90 °
Z	4
Z'	0.5

▸ Crystallography Open Database (COD)

2 Names and Identifiers

2.1 Computed Descriptors

2.1.1 IUPAC Name

hydrogen peroxide

Computed by Lexichem TK 2.7.0 (PubChem release 2021.10.14)

▸ **PubChem**

2.1.2 InChI

InChI=1S/H2O2/c1-2/h1-2H

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

▸ **PubChem**

2.1.3 InChIKey

MHAJPDPJQMAIIY-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

▸ **PubChem**

2.1.4 Canonical SMILES

OO

Computed by OEChem 2.3.0 (PubChem release 2021.10.14)

▸ **PubChem**

2.2 Molecular Formula

H_2O_2

Computed by PubChem 2.2 (PubChem release 2021.10.14)

▸ **CAMEO Chemicals; Wikipedia; PubChem**

H_2O_2

- ILO-WHO International Chemical Safety Cards (ICSCs)

2.3 Other Identifiers

2.3.1 CAS

7722-84-1

- CAMEO Chemicals; CAS Common Chemistry; ChemIDplus; DrugBank; DTP/NCI; EPA Chemica...

12325-10-9

- CAS Common Chemistry

2.3.2 Deprecated CAS

218625-72-0, 37355-84-3, 66554-50-5, 8007-30-5, 97929-73-2

- ChemIDplus

66554-50-5, 218625-72-0, 37355-84-3

- EPA DSSTox

8007-30-5

- FDA Global Substance Registration System (GSRS)

2.3.3 European Community (EC) Number

231-765-0

- European Chemicals Agency (ECHA)

2.3.4 UNII

BBX060AN9V

- FDA Global Substance Registration System (GSRS)

2.3.5 UN Number

2015

- CAMEO Chemicals; ILO-WHO International Chemical Safety Cards (ICSCs); NJDOH RTK Haza...

2014

- CAMEO Chemicals; The National Institute for Occupational Safety and Health (NIOSH)

2984

- CAMEO Chemicals; The National Institute for Occupational Safety and Health (NIOSH)

2015 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

- Emergency Response Guidebook (ERG)

2984 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide)

- Emergency Response Guidebook (ERG)

2014 (Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- Emergency Response Guidebook (ERG)

2.3.6 ChEMBL ID

CHEMBL71595

- ChEMBL

2.3.7 DSSTox Substance ID

DTXSID2020715

- EPA DSSTox

2.3.8 ICSC Number

0164

- ILO-WHO International Chemical Safety Cards (ICSCs)

2.3.9 KEGG ID

C00027

- KEGG

D00008

- KEGG

2.3.10 NCI Thesaurus Code

C28156

- NCI Thesaurus (NCIt)

2.3.11 NSC Number

19892

- DTP/NCI

2.3.12 Pharos Ligand ID

2448

- Pharos

2.3.13 RTECS Number

MX0900000

- The National Institute for Occupational Safety and Health (NIOSH)

2.3.14 RXCUI

5499

- NLM RxNorm Terminology

2.3.15 Wikidata

Q171877

- Wikidata

Q1088474

- Wikidata

2.3.16 Wikipedia

Hydrogen peroxide

- Wikipedia

Hydrogen_peroxide

- Wikipedia

2.4 Synonyms

2.4.1 MeSH Entry Terms

Hydrogen Peroxide
Hydrogen Peroxide (H2O2)
Hydroperoxide
Oxydol
Perhydrol
Peroxide, Hydrogen
Superoxol

▸ Medical Subject Headings (MeSH)

2.4.2 Depositor-Supplied Synonyms

hydrogen peroxide	hydroperoxide	Albone 70CG	Hydrogen peroxide, 3%	Ast
7722-84-1	T-Stuff	Perone 50	Caswell No. 486AAA	Hig
oxydol	Peroxaan	Albone DS	Hydrogen peroxide, 90%	Per
perhydrol	Elawox	Dihydrogen dioxide	dioxidane	Tea
Interox	Hioxyl	Peroxide	Oxyfull	Per
Inhibine	Lensept	H2O2	Eskata	Ase
Superoxol	Perone	Hydrogen peroxide, 30%	Hyrogen peroxide	Bac
Albone	Albone 35CG	Peroxan	Waterstofperoxyde	Cry
Kastone	Albone 50	Perone 30	Wasserstoffperoxid	Per
Hydrogen dioxide	Albone 50CG	Perone 35	CCRIS 1060	Pre
Albone 35	Albone 70	Hydrogen peroxide (H2O2)	HSDB 547	Pre

▸ PubChem

3 Chemical and Physical Properties

3.1 Computed Properties

Property Name	Property Value	Reference
Molecular Weight	34.015 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
XLogP3-AA	-0.9	Computed by XLogP3 3.0 (PubChem release 2021.10.14)

Property Name	Property Value	Reference
Hydrogen Bond Donor Count	2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Hydrogen Bond Acceptor Count	2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Rotatable Bond Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Exact Mass	34.005479302 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Monoisotopic Mass	34.005479302 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Topological Polar Surface Area	40.5Å²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Heavy Atom Count	2	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	0	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	1	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.10.14)

▸ PubChem

3.2 Experimental Properties

3.2.1 Physical Description

Hydrogen peroxide, aqueous solution, stabilized, with more than 60% hydrogen peroxide appears as a colorless liquid. Vapors may irritate the eyes and mucous membranes. Under prolonged exposure to fire or heat containers may violently rupture due to decomposition. Used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

- CAMEO Chemicals

Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary) appears as colorless aqueous solution. Vapors may irritate the eyes and mucous membranes. Contact with most common metals and their compounds may cause violent decomposition, especially in the higher concentrations. Contact with combustible materials may result in spontaneous ignition. Prolonged exposure to fire or heat may cause decomposition and rupturing of the container. Used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

- CAMEO Chemicals

Hydrogen peroxide solution is the colorless liquid dissolved in water. Its vapors are irritating to the eyes and mucous membranes. The material, especially the higher concentrations, can violently decompose in contact with most common metals and their compounds. Contact with combustible materials can result in spontaneous ignition. Under prolonged exposure to fire or heat containers may violently rupture due to decomposition of the material. It is used to bleach textiles and wood pulp, in chemical manufacturing and food processing.

- CAMEO Chemicals

Hydrogen peroxide, stabilized appears as a crystalline solid at low temperatures. Has a slightly pungent, irritating odor. Used in the bleaching and deodorizing of textiles, wood pulp, hair, fur, etc. as a source of organic and inorganic peroxides; pulp and paper industry; plasticizers; rocket fuel; foam rubber; manufacture of glycerol; antichlor; dyeing; electroplating; antiseptic; laboratory reagent; epoxidation; hydroxylation; oxidation and reduction; viscosity control for starch and cellulose derivatives; refining and cleaning metals; bleaching and oxidizing agent in foods; neutralizing agent in wine

distillation; seed disinfectant; substitute for chlorine in water and sewage treatment. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

- **CAMEO Chemicals**

Dry Powder; Liquid

- **EPA Chemicals under the TSCA**

Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12 degrees F. Often used in an aqueous solution.]; [NIOSH]

- **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

Liquid

- **Human Metabolome Database (HMDB)**

COLOURLESS LIQUID.

- **ILO-WHO International Chemical Safety Cards (ICSCs)**

Colorless liquid with a slightly sharp odor.

- **Occupational Safety and Health Administration (OSHA)**

Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12 °F. Often used in an aqueous solution.]

- **The National Institute for Occupational Safety and Health (NIOSH)**

3.2.2 Color / Form

Colorless liquid

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-67

- **Hazardous Substances Data Bank (HSDB)**

At low temperatures a crystalline solid /90% solution/

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 12th Edition. Wiley-Interscience,

Wiley & Sons, Inc. Hoboken, NJ. 2012., p. V4: 2434

▸ **Hazardous Substances Data Bank (HSDB)**

Colorless liquid ... [Note: The pure compound is a crystalline solid below 12 degrees F. Often used in an aqueous solution]

*NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: **https://www.cdc.gov/niosh/npg***

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.3 Odor

... Slightly sharp odor ...

*NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: **https://www.cdc.gov/niosh/npg***

▸ **Hazardous Substances Data Bank (HSDB)**

Odorless, or having an odor resembling that of **ozone**

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 1092

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.4 Taste

Bitter

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 12th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2012., p. V4: 2434

▸ **Hazardous Substances Data Bank (HSDB)**

Slightly acid

Osol, A. and J.E. Hoover, et al. (eds.). Remington's Pharmaceutical Sciences. 15th ed. Easton, Pennsylvania: Mack Publishing Co., 1975., p. 1092

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.5 Boiling Point

302.4 °F at 760 mmHg (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

- **CAMEO Chemicals**

306 °F at 760 mmHg ; 258 °F for concentrations greater than 52% (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

- **CAMEO Chemicals**

108

MSDS

- **DrugBank**

150.2 °C

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-67

- **Hazardous Substances Data Bank (HSDB)**

141 °C (90%)

- **ILO-WHO International Chemical Safety Cards (ICSCs)**

286 °F

- **Occupational Safety and Health Administration (OSHA); The National Institute for Occupati...**

3.2.6 Melting Point

31.3 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

▸ CAMEO Chemicals

31 to 40 °F for concentrations greater than 52% (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

-33

MSDS

▸ DrugBank

-0.43 °C

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-67

▸ Hazardous Substances Data Bank (HSDB); Human Metabolome Database (HMDB)

-11 °C (90%), -39 °C (70%)

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

12 °F

▸ Occupational Safety and Health Administration (OSHA); The National Institute for Occupati...

3.2.7 Solubility

greater than or equal to 100 mg/mL at 72 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

▸ CAMEO Chemicals

Miscible (NIOSH, 2023)

National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). https://www.cdc.gov/niosh/npg.

▸ CAMEO Chemicals

Soluble in cold water

MSDS

- **DrugBank**

In water, 1X10+6 mgL at 25 °C

Radding SB et al; Review of The Environmental Fate of Selected Chemicals. NTIS 68-01-2681 (1977)

- **Hazardous Substances Data Bank (HSDB)**

Very soluble in water

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-67

- **Hazardous Substances Data Bank (HSDB)**

Miscible with water

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

- **Hazardous Substances Data Bank (HSDB)**

Soluble in ether; insoluble in petroleum ether. Decomposed into water and oxygen by many organic solvents.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

- **Hazardous Substances Data Bank (HSDB)**

For more Solubility (Complete) data for Hydrogen peroxide (6 total), please visit the HSDB record page.

- **Hazardous Substances Data Bank (HSDB)**

1000 mg/mL at 25 °C

- **Human Metabolome Database (HMDB)**

Solubility in water: miscible

- **ILO-WHO International Chemical Safety Cards (ICSCs)**

Miscible

- **The National Institute for Occupational Safety and Health (NIOSH)**

3.2.8 Density

1.11 at 68 °F (NTP, 1992) - Denser than water; will sink

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

▸ CAMEO Chemicals

1.463 at 32 °F 1.29/1.3 at 68F for concentrations greater than 52% (EPA, 1998) - Denser than water; will sink

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

1.44 g/cu cm 25 °C

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-67

▸ Hazardous Substances Data Bank (HSDB)

Density, solid: 1.71 g/cc

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 735

▸ Hazardous Substances Data Bank (HSDB)

Contains 2.5-3.5% by wt of H2O2 = 8-12 vols oxygen. Colorless, slightly acid liquid. Density approximately 1.00 /3% solution Hydrogen Peroxide/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Contains 30% by wt of H2O2 = 100 vols oxygen. Colorless, colorless liquid. Density approximately 1.11. Miscible with water /30% solution Hydrogen Peroxide/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Relative density (water = 1): 1.4 (90%)

- ILO-WHO International Chemical Safety Cards (ICSCs)

1.39

- Occupational Safety and Health Administration (OSHA); The National Institute for Occupati...

3.2.9 Vapor Density

1.02 calculated (EPA, 1998) - Heavier than air; will sink (Relative to Air)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

- CAMEO Chemicals

Relative vapor density (air = 1): 1

- ILO-WHO International Chemical Safety Cards (ICSCs)

3.2.10 Vapor Pressure

1 mmHg at 59.5 °F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

- CAMEO Chemicals

1 mmHg at 59.54 °F (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

- CAMEO Chemicals

1.97 [mmHg]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

VP: 1 mm Hg at 15.3 °C

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 12th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2012., p. V4: 2434

- Hazardous Substances Data Bank (HSDB)

1.97 mm Hg at 25 °C

Daubert, T.E., R.P. Danner. Physical and Thermodynamic Properties of Pure Chemicals Data Compilation. Washington, D.C.: Taylor and Francis, 1989.

- Hazardous Substances Data Bank (HSDB)

Vapor pressure, kPa at 20 °C: 0.2 (90%)

- ILO-WHO International Chemical Safety Cards (ICSCs)

5 mmHg at 86 °F

- Occupational Safety and Health Administration (OSHA)

(86 °F): 5 mmHg

- The National Institute for Occupational Safety and Health (NIOSH)

3.2.11 LogP

-1.36

- ILO-WHO International Chemical Safety Cards (ICSCs)

3.2.12 Henry's Law Constant

Henry's Law constant = 7.04X10-9 atm-cu m/mol at 25 °C

Betterton EA; Gaseous Pollutants. New York, NY: John Wiley and Sons, Inc. p. 25 (1992)

- Hazardous Substances Data Bank (HSDB)

3.2.13 Stability / Shelf Life

Stable under recommended storage conditions. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Solutions of hydrogen peroxide gradually deteriorate and are usually stabilized by the addition of acetanilide or similar organic materials.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Hydrogen peroxide topical solution deteriorates upon standing or upon repeated agitation, undergoes accelerated decomposition when exposed to light or when in contact with many oxidizing or reducing substances, and decomposes suddenly when heated.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ Hazardous Substances Data Bank (HSDB)

Pure hydrogen peroxide solutions, completely free from contamination, are highly stable; a low percentage of an inhibitor such as acetanilide or sodium stannate is usually added to counteract the catalytic effect of traces of impurities such as iron, copper, and other heavy metals.

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 735

▸ Hazardous Substances Data Bank (HSDB)

A relatively stable sample of hydrogen peroxide typically decomposes at the rate of approximately 0.5% per year at room temperature.

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 637

▸ Hazardous Substances Data Bank (HSDB)

3.2.14 Autoignition Temperature

Not flammable. (USCG, 1999)

U.S. Coast Guard. 1999. Chemical Hazard Response Information System (CHRIS) - Hazardous Chemical Data. Commandant Instruction 16465.12C. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

3.2.15 Decomposition

Decomposed by many organic solvents.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

May decompose violently if traces of impurities are present.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ **Hazardous Substances Data Bank (HSDB)**

Decomposed into **water** and **oxygen** by many organic solvents.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ **Hazardous Substances Data Bank (HSDB)**

Agitation or contact with rough surfaces, metals or many other substances accelerates decomposition. Rapidly decomposed by alkalies, finely divided metals; the presence of mineral acid renders it more stable.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ **Hazardous Substances Data Bank (HSDB)**

Decomposition continuously occurs even at a slow rate when the compound is inhibited, and thus it must be stored properly and in vented containers. High-strength hydrogen peroxide is a very high-energy material. When it decomposes to **oxygen** and **water**, large amounts of heat are liberated, leading to an increased rate of decomposition, since decomposition is accelerated by increases in temperature. This rate increases about 2.2 times per 10 °C temperature increase between 20 and 100 °C.

International Labour Office. Encyclopaedia of Occupational Health and Safety. 4th edition, Volumes 1-4 1998. Geneva, Switzerland: International Labour Office, 1998., p. 104.350

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.16 Viscosity

1.819 cP at 0 °C; 1.249 cP at 20 °C

Goor G et al; Hydrogen Peroxide. Ullmann's Encyclopedia of Industrial Chemistry. 7th ed. (1999-2017). New York, NY: John Wiley & Sons. Online Posting Date: 15 Apr 2007

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.17 Corrosivity

Corrosive

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.18 Heat of Vaporization

1519 J-g/K at 25 °C

Goor G et al; Hydrogen Peroxide. Ullmann's Encyclopedia of Industrial Chemistry. 7th ed. (1999-2017). New York, NY: John Wiley & Sons. Online Posting Date: 15 Apr 2007

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.19 pH

Weak acid; H2O2 concn wt% = 35, 50, 70, 90; corresponding true pH: 4.6, 4.3, 4.4, 5.1

Eul W et al; Hydrogen Peroxide. Kirk-Othmer Encyclopedia of Chemical Technology. (1999-2017). New York, NY: John Wiley & Sons. Online Posting Date: 17 Aug 2001

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.20 Surface Tension

80.4 dynes/cm at 20 °C

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 735

▸ **Hazardous Substances Data Bank (HSDB)**

3.2.21 Ionization Potential

10.54 eV

- Occupational Safety and Health Administration (OSHA); The National Institute for Occupati...

3.2.22 Refractive Index

Index of refraction: 1.4061 at 28 °C

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 4-137

- Hazardous Substances Data Bank (HSDB)

3.2.23 Dissociation Constants

pKa = 11.62

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 5-92

- Hazardous Substances Data Bank (HSDB)

3.2.24 Other Experimental Properties

Strong oxidizer

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

- Hazardous Substances Data Bank (HSDB)

Densities of 30%, 70% and 90% are 1.1081, 1.2839 and 1.3867 g/mL, respectively.

Patnaik P; Handbook of Inorganic Chemicals. McGraw-Hill Handbooks. New York, NY: McGraw-Hill p. 372 (2003)

- Hazardous Substances Data Bank (HSDB)

pH of 50% aqueous solution is 4.3

Patnaik P; Handbook of Inorganic Chemicals. McGraw-Hill Handbooks. New York, NY: McGraw-Hill p. 372 (2003)

- Hazardous Substances Data Bank (HSDB)

Heat of Fusion: 12.5 kJ/mol at -0.43 °C

Haynes, W.M. (ed.). CRC Handbook of Chemistry and Physics. 95th Edition. CRC Press LLC, Boca Raton: FL 2014-2015, p. 6-148

- Hazardous Substances Data Bank (HSDB)

For more Other Experimental Properties (Complete) data for Hydrogen peroxide (11 total), please visit the HSDB record page.

- Hazardous Substances Data Bank (HSDB)

3.2.25 Chemical Classes

Toxic Gases & Vapors -> Oxidizers

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

3.3 SpringerMaterials Properties

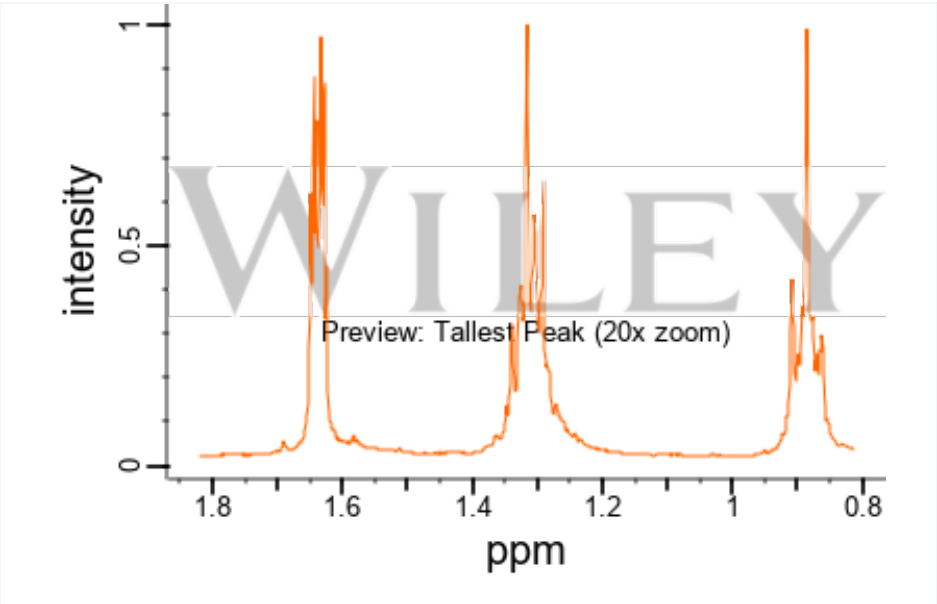
dielectric constant	electric dipole moment	corrosion
crystal structure	internuclear distance	density
diffusion	concentration	surface tension
enthalpy	lineshape	diamagnetic susceptibility
Gibbs energy	chemical diffusion	formation energy
molecular structure	boiling point	nuclear quadrupole resonance spectroscopy
heat capacity	formation entropy	chemical bond
Schoenflies notation	chemical shift	vapor pressure
excitation energy	quadrupole coupling	heat of sublimation
vapor-liquid equilibrium	transition entropy	refractive index
transition enthalpy	formation enthalpy	entropy

- SpringerMaterials

4 Spectral Information

4.1 1D NMR Spectra

4.1.1 1H NMR Spectra

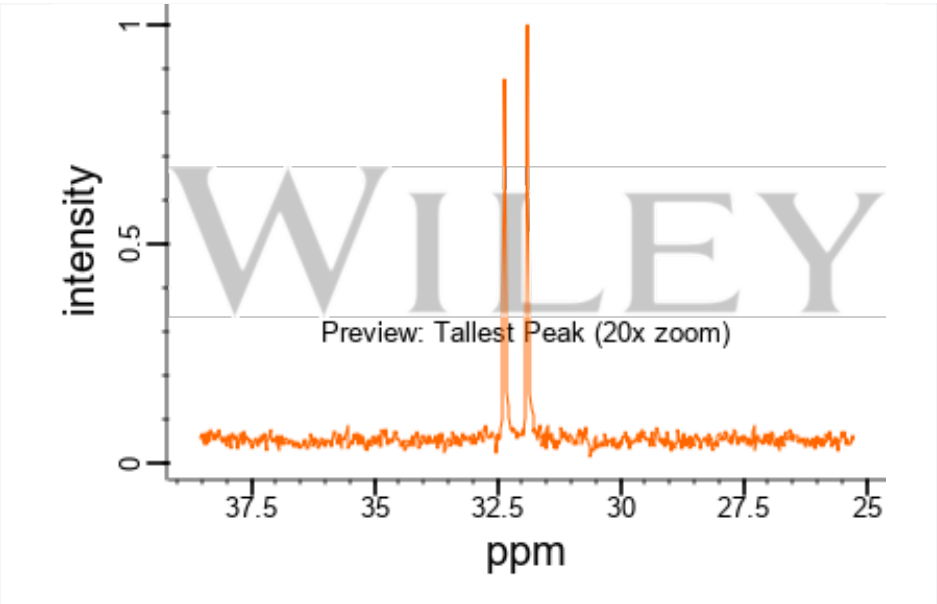
Source of Spectrum	Sigma-Aldrich Co. LLC.
Source of Sample	Sigma-Aldrich Co. LLC.
Catalog Number	H3410
Copyright	Copyright © 2021-2024 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▸ SpectraBase

4.1.2 13C NMR Spectra

Source of Spectrum	Sigma-Aldrich Co. LLC.
Source of Sample	Sigma-Aldrich Co. LLC.
Catalog Number	H3410
Copyright	Copyright © 2021-2024 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.

Thumbnail

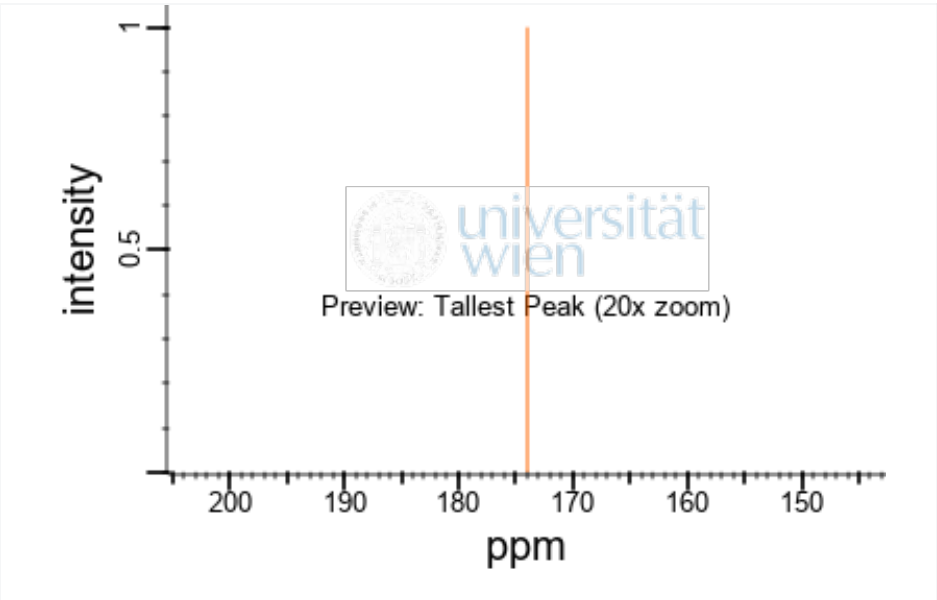


SpectraBase

4.1.3 17O NMR Spectra

Copyright	Copyright © 2016-2024 W. Robien, Inst. of Org. Chem., Univ. of Vienna. All Rights Reserved.

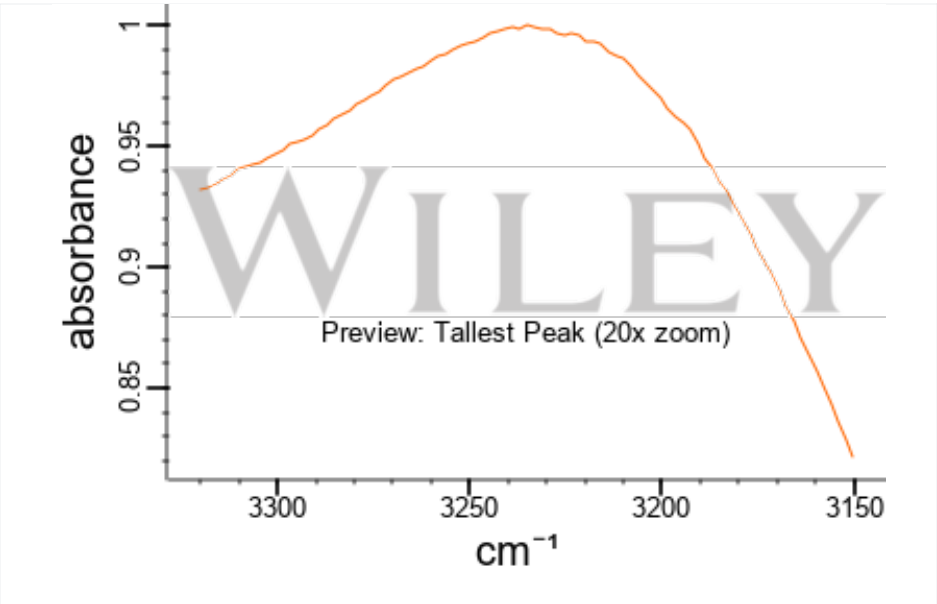
Thumbnail



SpectraBase

4.2 IR Spectra

4.2.1 ATR-IR Spectra

Source of Sample	Sigma-Aldrich
Catalog Number	216763
Copyright	Copyright © 2018-2024 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2018-2024 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

▸ SpectraBase

5 Related Records

5.1 Related Compounds with Annotation

▸ PubChem

5.2 Related Compounds

Same Connectivity Count	8
Mixtures, Components, and Neutralized Forms	5816

Count	
Similar Compounds Count	31
Similar Conformers Count	127

PubChem

5.3 Substances

5.3.1 PubChem Reference Collection SID

481107986

PubChem

5.3.2 Related Substances

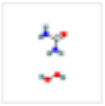
All Count	7973
Same Count	482
Mixture Count	7491

PubChem

5.3.3 Substances by Category

PubChem

5.4 Other Relationships


Carbamide Peroxide (active moiety of)


Magnesium peroxide (active moiety of)


Sodium percarbonate (active moiety of)

Alcohol; hydrogen peroxide (component of)
Glycerin; hydrogen peroxide (component of)
Hydrogen Peroxide; Lactic Acid (component of)
Hydrogen Peroxide; Silicon Dioxide (component
alpha-TOCOPHEROL ACETATE; Hydrogen Peroxi
Dodecylbenzenesulfonic acid; hydrogen peroxid

▸ PubChem

5.5 Entrez Crosslinks

PubMed Count	1108
Protein Structures Count	219
Taxonomy Count	35
OMIM Count	3
Gene Count	4625

▸ PubChem

5.6 NCBI LinkOut

▸ NCBI

6 Chemical Vendors

▸ PubChem

7 Drug and Medication Information

7.1 Drug Indication

Indicated to be used as a disinfectant and sterilizer.

- DrugBank

Treatment of common warts (verrucae vulgaris)

- European Medicines Agency (EMA)

Treatment of seborrhoeic keratosis

- European Medicines Agency (EMA)

7.2 FDA Approved Drugs

- Drugs@FDA

7.3 FDA Orange Book

- FDA Orange Book

7.4 FDA National Drug Code Directory

- National Drug Code (NDC) Directory

7.5 FDA Green Book

Active Ingredient: Hydrogen Peroxide

35% PEROX-AID®

- FDA Approved Animal Drug Products (Green Book)

7.6 Drug Labels

Drug and label

- DailyMed

Active ingredient and drug

- DailyMed

7.7 Clinical Trials

7.7.1 ClinicalTrials.gov

- ClinicalTrials.gov

7.7.2 EU Clinical Trials Register

- EU Clinical Trials Register

7.7.3 NIPH Clinical Trials Search of Japan

- NIPH Clinical Trials Search of Japan

7.8 EMA Drug Information

1 of 2

Type	Paediatric investigation
Active Substance	Hydrogen Peroxide
Therapeutic Area	Dermatology
Drug Form	Cutaneous solution

Administration Route	Cutaneous use
Decision Type	RP: decision refers to a refusal on a proposed Paediatric Investigation Plan
Decision Date	2019-07-25

▸ European Medicines Agency (EMA)

2 of 2	
Type	Paediatric investigation
Active Substance	Hydrogen Peroxide
Therapeutic Area	Dermatology
Drug Form	Cutaneous solution
Administration Route	Cutaneous use
Decision Type	W: decision granting a waiver in all age groups for all conditions or indications
Decision Date	2016-05-20

▸ European Medicines Agency (EMA)

7.9 Therapeutic Uses

Anti-Infective Agents, Local; Oxidants

*National Library of Medicine's Medical Subject Headings. Hydrogen peroxide. Online file (MeSH, 2017). Available from, as of October 2, 2017: **https://www.nlm.nih.gov/mesh/2017/mesh_browser/MBrowser.html***

▸ Hazardous Substances Data Bank (HSDB)

/CLINICAL TRIALS/ ClinicalTrials.gov is a registry and results database of publicly and privately supported clinical studies of human participants conducted around the world. The Web site is maintained by the National Library of Medicine (NLM) and the National Institutes of Health (NIH). Each ClinicalTrials.gov record presents summary information about a study protocol and includes the following: Disease or condition; Intervention (for example, the medical product, behavior, or procedure being studied); Title, description, and design of the study; Requirements for participation (eligibility criteria); Locations

where the study is being conducted; Contact information for the study locations; and Links to relevant information on other health Web sites, such as NLM's MedlinePlus for patient health information and PubMed for citations and abstracts for scholarly articles in the field of medicine. Hydrogen peroxide is included in the database.

*NIH/NLM; ClinicalTrials.Gov. Available from, as of October 2, 2017: **https://clinicaltrials.gov/***

▸ **Hazardous Substances Data Bank (HSDB)**

Antiseptic; disinfectant.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ **Hazardous Substances Data Bank (HSDB)**

Hydrogen peroxide 3% topical solution is used to cleanse minor cuts or skin abrasions. More potent solutions (e.g., 20-30%) have been used as a hair bleach.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ **Hazardous Substances Data Bank (HSDB)**

For more Therapeutic Uses (Complete) data for Hydrogen peroxide (14 total), please visit the **HSDB record page**.

▸ **Hazardous Substances Data Bank (HSDB)**

7.10 Drug Warnings

The US Food and Drug Administration (FDA) has alerted consumers that high strength hydrogen peroxide preparations (e.g., 35% food grade hydrogen peroxide) should not be used for any medicinal purpose. These preparations are being promoted on websites illegally for various medicinal purposes (e.g., AIDS, cancer, emphysema, other life-threatening conditions) without any proven clinical value, and such uses are dangerous. Hydrogen peroxide 35% is not approved by the FDA for any purpose. Ingestion of such preparations can cause serious harm or death. Oral ingestion of hydrogen peroxide can result in GI irritation and ulceration. IV administration of hydrogen peroxide can result in inflammation at the injection site, gas embolism, and life-threatening allergic reactions.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ **Hazardous Substances Data Bank (HSDB)**

Concentrated solutions (20-30% or more) of hydrogen peroxide are strongly irritating to

skin or mucous membranes and should be handled cautiously.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

- Hazardous Substances Data Bank (HSDB)

7.11 Biomarker Information

- MarkerDB

8 Food Additives and Ingredients

8.1 Food Additive Classes

JECFA Functional Classes

Food Additives -> PRESERVATIVE;

- Joint FAO/WHO Expert Committee on Food Additives (JECFA)

8.2 FDA Substances Added to Food

Substance	HYDROGEN PEROXIDE
Used for (Technical Effect)	OXIDIZING OR REDUCING AGENT
Document Number (21 CFR)	172.167 172.723 172.814 172.892 173.315 173.356 173.370 175.105 178.1005 178.1010 184.1366

- FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.3 FDA Generally Recognized as Safe - GRAS Notices

Substance	Hydrogen peroxide
GRN Number	14
Intended Use	Use in the manufacture of dehydrated onions as a processing aid to extend their shelf life
FDA Letter	Notice does not provide a basis for a GRAS determination
Notifier	Basic Vegetable Products
Date of Filing	Feb 17, 1999
Date of Closure	May 26, 1999

- FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.4 FDA Inventory of Effective Food Contact Substance Notifications - FCN

1 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No.79-21- 0), hydrogen peroxide (CAS Reg. No.7722-84-1), acetic acid (CAS Reg. No. 64-19-17), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP; CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Corporation
Effective Date	Aug 30, 2018
Intended Use	As an antimicrobial to control microorganisms in process water and ice used in the production and preparation of fruits and vegetables.
Limitations/Specifications	The components of the FCS will not exceed 80 ppm peroxyacetic acid, 433 ppm hydrogen peroxide, and 9.8 ppm HEDP in process water for washing or chilling fruits and vegetables in food processing facilities.
National Environmental Policy Act	Environmental Assessment (in PDF, 103 kB)

FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 168 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

2 of 81	
Food Contact Substance	An aqueous solution of hydrogen peroxide (CAS Reg. No. 7722-84-1), aluminum nitrate, nonahydrate (CAS Reg. No. 7784-27-2), and phosphoric acid (CAS Reg. No. 7664-38-2).
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Feb 24, 2018
Intended Use	The FCS is intended for use as an antimicrobial additive that may be used alone or in combination with other processes for the commercial sterilization of aseptic filling systems and packaging prior to filling. The FCS may be used on equipment and food packaging materials intended to contact infant formula products.
Limitations/Specifications	The FCS will be used as a 35 percent by weight aqueous hydrogen peroxide solution, with a maximum of 0.006 percent by weight aluminum nitrate, nonahydrate at the time of application. The concentration of hydrogen peroxide in distilled water packaged under production conditions (assay to be performed immediately after packaging) must not exceed 0.5 parts per million (ppm). The FCS may be used to sterilize polymeric packaging material (including packaging intended for contact with infant formula products) and the non-food contact surfaces of aseptic filling systems. FDAs review of the use of the FCS to sterilize aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials.
National Environmental Policy Act	Environmental Assessment (in PDF, 155 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 127 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other

	manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

3 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA; CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Valley Chemical Solutions
Effective Date	Feb 24, 2018
Intended Use	As an antimicrobial agent in:(1) brines, sauces, and marinades applied on the surface or injected into processed or unprocessed cooked or uncooked whole or cut meat or poultry, parts and pieces thereof;(2) brines, sauces, and marinades applied on the surface or injected into processed and preformed meat and poultry products.
Limitations/Specifications	The FCS may be used in brines, sauces, and marinades at a level not to exceed 50 ppm PAA, 19 ppm hydrogen peroxide, and 8 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 160 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 172 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

4 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-disphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).

Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Apr 1, 2018
Intended Use	As an antimicrobial additive that may be used alone or in combination with other processes in the commercial sterilization of aseptic filling systems and glass and plastic food packaging and their enclosures prior to filling, except for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS mixture will not exceed 4500 ppm peroxyacetic acid, 6600 ppm hydrogen peroxide, and 180 ppm HEDP. If the FCS mixture is applied at a rate exceeding 0.0175 milliliters treatment solution per ounce container capacity, the FCS mixture must be drained from the container and rinsed with sterile water and drained again. FDAs review of the use of the FCS to sterilize aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials. The FCS is not for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 560 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 124 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

5 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), water, and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Valley Chemical Solutions

Effective Date	Jan 19, 2018
Intended Use	As an antimicrobial agent used during the processing of meat and poultry carcasses, parts, and organs, and preformed and/or processed poultry and meat products.
Limitations/Specifications	The components of the FCS mixture will not exceed:2000 ppm PAA, 892 ppm HP, and 7 ppm HEDP for use in all process water that contacts poultry carcasses, parts, trim, and organs during production, including water applied by wash, rinse, dip, chill, scald, spray, and mist; 495 ppm PAA, 221 ppm HP, and 1.7 ppm HEDP for use in brine and ice that may contact poultry carcasses, parts, trim, and organs, and in process water, brine, and ice for washing, rinsing, or cooling processed and preformed poultry products;2000 ppm PAA, 892 ppm HP, and 7 ppm HEDP for use in all process water that contacts meat carcasses, parts, trim, and organs during production, including water applied by wash, rinse, dip, chill, spray, and mist; and495 ppm PAA, 221 ppm HP, and 1.7 ppm HEDP for use in brine and ice that may contact meat carcasses, parts, trim, and organs, and in process water, brine, or ice for washing, rinsing, or cooling processed and preformed meat products.
National Environmental Policy Act	Environmental Assessment (in PDF, 105 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 110 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

6 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4) and dipicolinic acid (DPA) (CAS Reg. No. 499-83-2).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Nov 29, 2017

Intended Use	As an antimicrobial agent in water used in the production and preparation of whole and cut poultry and meat, fruits and vegetables, and processed and pre-formed poultry and meat. (See Limitations/Specifications).
Limitations/Specifications	When used as intended, the components of the FCS mixture will not exceed:2000 ppm PAA, 1474 ppm HP, 14 ppm HEDP, and 0.88 ppm DPA in spray, wash, rinse, dip, chiller water, low temperature (e.g., less than 40 °F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs;1800 ppm PAA, 1215 ppm HP, 12 ppm HEDP, and 0.5 ppm DPA in process water or ice used for washing, rinsing, or cooling whole or cut meat, including carcasses, parts, trim, and organs;350 ppm PAA, 1000 ppm HP, 10 ppm HEDP, and 0.25 ppm DPA in water for washing or chilling fruits and vegetables in food processing facilities;230 ppm PAA, 186 ppm HP, 14 ppm HEDP, and 0.1 ppm DPA in water, brine, or ice used for washing, rinsing, or cooling processed and pre-formed poultry; and 495 ppm PAA, 335 ppm HP, 14 ppm HEDP, and 0.1 ppm DPA in water, brine, or ice used for washing, rinsing, or cooling processed and pre-formed meat.
National Environmental Policy Act	Environmental Assessment (in PDF, 140 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

7 of 81	
Food Contact Substance	An aqueous solution of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), with oxalic acid (CAS Reg. No. 144-62-7) and/or maleic acid (CAS Reg. No. 110-16-7).
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Dec 29, 2017
Intended Use	The FCS will be used as an antimicrobial agent for the commercial sterilization of aseptic filling equipment and polymeric food packaging prior to filling, except for use on food packaging used in contact with infant formula or human milk or on aseptic filling

	equipment used to fill such packaging.
Limitations/Specifications	The FCS may be used in the following applications. For each application, the concentration of PAA may not exceed 4000 parts per million (ppm) in the FCS.The FCS is applied as a fine mist or vapor on polymeric food packaging containers and closures without a rinse prior to filling with food. For this application of the FCS, the sum of the concentrations of oxalic and maleic acid may not exceed 267 ppm in the FCS. The maximum application rate in milliliters of FCS per packaging container is given by the formula: 70 x (container capacity in fluid ounces)/[PAA ppm] in the FCS. Food packaging containers and closures are filled with the FCS, drained, and rinsed with sufficient sterile water to achieve a theoretical 60-fold dilution of the FCS residue assumed to be 1 mg/cm2 on the interior container surface following draining.The FCS is applied as a spray to sterilize the non-food contact surfaces of aseptic filling equipment and subsequently rinsed with sterile water. FDAs review of the use of the FCS to sterilize aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials.The FCS is not intended for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 186 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

8 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1, 1-disphosphonic acid (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	BioSafe Systems LLC
Effective Date	Nov 30, 2017

Intended Use	As an antimicrobial in process water, brine, and ice used in the production and preparation of whole or cut meat.
Limitations/Specifications	The components of the FCS mixture will not exceed 1800 ppm peroxyacetic acid (PAA), 675 ppm hydrogen peroxide (HP), and 51.4 ppm 1-hydroxyethylidine-1, 1-disphosphonic acid (HEDP) in process water, brine, or ice used for washing, rinsing, or cooling whole or cut meat, including carcasses, parts, trim, and organs.
National Environmental Policy Act	Environmental Assessment (in PDF, 130 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

9 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9). REPLACES FCN 1419
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Oct 4, 2017
Intended Use	As an antimicrobial agent in process water and ice used in poultry processing.
Limitations/Specifications	The components of the FCS mixture will not exceed 2000 ppm PAA, 770 ppm HP, and 100 ppm HEDP in process water applied as a spray, wash, rinse, dip, chiller water, low temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs.
National Environmental Policy Act	Environmental Assessment (in PDF, 819 kB)
FDA Decision	Finding of No Significant Impact (FONSI)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Biosan, LLC
Effective Date	Sep 13, 2017
Intended Use	As an antimicrobial agent in: (1) process water or ice used to commercially prepare fish and seafood; (2) brines, sauces, and marinades applied either on the surface or injected into processed or unprocessed, cooked or uncooked whole or cut poultry, and (3) surface sauces and marinades applied on processed and preformed meat and poultry products as described in 21 CFR 170.3(n)(29) and (34).
Limitations/Specifications	The components of the FCS mixture will not exceed: 230 ppm peroxyacetic acid, 110 ppm hydrogen peroxide, and 15 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) on fish and seafood; 50 ppm peroxyacetic acid, 18 ppm hydrogen peroxide, and 6 ppm as HEDP on processed or unprocessed, cooked or uncooked whole or cut poultry; and 50 ppm peroxyacetic acid, 18 ppm hydrogen peroxide, and 6 ppm as HEDP on processed and preformed meat and poultry.
National Environmental Policy Act	Environmental Assessment (in PDF, 606 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid, (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), glycerol (CAS Reg. No. 56-81-5), and optionally acetic acid (CAS Reg. No. 64-19-7) or sulfuric acid (CAS Reg. No. 7664-93-9).
Effective Date	Sep 8, 2017
Intended Use	As an antimicrobial to control microorganisms in process water used during the commercial preparation of processed meat and poultry, fish and seafood, and fruits and vegetables that are not raw agricultural commodities.
Limitations/Specifications	The FCS will be added to process water as a spray, dip, ice chiller water or scald water for washing, rinsing, or cooling meat, poultry, fish and seafood, and fruits and vegetables that are not raw agricultural commodities. Final at-use concentrations of peroxyacetic acid and hydrogen peroxide are limited to: 1800 ppm peroxyacetic acid and 1215 ppm hydrogen peroxide in water for whole and cut meat carcasses, parts, trim, and organs;2000 ppm peroxyacetic acid and 1474 ppm hydrogen peroxide in water for whole or cut poultry carcasses, parts, trim, and organs; 230 ppm peroxyacetic acid and 165 ppm hydrogen peroxide in water for fish and seafood; and 350 ppm peroxyacetic acid and 525 ppm hydrogen peroxide in water for fruits and vegetables that are not raw agricultural commodities.
National Environmental Policy Act	Environmental Assessment (in PDF, 1.7 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP; CAS

	Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9). REPLACES FCN 447
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Mar 28, 2017
Intended Use	As an antimicrobial agent in process water or ice used in the production, processing and preparation of meat, fruits, and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed: (1) 1200 ppm PAA, 275 ppm hydrogen peroxide, and 33 ppm HEDP in process water or ice used for washing, rinsing, or cooling whole or cut meat, including hides, carcasses, parts, trim and organs; (2) 500 ppm PAA, 115 ppm hydrogen peroxide, and 14 ppm HEDP in process water or ice used for washing or chilling fruits and vegetables in food processing facilities.
National Environmental Policy Act	Environmental Assessment (in PDF, 750 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	CraftChem, Inc.
Effective Date	Mar 18, 2017
Intended Use	As an antimicrobial agent in process water used to wash raw and processed fruits and vegetables in food processing facilities.

Limitations/Specifications	The components of the FCS mixture will not exceed 350 ppm peroxyacetic acid, 117 ppm hydrogen peroxide, and 4 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 378 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7) and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).
Manufacturer	Seeler Industries, Inc.
Effective Date	Feb 4, 2017
Intended Use	As an antimicrobial agent in process water or ice used in the processing of meat, poultry, fish and seafood, shell eggs, fruit and vegetables.
Limitations/Specifications	Components of the FCS mixture will not exceed:2000 parts per million (ppm) PAA, 773 ppm HP, and 118 ppm HEDP in spray, wash, rinse, dip, chiller water, low temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs or in water for washing shell eggs;460 ppm PAA, 177 ppm HP, and 27 ppm HEDP in spray, wash, rinse, dip, chiller water, or scald water for meat carcasses, parts, trim, and organs; 495 ppm PAA, 190 ppm HP, and 29 ppm HEDP in process water or ice for washing, rinsing, or cooling of processed and pre-formed meat products; 230 ppm PAA, 88 ppm HP, and 14 ppm HEDP in water or ice used for washing, rinsing, or cooling processed and pre-formed poultry products or in the commercial preparation of fish and seafood;350 ppm PAA, 135 ppm HP, and 21 ppm HEDP in water or ice for washing or chilling fruits and vegetables in food processing facilities.

National Environmental Policy Act	Environmental Assessment (in PDF, 633 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Dec 13, 2016
Intended Use	As an antimicrobial agent in process water and ice used in the production and preparation of whole or cut poultry and meat.
Limitations/Specifications	The components of the FCS mixture will not exceed:2000 ppm peroxyacetic acid (PAA), 750 ppm hydrogen peroxide (HP), and 136 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in spray, wash, rinse, dip, chiller water, low temperature (i.e., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs;1800 ppm PAA, 675 ppm HP, and 33 ppm HEDP in process water or ice used for washing, rinsing, or cooling whole or cut meat, including carcasses, parts, trim, and organs.
National Environmental Policy Act	Environmental Assessment (in PDF, 536 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4) and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Alex C. Fergusson, LLC (AFCO)
Effective Date	Oct 13, 2016
Intended Use	As an antimicrobial agent in process water, brine, or ice for meat products.
Limitations/Specifications	The components of the FCS mixture in process water, brine, or ice will not exceed:1800 ppm peroxyacetic acid (PAA), 600 ppm hydrogen peroxide (HP), and 12 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) for washing, rinsing, or cooling meat carcasses, parts, trim, and organs;495 ppm PAA, 165 ppm HP, and 6 ppm HEDP for washing, rinsing, or cooling processed and pre-formed meat.
National Environmental Policy Act	Environmental Assessment (in PDF, 724 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), water, and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Valley Chemical Solutions
Effective Date	Oct 20, 2016

Intended Use	As an antimicrobial agent in process water for poultry and meat (including livestock and game) products.
Limitations/Specifications	The components of the FCS mixture in process water, brine, or ice, will not exceed:2000 parts per million (ppm) PAA, 750 ppm HP, and 10 ppm HEDP in spray, mist, wash, rinse, dip, chiller water, and scald water for meat and poultry carcasses, parts, trim, and organs.495 ppm PAA, 186 ppm HP, and 2.5 ppm HEDP for washing, rinsing, or cooling processed and pre-formed meat and poultry products.
National Environmental Policy Act	Environmental Assessment (in PDF, 635 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	CraftChem, Inc.
Effective Date	Sep 21, 2016
Intended Use	As an antimicrobial agent for use in process water and ice used in the production and preparation of meat and processed and pre-formed meat.
Limitations/Specifications	The components of the FCS mixture will not exceed:(1) 1800 ppm peroxyacetic acid (PAA), 600 ppm hydrogen peroxide (HP), and 22.5 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) in process water or ice used for washing, rinsing, or cooling whole or cut meat including carcasses, parts, trim and organs;(2) 495 ppm PAA, 165 ppm HP, and 14 ppm HEDP in process water, brine, or ice used for washing, rinsing, or cooling processed and pre-formed meat.
National Environmental Policy Act	Environmental Assessment (in PDF, 733 kB)

FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Jun 28, 2016
Intended Use	As an antimicrobial agent in: (1) brines, sauces, and marinades applied either on the surface or injected into processed or unprocessed, cooked or uncooked whole or cut poultry or parts and pieces and (2) surface sauces and marinades applied on processed and preformed meat and poultry products as described in 21 CFR 170.3(n)(29) and (34).
Limitations/Specifications	The FCS may be used in brines, sauces and marinades at a level not to exceed 50 ppm as peroxyacetic acid, 18 ppm as hydrogen peroxide, and 6.0 ppm as HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 402 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Alex C. Fergusson, LLC (AFCO)
Effective Date	Sep 15, 2016
Intended Use	The FCS will be used as an antimicrobial agent in process water and wash water used in the production and preparation of shell eggs.
Limitations/Specifications	The components of the FCS mixture will not exceed 2000 ppm peroxyacetic acid (PAA), 800 ppm hydrogen peroxide (HP), and 96 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in shell egg washes.
National Environmental Policy Act	Environmental Assessment (in PDF, 547 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), dipicolinic acid (CAS Reg. No. 499-83-2), and sodium hydroxide (CAS Reg. No. 1310-73-2).
Manufacturer	Solvay Chemicals, Inc.
Effective Date	Apr 7, 2016
Intended Use	As an antimicrobial agent in: (1) process water applied as a spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40 °F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim and organs; and (2) process water, ice, or brine used for washing, rinsing, or cooling of processed and preformed meat as

	defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34).
Limitations/Specifications	The components of the food-contact substance mixture will not exceed: (1) 2000 ppm peroxyacetic acid, 933 ppm hydrogen peroxide, 120 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) and 0.5 ppm dipicolinic acid in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, scald water for whole or cut poultry carcasses, parts, trim, skin on or off, and organs; and (2) 230 ppm peroxyacetic acid, 107 ppm hydrogen peroxide, 14 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) and 0.1 ppm dipicolinic acid in process water, ice, or brine used for washing, rinsing, or cooling of processed and preformed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34).
National Environmental Policy Act	Environmental Assessment (in PDF, 809 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Xgenex, LLC
Effective Date	Jun 21, 2016
Intended Use	The intended use of the FCS is as an antimicrobial agent for use in: 1) process water or ice used for washing, rinsing, or cooling whole or cut meat, including carcasses, hides, parts, trim, and organs as defined in 21 CFR 170.3 (n)(17)(29); 2) process water applied as a spray, wash, rinse, dip, chiller water, post-main chiller, secondary processing, pre-air chiller dip tanks and post-main water chiller systems as finishing chillers, low-temperature (e.g., less than 40°F) immersion baths, or scald water for poultry carcasses, parts and pieces, and skin on or off

	and organs; 3) process water, ice, or brine used for washing, rinsing, or cooling of processed and pre-formed meat and poultry products as defined in 21 CFR 170.3(n)(17)(18)(29)(34); 4) process water or ice used to commercially prepare fish and seafood; and 5) process water that contacts fruits and vegetables in a food processing facility.
Limitations/Specifications	The components of the FCS mixture will not exceed: 1) 460 ppm peroxyacetic acid, 220 ppm hydrogen peroxide, and 30 ppm HEDP on whole or cut meat (primarily as a spray); 2) 230 ppm peroxyacetic acid, 110 ppm hydrogen peroxide, and 15 ppm HEDP on processed and preformed meat and poultry; 3) 2000 ppm peroxyacetic acid, 950 ppm hydrogen peroxide, and 113 ppm HEDP on whole or cut poultry; 4) 230 ppm peroxyacetic acid, 110 ppm hydrogen peroxide, and 15 ppm HEDP on fish and seafood; 5) 350 ppm peroxyacetic acid, 165 ppm hydrogen peroxide, and 23 ppm HEDP on fruits and vegetables.
National Environmental Policy Act	Environmental Assessment (in PDF, 235 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Apr 15, 2016
Intended Use	As an antimicrobial agent in the production and preparation of fruits and vegetables, fish and seafood, processed and pre-formed meat and poultry, and shell eggs. (See Limitations/Specifications)
Limitations/Specifications	When used as intended, the components of the FCS mixture will not exceed: 350 ppm peroxyacetic acid (PAA), 127 ppm hydrogen peroxide (HP), and 10 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in water for washing or chilling fruits and vegetables in food

	processing facilities; 230 ppm PAA, 84 ppm HP, and 14 ppm HEDP in water or ice used during the commercial preparation of fish and seafood; 495 ppm PAA, 180 ppm HP, and 14 ppm HEDP in water, brine, or ice used for washing, rinsing, storing, or cooling processed and pre-formed meat as defined in 21 CFR 170.3(n)(29);230 ppm PAA, 84 ppm HP, and 14 ppm HEDP in water, brine, or ice used for washing, rinsing, storing, or cooling processed and pre-formed poultry as defined in 21 CFR 170.3(n)(34); and 2000 ppm PAA, 730 ppm HP, and 120 ppm HEDP in water for washing shell eggs.
National Environmental Policy Act	Environmental Assessment (in PDF, 665 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Valley Chemical Solutions
Effective Date	Jan 26, 2016
Intended Use	As an antimicrobial agent in process water used to wash raw and processed fruits and vegetables in food processing facilities.
Limitations/Specifications	The components of the FCS mixture will not exceed 350 ppm peroxyacetic acid, 80 ppm hydrogen peroxide, and 4.7 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 673 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other

	manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Jan 26, 2016
Intended Use	As an antimicrobial agent in the production and preparation of whole or cut meat and poultry (see Limitations/Specifications).
Limitations/Specifications	When used as intended, the components of the food contact substance mixture will not exceed: (1) 2000 ppm peroxyacetic acid (PAA), 730 ppm hydrogen peroxide (HP), and 14 ppm 1-hydroxyethylidine- 1,1-diphosphonic acid (HEDP) in spray, wash, rinse, dip, chiller water, low temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs; and (2) 1800 ppm PAA, 655 ppm HP, and 12 ppm HEDP in process water or ice used for washing, rinsing, or cooling whole or cut meat, including carcasses, parts, trim, and organs.
National Environmental Policy Act	Environmental Assessment (in PDF, 646 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of hydrogen peroxide (HP; CAS Reg. No. 7722-84-1), percitric acid (CAS Reg. No. 127542-88-5), perlactic acid

	(CAS Reg. No. 75033-25-9), citric acid (CAS Reg. No. 77-92-9), and lactic acid (CAS Reg. No. 79-33-4), manufactured and characterized as further described in the notification.
Manufacturer	Mantrose-Haeuser Co., Inc.
Effective Date	Aug 26, 2015
Intended Use	As an antimicrobial in wash water used intermittently or continuously in the processing and/or preparation of whole and cut raw fruits and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed 61 ppm peroxyacids as peroxyacetic acid, 430 ppm HP, in process water for washing fruits and vegetables in food processing facilities.
National Environmental Policy Act	Environmental Assessment (in PDF, 830 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 02809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	BioSafe Systems, LLC
Effective Date	Oct 27, 2015
Intended Use	As an antimicrobial to control microorganisms in process water and ice used in the production and preparation of fruits and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed 350 ppm peroxyacetic acid , 117 ppm hydrogen peroxide, 10 ppm HEDP in process water for washing or chilling fruits and vegetables in food processing facilities

National Environmental Policy Act	Environmental Assessment (in PDF, 574 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4), dipicolinic acid (DPA, CAS Reg. No. 499-83-2) and sulfuric acid (CAS Reg. No. 7664-93-9)
Manufacturer	Evonik Corporation
Effective Date	May 28, 2015
Intended Use	As an antimicrobial agent in process water and ice used in the production and preparation of poultry and processed and pre-formed meat and poultry.
Limitations/Specifications	The components of the FCS mixture will not exceed: (1) 1150 ppm peroxyacetic acid (PAA), 235 ppm hydrogen peroxide (HP), 2.5 ppm HEDP and 0.5 ppm DPA in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs (2) 230 ppm PAA, 50 ppm HP, 0.5 ppm HEDP, and 0.1 ppm DPA in process water, ice, or brine used for washing, rinsing, storing, or cooling of processed and pre-formed meat and poultry.
National Environmental Policy Act	Environmental Assessment (in PDF, 678 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), sulfuric acid (CAS Reg. No. 7664-93-9), and 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4)
Manufacturer	Valley Chemical Solutions
Effective Date	May 21, 2015
Intended Use	As an antimicrobial agent for use in process water and ice used in the production and preparation of poultry including processed and pre-formed poultry.
Limitations/Specifications	The components of the FCS mixture will not exceed (1) 2000 parts per million (ppm) peroxyacetic acid (PAA), 666 ppm hydrogen peroxide (HP), and 130 ppm HEDP in spray, wash, rinse, dip, chiller water, low-temperature immersion baths, scald water or other process water on poultry parts, organs, and carcasses, and (2) 230 ppm PAA, 77 ppm HP, and 14 ppm HEDP in process water, brine, or ice used for washing, rinsing, storing, or cooling processed and pre-formed poultry products.
National Environmental Policy Act	Environmental Assessment (in PDF, 726 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).

Manufacturer	Arkema Inc. and Biosafe Systems
Effective Date	Mar 21, 2015
Intended Use	As an antimicrobial to control microorganisms in process water and ice used in the production and preparation of poultry, shell eggs, meat, processed and pre-formed meat and poultry, fish and seafood, and fruits and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed: (1) 2000 ppm peroxyacetic acid (PAA), 933 ppm hydrogen peroxide (HP), and 120 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, scald water for whole or cut poultry carcasses, parts, trim, skin on or off, and organs, and shell egg washes; (2) 400 ppm PAA, 187 ppm HP, and 24 ppm HEDP in process water or ice used for washing, rinsing, storing, or cooling whole or cut meat, including carcasses, parts, trim, and organs; (3) 230 ppm PAA, 107 ppm HP, and 14 ppm HEDP in process water, ice, or brine used for washing, rinsing, storing, or cooling of processed and pre-formed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34); (4) 230 ppm PAA, 107 ppm HP, and 14 ppm HEDP in process water or ice used during commercial preparation of fish and seafood; and (5) 80 ppm PAA, 37 ppm HP, and 5 ppm HEDP in process water for washing or chilling fruits and vegetables in food processing facilities.
National Environmental Policy Act	Environmental Assessment (in PDF, 3.8 Mb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), sulfuric acid (CAS Reg. No. 7664-93-9), and 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).

Manufacturer	Valley Chemical Solutions
Effective Date	Feb 20, 2015
Intended Use	As an antimicrobial agent for use in process water and ice used in the production and preparation of meat and processed and pre-formed meat.
Limitations/Specifications	The components of the FCS mixture will not exceed: (1) 1800 ppm peroxyacetic acid (PAA), 600 ppm hydrogen peroxide (HP), and 12 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) in process water or ice used for washing, rinsing, or cooling whole or cut meat including carcasses, parts, trim, and organs; (2) 495 ppm PAA, 165 ppm HP, and 6 ppm HEDP in process water, brine, or ice used for washing, rinsing, storing, or cooling processed and pre-formed meat as defined in 21 CFR 170.3(n)(29).
National Environmental Policy Act	Environmental Assessment (in PDF, 791 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4), dipicolinic acid (CAS Reg. No. 499-83-2) and sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Corporation
Effective Date	Jan 6, 2015
Intended Use	As an antimicrobial agent on meat carcasses, parts, trim, and organs.
Limitations/Specifications	The FCS will be used in the process water at a level not to exceed 460 ppm peroxyacetic acid, 100 ppm hydrogen peroxide, 2 ppm HEDP, and 0.5 ppm dipicolinic acid.

National Environmental Policy Act	Environmental Assessment (in PDF, 781 kb)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous solution of hydrogen peroxide (CAS Reg. No. 7722-84-1) containing hydrogen peroxide at levels of up to 50 percent, manufactured and characterized as further described in the notification.
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Oct 30, 2014
Intended Use	As a sterilant/antimicrobial on (1) polymeric food packaging material, used in contact with infant formula and breast milk, and (2) surfaces of aseptic food packaging equipment for infant food-contact applications.
Limitations/Specifications	The concentration of hydrogen peroxide in distilled water packaged under production conditions (assay to be performed immediately after packaging) must not exceed 0.5 parts per million (ppm) when the FCS is used as intended. Permitted uses: The FCS may be used in polymeric packaging material intended for contact with infant formula and breast milk and on the surfaces of aseptic food packaging equipment for infant food contact applications.
National Environmental Policy Act	Environmental Assessment (in PDF, 1.1 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. 02809-21-4).
Manufacturer	CraftChem, Inc.
Effective Date	Oct 22, 2014
Intended Use	As an antimicrobial to control microorganisms in process water and ice used in the production and preparation of fish and seafood, meat, and poultry.
Limitations/Specifications	The components of the FCS mixture will not exceed (1) 2000 parts per million (ppm) peroxyacetic acid (PAA), 750 ppm hydrogen peroxide (HP), and 136 ppm l-hydroxyethylidine-1,1-diphosphonic acid (HEDP) on poultry parts, organs, and carcasses. (2) 400 ppm PAA, 350 ppm HP, and 22.5 ppm HEDP in process water used for washing, rinsing, or cooling whole or cut meat including carcasses, parts, trim, and organs (3) 230 ppm PAA, 165 ppm HP, and 14 ppm HEDP in process water or ice for washing, rinsing, storing or cooling of processed and pre-formed meat and poultry products. (4) 230 ppm PAA, 165 ppm HP, and 14 ppm HEDP in process water used to commercially prepare fish and seafood.
National Environmental Policy Act	Environmental Assessment (in PDF, 703 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous solution of hydrogen peroxide (CAS Reg. No. 7722-84-1) containing hydrogen peroxide at levels of up to 50%, manufactured and characterized as further described in the notification.

Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Jun 27, 2014
Intended Use	As a sterilant/antimicrobial on aseptic polymeric food packaging material and on surfaces of aseptic food packaging equipment, except the FCS is not intended for use on food packaging material and/or aseptic food packaging equipment used with infant formula or breast milk.
Limitations/Specifications	The concentration of hydrogen peroxide in distilled water packaged under production conditions (assay to be performed immediately after packaging) must not exceed 0.5 parts per million (ppm) when the FCS is used as intended. The FCS is not intended for use on food packaging material and/or aseptic food packaging equipment used with infant formula or breast milk.
National Environmental Policy Act	Environmental Assessment (in PDF, 5.2 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0); hydrogen peroxide (CAS Reg. No. 7722-84-1); acetic acid (CAS Reg. No. 64-19-7); 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Mar 20, 2014
Intended Use	As an antimicrobial in process water or ice for washing, rinsing, cooling, or storing of whole or cut meat including carcasses, parts, trim, and organs.
Limitations/Specifications	The components of the food-contact substance mixture will not exceed 400 ppm peroxyacetic acid, 267 ppm hydrogen peroxide, and

	27 ppm 1-hydroxyethylidene-1, 1-diphosphonic acid (HEDP).
National Environmental Policy Act	Environmental Assessment (in PDF, 597 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	A aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Alex C. Fergusson, LLC (AFCO)
Effective Date	Mar 14, 2014
Intended Use	The FCS will be used as an antimicrobial agent in process water and ice used in the production and preparation of poultry, meat, processed and pre-formed meat and poultry, fish and seafood, and fruits and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed: (1) 2000 ppm peroxyacetic acid (PAA), 800 ppm hydrogen peroxide (HP), and 96 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs; (2) 388 ppm PAA, 155 ppm HP, and 19 ppm HEDP in process water or ice used for washing, rinsing, storing, or cooling whole or cut meat, including carcasses, parts, trim, and organs; (3) 230 ppm PAA, 92 ppm HP, and 11 ppm HEDP in process water, ice, or brine used for washing, rinsing, storing, or cooling of processed and pre-formed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34); (4) 230 ppm PAA, 92 ppm HP, and 11 ppm HEDP in process water or ice used during commercial preparation of fish and seafood; and (5) 80 ppm PAA, 32 ppm HP, and 4 ppm HEDP in process water for washing or chilling fruits and vegetables in food processing facilities.

National Environmental Policy Act	Environmental Assessment (in PDF, 606 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), sodium hydroxide (CAS Reg. No. 1310-73-2), and glycerine (CAS Reg. No. 56-81-5).
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Mar 6, 2014
Intended Use	As an antimicrobial agent added to process water or ice used for preparing whole and cut meat and whole or cut poultry products, including hides, parts, trim and organs, and for processing fruits and vegetables.
Limitations/Specifications	The final process water or ice used for washing, rinsing, cooling, or otherwise for processing will not exceed: 1) 400 ppm peroxyacetic acid and 100 ppm hydrogen peroxide for whole or cut meat products, 2) 1000 ppm peroxyacetic acid and 250 ppm hydrogen peroxide for whole or cut poultry products, 3) 2000 ppm peroxyacetic acid and 500 ppm hydrogen peroxide for poultry post-chiller or dip tanks prior to air chillers, and 4) 350 ppm peroxyacetic acid and 87.5 ppm hydrogen peroxide for fruits and vegetables.
National Environmental Policy Act	Environmental Assessment (in PDF, 653 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous solution of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Mar 1, 2014
Intended Use	As an antimicrobial agent to treat process water or ice as a spray, wash, rinse, dip, chiller water, or scald water for whole or cut poultry including parts, trim, and organs.
Limitations/Specifications	Not to exceed use concentrations of 2000 ppm peroxyacetic acid (PAA), 728 ppm hydrogen peroxide, and 13.3 ppm of HEDP for poultry.
National Environmental Policy Act	Environmental Assessment (in PDF, 3.43 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4).
Manufacturer	CraftChem, Inc.
Effective Date	Feb 25, 2014
Intended Use	As an antimicrobial additive in water or ice used for: 1) washing, rinsing, cooling or processing whole or cut meat including parts, trim or organs, and 2) application to whole or cut poultry, including parts,

	trim and organs as a spray wash, rinse dip and in chiller water or scald water.
Limitations/Specifications	Final use concentrations for meat and poultry are limited to 220 ppm peroxyacetic acid, 80 ppm hydrogen peroxide, and 13 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 257 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), glycerol (CAS Reg. No. 56-81-5), and optionally acetic acid (CAS Reg. No. 64-19-7) or sulfuric acid (CAS Reg. No. 7664-93-9).
Effective Date	Feb 25, 2014
Intended Use	As an antimicrobial agent on meat, poultry, fish and seafood, and fruits and vegetables that are not raw agricultural commodities.
Limitations/Specifications	The FCS will be added to process water or ice applied to (1) meat carcasses, parts, trim, and organs at a level not to exceed 400 ppm peroxyacetic acid and 280 ppm hydrogen peroxide; (2) poultry parts, organs, and carcasses at a level not to exceed 1000 ppm peroxyacetic acid and 700 ppm hydrogen peroxide; (3) fish and seafood at a level not to exceed 190 ppm peroxyacetic acid and 140 ppm hydrogen peroxide; (4) fruits and vegetables that are not raw agricultural commodities at a level not to exceed 80 ppm peroxyacetic acid and 60 ppm hydrogen peroxide.
National Environmental Policy Act	Environmental Assessment (in PDF, 9.43 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other

	manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous solution of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4).
Manufacturer	Mason Chemical Company
Effective Date	Oct 19, 2013
Intended Use	As an antimicrobial agent to treat the process water or ice for washing, rinsing, storing, or cooling of fish, seafood, meat, and poultry products.
Limitations/Specifications	Not to exceed 220 ppm peroxyacetic acid (PAA), 82 ppm hydrogen peroxide, and 12.3 ppm of HEDP for meat and poultry; or 179 ppm PAA, 75 ppm hydrogen peroxide, and 10 ppm HEDP for fish and seafood.
National Environmental Policy Act	Environmental Assessment (in PDF, 239 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), water, and optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Diversey, Inc. and Cryovac, Inc.

Effective Date	Sep 10, 2013
Intended Use	As an antimicrobial agent for use in: 1) process water or ice used for washing, rinsing, storing, or cooling whole or cut meat, including carcasses, parts, trim, and organs; 2) process water, ice, or brine used for washing, rinsing, storing, or cooling of processed and pre-formed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34); 3) process water applied as a spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for poultry carcasses, parts, and organs; 4) process water or ice used to commercially prepare fish and seafood; and 5) process water that contacts fruits and vegetables in a food processing facility.
Limitations/Specifications	In whole or cut meat (primarily as a spray), the components of the FCS mixture will not exceed 400 ppm peroxyacetic acid, 280 ppm hydrogen peroxide, and 20 ppm HEDP. In processed and preformed meat and poultry, the components of the FCS mixture will not exceed 230 ppm peroxyacetic acid, 280 ppm hydrogen peroxide, and 14 ppm HEDP. In whole or cut poultry, the components of the FCS mixture will not exceed 2000 ppm peroxyacetic acid and 136 ppm HEDP. In fish and seafood, the components of the FCS mixture will not exceed 230 ppm peroxyacetic acid, 280 ppm hydrogen peroxide, and 14 ppm HEDP. In fruits and vegetables, the components of the FCS mixture will not exceed 80 ppm peroxyacetic acid, 120 ppm hydrogen peroxide, and 10 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 733 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7) and l-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4).

Manufacturer	Valley Chemical Solutions
Effective Date	May 31, 2013
Intended Use	As an antimicrobial to control microorganisms in process water and ice used in the production and preparation of fish and seafood, meat, and poultry.
Limitations/Specifications	The components of the FCS mixture will not exceed (1) 2000 parts per million (ppm) peroxyacetic acid (PAA), 750 ppm hydrogen peroxide (HP), and 136 ppm l-hydroxyethylidine-1,1-diphosphonic acid (HEDP) in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water on poultry parts, organs, and carcasses. (2) 400 ppm PAA, 350 ppm HP, and 22.5 ppm HEDP in process water used for washing, rinsing, or cooling whole or cut meat including carcasses, parts, trim, and organs (3) 230 ppm PAA, 165 ppm HP, and 14 ppm HEDP in process water or ice for washing, rinsing, storing or cooling of processed and pre-formed meat and poultry products. (4) 230 ppm PAA, 165 ppm HP, and 14 ppm HEDP in process water used to commercially prepare fish and seafood.
National Environmental Policy Act	Environmental Assessment (in PDF, 170 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	A mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid, (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and water. REPLACES FCN 1081 and FCN 1082
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Mar 20, 2012
Intended Use	As an antimicrobial to control microorganisms in (1) process water used to commercially prepare fish and seafood, and (2) process water or ice for washing, rinsing, storing or cooling of processed and pre-

	formed meat and poultry products.
Limitations/Specifications	In either application, the components of the FCS mixture will not exceed 230 parts per million (ppm) peroxyacetic acid, 165 ppm hydrogen peroxide, and 14 ppm 1-hydroxyethylidine-1,1-diphosphonic acid. For intended use (2), the FCS mixture is limited to contact with processed and pre-formed meat and poultry products as described in 21 CFR 170.3(n)(29) and (34).
National Environmental Policy Act	Environmental Assessment (in PDF, 2.00 MB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), sulfuric acid (CAS Reg. No. 7664-93-9, optional ingredient), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4).
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Feb 10, 2012
Intended Use	As an antimicrobial agent for use in process water used for washing, rinsing, or cooling whole or cut meat or poultry including carcasses, parts, trim, and organs.
Limitations/Specifications	The final process water will not exceed: For poultry: 1000 ppm peroxyacetic acid, 385 ppm hydrogen peroxide, and 50 ppm HEDP. For meat (primarily as a spray): 400 ppm peroxyacetic acid, 155 ppm hydrogen peroxide, and 20 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 69 kB)
FDA Decision	Finding of No Significant Impact (FONSI)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4), dipicolinic acid (DPA, CAS Reg. No. 499-83-2) and sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Degussa Corporation
Effective Date	Aug 11, 2011
Intended Use	As an antimicrobial agent on meat carcasses, parts, trim, and organs.
Limitations/Specifications	The FCS will be used in accordance with current industry practice where the maximum concentration of peroxyacetic acid is 230 ppm, the maximum concentration of hydrogen peroxide is 75 ppm, the maximum concentration of HEDP is 1 ppm, and the maximum concentration of dipicolinic acid is 0.5 ppm.
National Environmental Policy Act	Environmental Assessment (in PDF, 181 kB)
FDA Decision	Finding of No Significant Impact (FONSI)/EA Supplement
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and water (CAS Reg. No. 7732-18-5).

Manufacturer	Alex C. Fergusson, LLC (AFCO)
Effective Date	Jul 29, 2011
Intended Use	As an antimicrobial agent for meat and poultry carcasses.
Limitations/Specifications	The FCS will be added to: 1) process water used for washing, rinsing, cooling or otherwise for processing meat carcasses, parts, trim, and organs; and 2) process water applied to poultry parts, organs, and carcasses as a spray, wash, rinse, dip, chiller water, or scald water. In either application, the level of the components of the FCS in the process water will not exceed 220 ppm for peroxyacetic acid, 160 ppm for hydrogen peroxide, and 11 ppm for 1-hydroxyethylidene-1,1-diphosphonic acid.
National Environmental Policy Act	Environmental Assessment (in PDF, 89 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4).
Manufacturer	Brainerd Chemical Company, Inc.
Effective Date	Sep 2, 2010
Intended Use	As an antimicrobial additive in: (1) water or ice for washing, rinsing, cooling or processing whole or cut meat including parts, trim, and organs; and, (2) water or ice applied to whole or cut poultry, including parts, trim, and organs as a spray, wash, rinse, dip, chiller water, or scald water.
Limitations/Specifications	The FCS will be used in accordance with current industry practice where the maximum concentration of peroxyacetic acid is 220 ppm, the maximum concentration of hydrogen peroxide is 80 ppm, and the

	maximum concentration of HEDP is 1.5 ppm.
National Environmental Policy Act	Environmental Assessment (in PDF, 520 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP, CAS Reg. No. 2809-21-4), and sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Degussa Corp.
Effective Date	Mar 16, 2010
Intended Use	As an antimicrobial agent on meat carcasses, parts, trim, and organs.
Limitations/Specifications	The FCS will be used in accordance with current industry practice where the maximum concentration of peroxyacetic acid is 230 ppm, the maximum concentration of hydrogen peroxide is 75 ppm, and the maximum concentration of HEDP is 13 ppm.
National Environmental Policy Act	Environmental Assessment (in PDF, 724 kB)
FDA Decision	Finding of No Significant Impact (FONSI)/EA Supplement
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No 64-19-7), sulfuric acid (CAS Reg. No. 7664-93-9), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).
Manufacturer	Enviro Tech Chemical Services
Effective Date	Sep 24, 2009
Intended Use	The FCS will be used as an antimicrobial additive in process water, ice, or brine for washing, rinsing, storing or cooling of processed and pre-formed meat and poultry products.
Limitations/Specifications	1) The composition of the food-contact substance mixture will not exceed 220 parts per million peroxyacetic acid, 85 parts per million hydrogen peroxide, and 11 parts per million 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP). 2) The solution is limited to contact with processed and pre-formed meat and poultry products as described in 21 CFR 170.3 (n)(29) and (34).
National Environmental Policy Act	Environmental Assessment (in PDF, 752 kB)
FDA Decision	Finding of No Significant Impact (FONSI)/EA Supplement
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Jun 18, 2009
Intended Use	The FCS will be used as an antimicrobial additive in: (1) water or ice for washing, rinsing, cooling or otherwise processing whole or cut meat, including parts, trim, and organs; and, (2) water or ice applied to

	whole or cut poultry, including parts, trim, and organs as a spray, wash, rinse, dip, chiller water or scald water.
Limitations/Specifications	Not to exceed 220 parts per million peroxyacetic acid, 85 parts per million hydrogen peroxide, and 11 parts per million 1-hydroxyethylidine-1,1-diphosphonic acid.
National Environmental Policy Act	Environmental Assessment (in PDF, 685 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and water.
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	May 21, 2009
Intended Use	As an antimicrobial agent for poultry carcasses.
Limitations/Specifications	The FCS may be added to process applied to poultry parts, organs, and carcasses as a spray, wash, rinse, dip, chiller water, low-temperature (e.g., less then 40°F) immersion baths, or scald water, at a level not to exceed 2000 ppm peroxyacetic acid and 136 ppm 1-hydroxyethylidene-1,1-diphosphonic acid.
National Environmental Policy Act	Environmental Assessment (in PDF, 1.04 MB)
FDA Decision	Finding of No Significant Impact (FONSI)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No.7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	May 15, 2009
Intended Use	As an antimicrobial additive to liquid, pasteurized whey used in the production of whey protein concentrate.
Limitations/Specifications	Not to exceed 15 parts per million of peroxyacetic acid, and 67 parts per million of hydrogen peroxide in the whey solution.
National Environmental Policy Act	Environmental Assessment (in PDF, 428 kB)
FDA Decision	Finding of No Significant Impact (FONSI)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	Peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and water.
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Sep 12, 2007

Intended Use	The FCS will be used as a part of the process to treat food-contact surfaces of polymeric food packaging to attain commercial sterility at least equivalent to that attainable by thermal processing for metal containers as provided for by 21 CFR Part 113, and as an antimicrobial on all polymers used to package acidic foods.
Limitations/Specifications	The maximum concentration of 1-hydroxyethylidine-1,1-diphosphonic acid in the food-contact substance solution will not exceed one percent of the solution. After application of the solution to the food packaging, the solution is rinsed from the package surface with sterile water. If the packaging surface is a film, the solution may be mechanically stripped in accordance with good manufacturing practice rather than rinsed from the food-contact surface. If the excess solution is to be mechanically stripped rather than rinsed, the concentration of the food-contact substance in the treatment bath must be reduced at least 37.5 fold (i.e. from 15 percent to 4,000 parts per million or less peroxyacetic acid), maintained at that dilution during operations, and drained and recharged with fresh solution when the total volume of the food-contact substance added as makeup reaches 90% of the volume of the solution bath reservoir.
National Environmental Policy Act	Environmental Assessment (in PDF, 482 kB)
FDA Decision	Finding of No Significant Impact (FONSI)/EA Supplement
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and water.
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Feb 22, 2006
Intended Use	The FCS will be used as a part of the process to treat food-contact surfaces to attain commercial sterility at least equivalent to that attainable by thermal processing for metal containers as provided for

	in 21 CFR Part 113.
Limitations/Specifications	After application of the mixture (solution) to the food contact surfaces of the food packaging, the surface is rinsed with sterile water. The maximum concentration of HEDP in the treatment solution will not exceed 1 percent. Processed foods packaged in materials treated with the FCS shall conform with 21 CFR Parts 108, 110, 113, and 114, as applicable.
National Environmental Policy Act	Environmental Assessment (in PDF, 433 kB)
FDA Decision	Finding of No Significant Impact (FONSI)/EA Supplement
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and water.
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	May 27, 2003
Intended Use	The FCS will be used as an antimicrobial agent for meat and poultry carcasses.
Limitations/Specifications	The FCS will be added to (1) process water used for washing, rinsing, cooling or otherwise for processing meat carcasses, parts, trim, and organs; and (2) process water applied to poultry parts, organs, and carcasses as a spray, wash, rinse, dip, chiller water, or scald water. In either application, the level of peroxyacetic acid will not exceed 230 ppm, hydrogen peroxide will not exceed 165 ppm, and HEDP will not exceed 14.0 ppm.
National Environmental Policy Act	Environmental Assessment (in PDF, 624 kB)
FDA Decision	Finding of No Significant Impact (FONSI)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethane 1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Xgenex, LLC
Effective Date	Dec 6, 2018
Intended Use	As an antimicrobial agent in process water and ice used in the production, processing, and preparation of meat.
Limitations/Specifications	The components of the FCS mixture will not exceed 2000 ppm PAA, 950 ppm HP, and 57 ppm HEDP in process water and ice that contacts whole or cut meat carcasses, parts, trim, and organs.
National Environmental Policy Act	Environmental Assessment (in PDF, 418 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 153 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No.79-21-0), hydrogen peroxide (HP) (CAS Reg. No.7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid

	(CAS Reg. No. 7664-93-9). REPLACES FCN 1595
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Mar 29, 2019
Intended Use	As an antimicrobial agent in process water or ice for washing, rinsing, chilling or processing fruits and vegetables in a food processing facility (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS mixture will not exceed 500 ppm PAA, 338 ppm HP and 34 ppm HEDP.
National Environmental Policy Act	Environmental Assessment (in PDF, 598 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 141 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), and, optionally, sulfuric acid (SA) (CAS Reg. No. 7664-93-9).
Manufacturer	Hydrite Chemical Co.
Effective Date	Oct 30, 2019
Intended Use	As an antimicrobial agent for use as a spray on seeds for sprouting and on edible seeds and nuts.

Limitations/Specifications	The components of the FCS application mixture will not exceed 229 parts-per-million (ppm) PAA and 1067 ppm HP on treated seeds and nuts. The FCS will be applied in the preparing, packing, or holding of the food for commercial purposes, consistent with the Federal Food, Drug, and Cosmetic Act (FD&C Act) section 201(q)(1)(B)(i). The treated edible seeds can be consumed directly or further processed into flour, protein, or oil. The treated edible nuts are intended to be consumed as nuts. The treated seeds for sprouting are intended to be consumed as sprouts.
National Environmental Policy Act	Environmental Assessment (in PDF, 502 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 117 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), sulfuric acid (SA) (CAS reg. No. 7664-93-9), and 1-hydroxyethylidine-1,1- diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).
Manufacturer	DeLaval Inc.
Effective Date	Oct 23, 2019
Intended Use	The FCS will be used as an antimicrobial agent for the commercial sterilization of aseptic, polymeric food packaging prior to filling, except for use of food packaging used in contact with infant formula or human milk. (see Limitations/Specifications).
Limitations/Specifications	The FCS may be applied as a spray only in the following applications:The FCS may be applied to polymeric bottles and closures without a rinse prior to filling with food and on the exterior of sealed polymeric food packaging without a rinse. The maximum at-use concentration of PAA, HP, and HEDP may not exceed 508 ppm, 2700 ppm, and 61 ppm, respectively.The FCS may be applied to polymeric containers and closures, drained, and the interior rinsed with potable water. The maximum at-use concentration of PAA, HP, and HEDP may

	not exceed 2030 ppm, 10,802 ppm, and 244 ppm, respectively.The FCS is not intended to be used on food packaging used in contact with infant formula and human milk. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 224 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 135 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxylactic acid (PLA) (CAS Reg. No. 75033-25-9), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), lactic acid (LA) (CAS Reg. No. 50-21-5), optionally 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9), optionally dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally phosphoric acid (PA) (CAS Reg. No. 7664-38-2).
Manufacturer	Valley Chemical Solutions
Effective Date	Oct 30, 2019
Intended Use	As an antimicrobial agent in process water, brine, or ice in the processing of meat and poultry.
Limitations/Specifications	Components of the FCS mixture will not exceed:1000 parts per million (ppm) PLA, 2480 ppm HP, 5.7 ppm HEDP, and 1.64 ppm DPA in process water or ice that contacts meat or poultry carcasses, parts, trim, and organs.268 ppm PLA, 665 ppm HP, 1.53 ppm HEDP, and 0.44 ppm DPA in process water, ice, or brine that contacts processed and pre-formed meat and poultry.
National Environmental Policy Act	Environmental Assessment (in PDF, 259 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 137 kB)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally dipicolinic acid (DPA) (CAS Reg. No. 499-83-2) and/or sodium hydroxide (NaOH) (CAS Reg. No. 1310-73-2). REPLACES FCN 1426
Manufacturer	Solvay Chemicals, Inc.
Effective Date	Mar 31, 2020
Intended Use	As an antimicrobial agent in process water and ice used for washing or chilling fruits and vegetables.
Limitations/Specifications	The components of the FCS mixture will not exceed levels of 600 ppm PAA, 1112 ppm HP, 934 ppm AA, 34 ppm HEDP, and 0.68 ppm DPA.
National Environmental Policy Act	Environmental Assessment (in PDF, 319 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 142 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (CAS Reg.

	No. 7664-93-9). REPLACES FCN 1639
Manufacturer	Biosan LLC
Effective Date	Apr 2, 2020
Intended Use	As an antimicrobial agent used:in process water, ice or brine used in washing, rinsing, scalding, or cooling whole or cut meat and poultry carcasses, parts, trim, and organs.in process water, ice, or brine used in washing, rinsing, or cooling processed and preformed meat and poultry products.in process water or ice for washing, rinsing, chilling or processing fruits and vegetables in food processing facilities.in process water and ice used to commercially prepare fish and seafood.in brines, sauces, and marinades applied either on the surface or injected into processed or unprocessed, cooked, or uncooked, whole or cut poultry parts or pieces.in surface sauces and in marinades applied on processed and preformed meat and poultry products.alone or in combination with other processes in the commercial sterilization of aseptic filling systems and glass and plastic food packaging and their enclosures prior to filling, except for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS will not exceed:2000 ppm PAA, 1474 ppm HP, 121.5 ppm HEDP, and 1.64 ppm DPA in process water, ice, or brine used in washing, rinsing, scalding, or cooling whole or cut meat carcasses, parts, trim, and organs.2000 ppm PAA, 1474 ppm, HP, 136 ppm HEDP, and 4 ppm DPA in process water, ice, or brine used in washing, rinsing, scalding, or cooling whole or cut poultry carcasses, parts, trim, and organs.495 ppm PAA, 365 ppm HP, 33.5 ppm HEDP, and 0.44 ppm DPA in process water, ice, or brine used in washing, rinsing, or cooling processed and pre-formed meat products.495 ppm PAA, 365 ppm HP, 29 ppm HEDP, and 0.44 ppm DPA in process water, ice, or brine used in washing, rinsing, or cooling processed and pre-formed poultry products.500 ppm PAA, 1000 ppm HP, 34 ppm HEDP, and 0.68 ppm DPA in process water or ice used in washing, rinsing, chilling or processing fruits and vegetables in food processing facilities.230 ppm PAA, 280 ppm HP, 15 ppm HEDP, and 0.38 ppm DPA in process water and ice used to commercially prepare fish and seafood.50 ppm PAA, 33 pm HP, 8 ppm HEDP, and 0.1 ppm DPA in brines, sauces, and marinades applied either on the surface or injected into processed or unprocessed, cooked, or uncooked, whole or cut poultry parts or pieces.50 ppm PAA, 33 pm HP, 8 ppm HEDP, and 0.1 ppm DPA in surface sauces and in marinades applied on processed and preformed meat and poultry products.4500 ppm PAA, 6600 ppm HP, 180 ppm HEDP, and 9 ppm DPA when applied to aseptic filling systems and glass and plastic food packaging and their

	enclosures prior to filling. If the FCS mixture is applied at a rate exceeding 0.0175 milliliters treatment solution per ounce container capacity, the FCS mixture must be drained from the container and rinsed with sterile water and drained again. FDAs review of the use of the FCS to sterilize aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials. The FCS is not for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 554 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 133 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and/or dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9). REPLACES FCNs 1968, 1745, 1495, 1236, 1096, 921 and 140
Manufacturer	Ecolab Inc.
Effective Date	Jul 21, 2020
Intended Use	As an antimicrobial agent used in:process water, ice, or brine used in the production, processing, and preparation of poultry, meat, processed and pre-formed meat and poultry, fruits, vegetables, fish, seafood, shell eggs, and hard-boiled,peeled eggs.brines, marinades, and sauces applied on the surface or injected into processed or unprocessed, cooked or uncooked, whole or cut, meat and poultry.surface sauces and marinades applied on processed and pre-formed meat and poultry products.the commercial sterilization of aseptic filling systems and food packaging prior to filling, except for

	use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS will not exceed:2000 ppm PAA, 1474 ppm HP, 136 ppm HEDP, and 6.7 ppm DPA in process water, ice, or brine applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut poultry, including carcasses, parts, trim, and organs.495 ppm PAA, 1180 ppm HP, 29 ppm HEDP, and 0.44 ppm DPA in process water, ice, or brine for washing, rinsing, or cooling processed and pre-formed poultry.2000 ppm PAA, 1474 ppm HP, 121.5 ppm HEDP, and 6.7 ppm DPA in process water, ice, or brine applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut meat, including carcasses, parts, trim, and organs.495 ppm PAA, 1180 ppm HP, 33.5 ppm HEDP, and 0.44 ppm DPA in process water, ice, or brine for washing, rinsing, or cooling processed and pre-formed meat.500 ppm PAA, 1000 ppm HP, 34 ppm HEDP, and 2 ppm DPA in process water or ice used for washing, rinsing, chilling, or processing fruits and vegetables in food processing facilities.230 ppm PAA, 280 ppm HP, 15 ppm HEDP, and 0.8 ppm DPA in process water, ice, or brine used during commercial preparation of fish and seafood in food processing facilities.2000 ppm PAA, 947 ppm HP, 120 ppm HEDP, and 6.7 ppm DPA in wash water for shell eggs in food processing facilities.2000 ppm PAA, 1447 ppm HP, 85 ppm HEDP, and 6.7 ppm DPA in spray, wash, dip, rinse, mist, or chiller water of hard-boiled, peeled eggs.50 ppm PAA, 33 ppm HP, 8 ppm HEDP, and 0.1 ppm DPA in brines, marinades, and sauces applied to the surface or injected into processed or unprocessed, cooked or uncooked, whole or cut, meat and poultry.50 ppm PAA, 33 ppm HP, 8 ppm HEDP, and 0.1 ppm DPA in surface sauces and marinades applied on processed and pre-formed meat and poultry products.4500 ppm PAA, 6600 ppm HP, 600 ppm HEDP, and 9 ppm DPA in the commercial sterilization of aseptic filling systems and food packaging prior to filling. The surfaces of food packaging will be drained, rinsed, and drained again following application of the FCS mixture. FDAs review of the use of the FCS in aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials. The FCS is not for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 873 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 158 kB)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), sulfuric acid (SA) (CAS Reg. No. 7664-93-9), and 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4).
Manufacturer	Agri-Neo Inc.
Effective Date	Aug 6, 2020
Intended Use	As an antimicrobial agent applied during the tempering and before milling of grains of wheat, corn, and rice.
Limitations/Specifications	The components of the FCS on grains will not exceed 114 ppm PAA, 1,704 ppm HP, 193 ppm AA, 25 ppm SA, and 12.5 ppm HEDP. The FCS is applied in the preparing, packing, or holding of the food for commercial purposes, consistent with the Federal Food, Drug, and Cosmetic Act (FD&C Act) section 201(q)(1)(B)(i).
National Environmental Policy Act	Environmental Assessment (in PDF, 752 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 151 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous solution of hydrogen peroxide (CAS Reg. No. 7722-84-1) stabilized with 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP)

	(CAS Reg. No. 2809-21-4). REPLACES FCN 2029
Manufacturer	Agri-Neo Inc.
Effective Date	Jan 21, 2021
Intended Use	As an antimicrobial agent for use as a spray on seeds for sprouting (alfalfa, clover, broccoli, flax, and chia), edible seeds (chia, flax, hemp, millet hulled, pumpkin, sesame, sunflower kernel, and quinoa), nuts (almond, cashew, walnut, brazil nuts, hazelnuts, macadamia and pecans), and all spices.
Limitations/Specifications	The FCS will be applied in the preparing, packing, or holding of the food for commercial purposes, consistent with the FD&C Act section 201(q)(1)(B)(i), at a level not to exceed 7.9 g hydrogen peroxide per kg of seeds, nuts, or spices. The concentration of HEDP in the FCS will not exceed 60 ppm. The treated edible seeds may be consumed directly or further processed into flour, protein, or oil. The treated edible nuts are intended to be consumed as nuts. The treated seeds for sprouting are intended to be consumed as sprouts. The treated spices may be consumed directly.
National Environmental Policy Act	Environmental Assessment (in PDF, 287 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 112 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), sulfuric acid (CAS Reg. No. 7664-93-9), and 1-hydroxyethylidine-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4). REPLACES FCN 2000
Manufacturer	Agri-Neo Inc.
Effective Date	Jan 6, 2021

Intended Use	As an antimicrobial agent for use as a spray on seeds for sprouting (alfalfa, clover, broccoli, flax, and chia), edible seeds (chia, flax, hemp, millet hulled, pumpkin, sesame, sunflower kernel, and quinoa), nuts (almond, cashew, walnut, brazil nuts, hazelnuts, macadamia and pecans), and all spices, except for use in contact with infant formula and human milk (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS on seeds, nuts, or spices will not exceed 229 parts per million (ppm) peroxyacetic acid, 1043 ppm hydrogen peroxide, 388 ppm acetic acid, 48 ppm sulfuric acid, and 25 ppm HEDP. The FCS will be applied in the preparing, packing, or holding of the food for commercial purposes, consistent with the FD&C Act section 201(q)(1)(B)(i). The treated edible seeds may be consumed directly or further processed into flour, protein, or oil. The treated edible nuts are intended to be consumed as nuts. The treated seeds for sprouting are intended to be consumed as sprouts. The treated spices may be consumed directly. The FCS is not for use in contact with infant formula and human milk. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 413 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 190 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9). REPLACES FCN 2060
Manufacturer	Alex. C Fergusson, LLC (AFCO)
Effective Date	Jan 1, 2021

Intended Use	As an antimicrobial agent in process water or ice used for washing, rinsing, chilling or processing fruits and vegetables in food processing facilities.
Limitations/Specifications	The components of the FCS mixture in process water or ice will not exceed: 500 ppm peroxyacetic acid (PAA), 208 ppm hydrogen peroxide (HP), and 24 ppm 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP).
National Environmental Policy Act	Environmental Assessment (in PDF, 378 kB)
FDA Decision	Finding of No Significant Impact (FONSI) and EA Revision Sheet (in PDF, 199 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and/or dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9). REPLACES FCN 2059
Manufacturer	Hydrite Chemical Co.
Effective Date	Dec 26, 2020
Intended Use	As an antimicrobial agent used in the commercial sterilization of aseptic filling systems and glass and plastic food packaging and their closures prior to filling, except for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS will not exceed 4500 ppm PAA, 6600 ppm HP, 240 ppm HEDP, and 9 ppm DPA in the commercial sterilization of aseptic filling systems and food packaging and their closures prior to filling. The surfaces of food packaging and their closures will be drained, rinsed, and drained again following application of the FCS

	mixture. FDAs review of the use of the FCS in aseptic filling systems is limited to the extent that the FCS residues may transfer from the non-food contact surfaces of the aseptic filling system to food packaging materials. The FCS is not for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 216 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 134 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), and 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4).
Manufacturer	Diversey, Inc.
Effective Date	Feb 20, 2021
Intended Use	As an antimicrobial agent in process water or ice for washing, rinsing, chilling, or processing fruits and vegetables in food processing facilities.
Limitations/Specifications	The components of the FCS mixture in process water or ice will not exceed: 350 parts per million (ppm) peroxyacetic acid (PAA), 630 ppm hydrogen peroxide (HP), and 16 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP).
National Environmental Policy Act	Environmental Assessment (in PDF, 780 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 182 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other

	manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous solution of hydrogen peroxide (CAS Reg. No. 7722-84-1).
Manufacturer	Cargill, Inc.
Effective Date	Oct 8, 2021
Intended Use	As a processing aid in the manufacture of corn protein, except for use in contact with infant formula (see Limitations/Specifications)
Limitations/Specifications	Hydrogen peroxide concentration will not exceed 2% when applied to insoluble corn protein. The FCS is not intended for use in contact with infant formula. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 173 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 206 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Dec 23, 2021

Intended Use	As an antimicrobial agent used in the production, processing, and preparation of poultry, and processed and pre-formed poultry.
Limitations/Specifications	The components of the FCS will not exceed:2000 ppm PAA, 1333 ppm HP, 120 ppm HEDP, and 2.7 ppm DPA in process water, ice, or brine applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut poultry, including carcasses, parts, trim, and organs.230 ppm PAA, 153 ppm HP, 14 ppm HEDP, and 0.3 ppm DPA in process water, ice, or brine for washing, rinsing, or cooling processed and pre-formed poultry.
National Environmental Policy Act	Environmental Assessment (in PDF, 195 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 139 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and/or dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Hydrite Chemical Co.
Effective Date	Apr 6, 2022
Intended Use	As an antimicrobial agent used alone or in combination with other processes in the commercial sterilization of aseptic filling systems and glass and plastic food packaging and their closures prior to filling, except for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging (see Limitations/Specifications).
Limitations/Specifications	The components of the FCS will not exceed 4500 ppm PAA, 6600 ppm HP, 240 ppm HEDP, and 9 ppm DPA when used in the commercial sterilization of aseptic filling systems and glass and plastic food

	packaging and their closures prior to filling. If the FCS mixture is applied at a rate exceeding 0.0175 milliliters treatment solution per ounce container capacity, the FCS mixture must be drained from the container and rinsed with sterile water and drained again. The FCS is not for use on food packaging used in contact with infant formula or human milk or on aseptic filling equipment used to fill such packaging. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 943 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 222 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture containing peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (CAS Reg. No. 2809-21-4), and, optionally, sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	AFCO
Effective Date	Jun 28, 2022
Intended Use	The FCS will be used as an antimicrobial agent in spray, wash, dip, rinse, mist, or chiller water, used in the processing of hard-boiled, peeled eggs.
Limitations/Specifications	The components of the FCS mixture will not exceed 2000 ppm peroxyacetic acid (PAA), 1447 ppm hydrogen peroxide (HP), and 85 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) in spray, wash, dip, rinse, mist, or chiller water, used in the processing of hard boiled, peeled eggs.
National Environmental Policy Act	Environmental Assessment (in PDF, 1.2 MB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 248 kB)

Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxycitric acid (PCA) (CAS Reg. No. 127542-89-6), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), citric acid (CAS Reg. No. 77-92-9), lactic acid (CAS Reg. No. 50-21-5), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally sulfuric acid (CAS Reg. No. 7664-93-9).
Manufacturer	Evonik Active Oxygens, LLC
Effective Date	Sep 28, 2022
Intended Use	As an antimicrobial agent used in process water, ice, or brine used in the production, processing, and preparation of poultry, meat, processed and pre-formed meat and poultry, fruits, vegetables, fish, and seafood.
Limitations/Specifications	The components of the FCS will not exceed:2000 ppm PCA, 2480 ppm HP, and 136 ppm HEDP in process water, ice, or brine applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut poultry, including carcasses, parts, trim, and organs.495 ppm PCA, 1180 ppm HP, and 29 ppm HEDP in process water, ice, or brine for washing, rinsing, or cooling processed and pre-formed poultry.2000 ppm PCA, 2480 ppm HP, and 121.5 ppm HEDP in process water, ice, or brine applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut meat, including carcasses, parts, trim, and organs.495 ppm PCA, 1180 ppm HP, and 33.5 ppm HEDP in process water, ice, or brine for washing, rinsing, or cooling processed and pre-formed meat.600 ppm PCA, 1112 ppm HP, and 34 ppm HEDP in process water or ice used for washing, rinsing, chilling, or processing fruits and vegetables in food processing facilities.230 ppm PCA, 280 ppm HP, and 15 ppm HEDP in process water, ice, or brine used during commercial preparation of fish and seafood in food processing facilities.
National Environmental Policy Act	Environmental Assessment (in PDF, 1 MB)

FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 214 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), optionally, sulfuric acid (CAS Reg. No. 7664-93-9), and optionally, 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4) and/or optionally dipicolinic acid (DPA) (CAS Reg. No. 499-83-2). REPLACES FCNS 1872, 1897, and 2070
Manufacturer	Hydrite Chemical Co.
Effective Date	Apr 7, 2023
Intended Use	As an antimicrobial agent in process water, ice, and brine used in the production and preparation of meat, poultry, processed and pre-formed meat and poultry products, fruits, vegetables, fish, seafood, in sauces and marinades used in the production and preparation of poultry and processed and pre-formed meat and poultry products; shell eggs; hard-boiled eggs; and, during the tempering and before the milling of grains of wheat, corn, and rice, except for use in contact with infant formula or human milk (See Limitations/Specifications).
Limitations/Specifications	The components of the FCS will not exceed:1800 ppm PAA, 1203 ppm HP, 60 ppm HEDP, and 1.64 ppm DPA in process water and ice used to spray, wash, rinse, or dip meat carcasses, parts, trim, and organs, and in chiller water for meat carcasses, parts, trim, and organs;2000 ppm PAA, 1474 ppm HP, 100 ppm HEDP, and 2.01 ppm DPA in process water and ice used to spray, wash, rinse, or dip poultry carcasses, parts, trim, and organs, and in chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for poultry carcasses, parts, trim and organs;495 ppm PAA, 367 ppm HP, 23 ppm HEDP, and 0.50 ppm DPA in water, brine, or ice for washing, rinsing, or cooling processed and pre-formed meat products;230 ppm PAA, 323 ppm HP, 12 ppm HEDP, and 0.44 ppm DPA in water, brine, or ice for washing, rinsing, or cooling processed and pre-formed poultry products;600 ppm PAA, 880 ppm HP, 32 ppm HEDP, and 1.20 ppm DPA in water or

	ice used for washing or chilling fruits and vegetables in a food processing facility;230 ppm PAA, 280 ppm HP, 12 ppm HEDP, and 0.38 ppm DPA in process water or ice used to commercially prepare fish and seafood;50 ppm PAA, 33 ppm HP, 2 ppm HEDP, and 0.05 ppm DPA in brines, sauces and marinades applied on the surface or injected into processed or unprocessed, cooked or uncooked, whole or cut poultry parts and pieces; and surface sauces and marinades applied on processed and pre-formed meat and poultry products;2000 ppm PAA, 947 ppm HP, 60 ppm HEDP, and 1.29 ppm DPA in water for washing shell eggs;987 ppm PAA, 1447 ppm HP, 53 ppm HEDP, and 1.97 ppm DPA in spray, wash, dip, rinse, mist, or chiller water for hard boiled, peeled eggs; and,234 ppm PAA, 344 ppm HP, 13 ppm HEDP, and 0.47 ppm DPA during the tempering and before the milling of grains of wheat, corn, and rice.The FCS is not for use in contact with infant formula and human milk. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 3.9 MB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 226 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg. No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidine-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4) and/or dipicolinic acid (DPA) (CAS Reg. No. 499-83-2), and optionally sulfuric acid (CAS Reg. No. 7664-93-9). REPLACES FCNs 2011 and 1986
Manufacturer	Safe Foods Chemical Innovations and LPR Technologies
Effective Date	Feb 8, 2023
Intended Use	As an antimicrobial agent used in:process water, ice, or brine used in the production, processing, and preparation of poultry, meat, processed and preformed meat and poultry, fruits, vegetables, fish, seafood, and shell eggs.brines, marinades, and sauces applied on the surface or injected into processed or unprocessed, cooked or

	uncooked, whole or cut poultry.surface sauces and marinades applied on processed and preformed meat and poultry products.
Limitations/Specifications	The components of the FCS will not exceed:2000 ppm PAA, 1333 ppm HP, 133 ppm HEDP, and 6.5 ppm DPA in process water applied as a wash, spray, dip, rinse, chiller water, low-temperature (less than 40°F) immersion bath, or scald water for whole or cut poultry, including carcasses, parts, trim, and organs.1800 ppm PAA, 1200 ppm HP, 120 ppm HEDP, and 5.9 ppm DPA in process water or ice used in washing, rinsing, or cooling whole or cut meat carcasses, parts, trim, and organs.230 ppm PAA, 153 ppm HP, 15 ppm HEDP, and 0.8 ppm DPA in process water or ice used during commercial preparation of fish and seafood in food processing facilities.350 ppm PAA, 233 ppm HP, 23 ppm HEDP, and 1.2 ppm DPA in process water or ice used for washing or chilling fruits and vegetables in food processing facilities.2000 ppm PAA, 1333 ppm HP, 120 ppm HEDP, and 6.5 ppm DPA in wash water for shell eggs.495 ppm PAA, 193 ppm HP, 33 ppm HEDP, and 0.5 ppm DPA in process water, ice, or brine for washing, rinsing, or cooling processed and preformed meat.50 ppm PAA, 17 ppm HP, 4 ppm HEDP, and 0.1 ppm DPA in surface sauces and marinades applied on processed and preformed meat products.Uses of the FCS listed below do not include DPA, and the components will not exceed:230 ppm PAA, 90 ppm HP, and 15 ppm HEDP in process water, ice, or brine for washing, rinsing, or cooling processed and preformed poultry.50 ppm PAA, 17 ppm HP, and 4 ppm HEDP in brines, marinades, and sauces applied to the surface or injected into processed or unprocessed, cooked or uncooked, whole or cut poultry.50 ppm PAA, 17 ppm HP, and 4 ppm HEDP in surface sauces and marinades applied on processed and preformed poultry products.
National Environmental Policy Act	Environmental Assessment (in PDF, 486 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 398 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

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Food Contact Substance	A hydrogen peroxide solution (CAS Reg. No. 7722-84-1).

Manufacturer	Perfect Day, Inc.
Effective Date	Dec 9, 2022
Intended Use	As a processing aid added prior to pasteurization in the manufacture of frozen dessert mixes and ready-to-drink beverages containing whey protein, except for use in contact with infant formula and human milk (see Limitations/Specifications).
Limitations/Specifications	Hydrogen peroxide will not exceed 0.005% of the pre-pasteurized ingredient mixture. The FCS is not for use in contact with infant formula and human milk. Such uses were not included as part of the intended use of the substance in the FCN.
National Environmental Policy Act	Environmental Assessment (in PDF, 992 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 237 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

80 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (CAS Reg. No. 79-21-0), hydrogen peroxide (CAS Reg. No. 7722-84-1), acetic acid (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No. 2809-21-4), and optionally, octanoic acid (CAS Reg. No. 124-07-2) and peroxyoctanoic acid (CAS Reg. No. 33734-57-5).
Manufacturer	LPR Technologies & Safe Foods Corporation
Effective Date	Nov 16, 2022
Intended Use	As an antimicrobial agent used in process water or ice used in washing, rinsing, or cooling whole or cut meat carcasses, parts, trim, and organs.
Limitations/Specifications	The maximum concentration of all peroxyacids is 1800 parts per million (ppm), the maximum concentration of hydrogen peroxide is 1050 ppm, and the maximum concentration of HEDP is 117 ppm.

National Environmental Policy Act	Environmental Assessment (in PDF, 697 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 238 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

81 of 81	
Food Contact Substance	An aqueous mixture of peroxyacetic acid (PAA) (CAS Reg No. 79-21-0), hydrogen peroxide (HP) (CAS Reg. No. 7722-84-1), acetic acid (AA) (CAS Reg. No. 64-19-7), 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) (CAS Reg. No.2809-21-4), and optionally sulfuric acid (SA) (CAS Reg. No. 7664-93-9). REPLACES FCNs 887, 1132, 1738, and 1806
Manufacturer	Enviro Tech Chemical Services, Inc.
Effective Date	Jul 25, 2023
Intended Use	As an antimicrobial agent used in process water or ice used in the production, processing, and preparation ofwhole or cut meat including hides, carcasses, parts, trim, and organs,whole or cut poultry including carcasses, parts, trim, and organs, andfruits and vegetables, except for use in contact with infant formula and human milk (see Limitations/Specifications).
Limitations/Specifications	The FCS will be used at levels not to exceed:2000 ppm PAA, 800 ppm HP, and 80 ppm HEDP in process water or ice used for washing, rinsing, or cooling whole or cut meat, including hides, carcasses, parts, trim, and organs;2000 ppm PAA, 770 ppm HP, and 100 ppm HEDP in process water or ice applied as a spray, wash, rinse, dip, chiller water, low temperature (e.g., less than 40°F) immersion baths, or scald water for washing, rinsing, or cooling whole or cut poultry, including carcasses, parts, trim, and organs, and500 ppm PAA, 115 ppm HP, and 14 ppm HEDP in process water or ice used for washing or chilling fruits and vegetables in food processing facilities.The FCS is not for use in contact with infant formula and human milk. Such uses were not included as part of the intended use of the substance in the FCN.

National Environmental Policy Act	Environmental Assessment (in PDF, 987 kB)
FDA Decision	Finding of No Significant Impact (FONSI) (in PDF, 240 kB)
Notification	According to Section 409(h)(1)(C) of the Federal Food, Drug, and Cosmetic Act, food contact substance notifications (FCNs) are effective only for the listed manufacturer and its customers. Other manufacturers must submit their own FCN for the same food contact substance and intended use.

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.5 FDA Indirect Additives used in Food Contact Substances

1 of 2

Indirect Additives	HYDROGEN PEROXIDE
Title 21 of the U.S. Code of Federal Regulations (21 CFR)	172.167 172.723 172.814 172.892 173.315 173.356 173.370 175.105 178.1005 178.1010 184.1366

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

2 of 2

Indirect Additives	HYDROGEN PEROXIDE SOLUTION
Title 21 of the U.S. Code of Federal Regulations (21 CFR)	178.1005

▸ FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.6 Food Additive Status

FDA Food Additive Status

Hydrogen peroxide - MISC, REG, Used in combination with acetic acid to form peroxyacetic acid 59 ppm in wash water for fruits and vegetables that are not raw agricultural commodities- 173.315.

- FDA Center for Food Safety and Applied Nutrition (CFSAN)

8.7 Evaluations of the Joint FAO / WHO Expert Committee on Food Additives - JECFA

Chemical Name	HYDROGEN PEROXIDE
Evaluation Year	2004
ADI	NOT SPECIFIED
Comments	Small residues of hydrogen peroxide on food (which has been treated with antimicrobial washing solutions) at the time of consumption would not pose a safety concern.
Report	TRS 928-JECFA 63/26
Tox Monograph	NOT PREPARED

- Joint FAO/WHO Expert Committee on Food Additives (JECFA)

9 Agrochemical Information

9.1 Agrochemical Category

Microbiocide

- EPA Pesticide Ecotoxicity Database

Pesticide active substances

- EU Pesticides Database

9.2 EU Pesticides Data

Active Substance	hydrogen peroxide
Status	Approved [Reg. (EC) No 1107/2009]
Legislation	2007/442, Reg. (EU) 2017/409

▸ EU Pesticides Database

10 Minerals

Name	hydrogen peroxide
Crystal Structure Data Link	American Mineralogist Crystal Structure Database

▸ RRUFF Project

11 Pharmacology and Biochemistry

11.1 Pharmacodynamics

Hydrogen peroxide exhibits antimicrobial properties against most forms of microorganisms, including dormant forms with known high resistance profiles, such as bacterial spores and protozoal cysts. It acts as an oxidative biocide to generate free radical species to induce DNA, protein and membrane lipid damage via oxidation.

▸ DrugBank

11.2 MeSH Pharmacological Classification

Anti-Infective Agents, Local

Substances used on humans and other animals that destroy harmful microorganisms or inhibit their activity. They are distinguished from DISINFECTANTS, which are used on inanimate objects. (See all compounds classified as Anti-Infective Agents, Local.)

▸ Medical Subject Headings (MeSH)

Oxidants

Electron-accepting molecules in chemical reactions in which electrons are transferred from one molecule to another (OXIDATION-REDUCTION). (See all compounds classified as Oxidants.)

- Medical Subject Headings (MeSH)

11.3 ATC Code

D - Dermatologicals
D08 - Antiseptics and disinfectants
D08A - Antiseptics and disinfectants
D08AX - Other antiseptics and disinfectants
D08AX01 - Hydrogen peroxide

- WHO Anatomical Therapeutic Chemical (ATC) Classification

S - Sensory organs
S02 - Otologicals
S02A - Antiinfectives
S02AA - Antiinfectives
S02AA06 - Hydrogen peroxide

- WHO Anatomical Therapeutic Chemical (ATC) Classification

D - Dermatologicals
D11 - Other dermatological preparations
D11A - Other dermatological preparations
D11AX - Other dermatologicals
D11AX25 - Hydrogen peroxide

- WHO Anatomical Therapeutic Chemical (ATC) Classification

A - Alimentary tract and metabolism
A01 - Stomatological preparations
A01A - Stomatological preparations
A01AB - Antiinfectives and antiseptics for local oral treatment
A01AB02 - Hydrogen peroxide

- WHO Anatomical Therapeutic Chemical (ATC) Classification

11.4 Absorption, Distribution and Excretion

Absorption

It is reported that hydrogen peroxide is decomposed before absorption in the intestine. Solutions of hydrogen peroxide displays poor penetration when applied to tissue.

- DrugBank

Volume of Distribution

Target organs affected by hydrogen peroxide include the lungs, intestine, thymus, liver, and kidney.

- DrugBank

This in vivo study determined the kinetics of 3% hydrogen peroxide in a bleaching gel within the first hour. The material used in this study was 3% hydrogen peroxide gel and the study involved 10 subjects who met the inclusion and exclusion criteria. Each subject wore the tray with gel six different times on separate days. Evaluation of the remaining amount of hydrogen peroxide was calculated by the method stated in US Pharmacopoeia. The study results indicate that the mean percentage of hydrogen peroxide recovered for 5, 10, 20, 30, 45 and 60 minutes was 61, 56, 49, 44, 38 and 32, respectively. The amount of hydrogen peroxide in the saliva sample after one hour was 0.42 mg. Excluding the first 10 minutes, the kinetics of hydrogen peroxide in the tray and teeth sample was exponential.

PMID:12760694

Al-Qunaian TA et al; Oper Dent 28 (3): 236-41 (2003)

- Hazardous Substances Data Bank (HSDB)

11.5 Metabolism / Metabolites

Hydrogen peroxide is reduced by glutathione peroxidase, which is an endogenous enzyme in human tissue. It is rapidly decomposed to oxygen and water when in contact with catalase, an enzyme found in blood and most tissues.

- DrugBank

11.6 Mechanism of Action

The production of free hydroxyl radicals in the Fenton reaction is thought to be the basis of biocidal actions of hydrogen peroxide. Free radicals eventually lead to oxidative damage proteins and membrane lipids _in vivo_. The oxidizing radical as the ferryl radical induces DNA oxidation.

▸ DrugBank

Hydrogen peroxide topical solution is a weak antibacterial agent, a wound cleanser, and a deodorant. The pharmacologic activity of the drug depends on the release of nascent oxygen which has a powerful oxidizing effect that destroys some microorganisms and chemically alters many organic substances. When hydrogen peroxide topical solution comes in contact with tissues that contain the enzyme catalase, the solution releases oxygen which exerts antibacterial action; the mechanical effect of effervescence loosens tissue debris and pus. The release of nascent oxygen and effervescence is more rapid on wounds, denuded areas, and mucous membranes than on unbroken skin. The presence of reactive organic material such as pus and blood diminishes the efficiency of hydrogen peroxide. The antibacterial activity of hydrogen peroxide is relatively weak and slow and the drug exhibits poor tissue and wound penetration. Hydrogen peroxide's mechanical effect of effervescence and resultant removal of tissue debris is probably a more effective means of reducing the bacterial content of wounds, denuded areas, and mucous membranes than actual antibacterial activity. The drug also appears to have a styptic effect when applied topically to minor wounds. Concentrated solutions of hydrogen peroxide have a bleaching effect on hair and may injure tissue.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ Hazardous Substances Data Bank (HSDB)

Increases in the levels of reactive oxygen species (ROS) are correlated with a decrease in calcineurin (CN) activity under oxidative or neuropathological conditions. However, the molecular mechanism underlying this ROS-mediated CN inactivation remains unclear. Here, we describe a mechanism for the inactivation of CN by hydrogen peroxide. The treatment of mouse primary cortical neuron cells with Abeta(1-42) peptide and hydrogen peroxide triggered the proteolytic cleavage of CN and decreased its enzymatic activity. In addition, hydrogen peroxide was found to cleave CN in different types of cells. Calcium influx was not involved in CN inactivation during hydrogen peroxide-mediated cleavage, but CN cleavage was partially blocked by chloroquine, indicating that an unidentified lysosomal protease is probably involved in its hydrogen peroxide-mediated cleavage. Treatment with hydrogen peroxide triggered CN cleavage at a specific sequence within

its catalytic domain, and the cleaved form of CN had no enzymatic ability to dephosphorylate nuclear factor in activated T cells. Thus, our findings suggest a molecular mechanism by which hydrogen peroxide inactivates CN by proteolysis in ROS-related diseases.

PMID:17217415

Lee JE et al; J Neurochem 100 (6): 1703-12 (2007)

▸ **Hazardous Substances Data Bank (HSDB)**

Matrix metalloproteinase-2 (MMP-2) is well known to proteolyse both extracellular and intracellular proteins. Reactive oxygen species activate MMP-2 at both transcriptional and post-translational levels, thus MMP-2 activation is considered an early event in oxidative stress injury. Although hydrogen peroxide is widely used to trigger oxidative stress-induced cell death, the type of cell death (apoptosis vs. necrosis) in cardiomyocytes is still controversial depending on the concentration used and the exposure time. We ... investigated the mode of cell death in neonatal rat cardiomyocytes induced by different concentrations (50-500 uM) of hydrogen peroxide at various time intervals after exposure and determined whether MMP-2 is implicated in hydrogen peroxide-induced cardiomyocyte death. Treating cardiomyocytes with hydrogen peroxide led to elevated MMP-2 level/activity with maximal effects seen at 200 uM. Hydrogen peroxide caused necrotic cell death by disrupting the plasmalemma as evidenced by the release of lactate dehydrogenase in a concentration- and time-dependent manner as well as the necrotic cleavage of PARP-1. The absence of both caspase-3 cleavage/activation and apoptotic cleavage of PARP-1 illustrated the weak contribution of apoptosis. Pre-treatment with selective MMP inhibitors did not protect against hydrogen peroxide-induced necrosis. In conclusion hydrogen peroxide increases MMP-2 level/activity in cardiomyocytes and induces necrotic cell death, however, the later effect is MMP-2 independent.

PMID:23665313

Ali MA et al; Toxicol In Vitro 27 (6): 1686-92 (2013)

▸ **Hazardous Substances Data Bank (HSDB)**

11.7 Human Metabolite Information

11.7.1 Metabolite Pathways

2-aminoadipic 2-oxoadipic aciduria
2-Methyl-3-Hydroxybutryl CoA Dehydrogenase Deficiency
3-Hydroxy-3-Methylglutaryl-CoA Lyase Deficiency
3-hydroxyisobutyric acid dehydrogenase deficiency
3-hydroxyisobutyric aciduria
3-Methylcrotonyl Coa Carboxylase Deficiency Type I
3-Methylglutaconic Aciduria Type I
3-Methylglutaconic Aciduria Type III
3-Methylglutaconic Aciduria Type IV
3-Phosphoglycerate dehydrogenase deficiency
Total 130 pathways, visit the HMDB page for details

- Human Metabolome Database (HMDB)

11.8 Biochemical Reactions

- IUPHAR/BPS Guide to PHARMACOLOGY
- Rhea - Annotated Reactions Database
- PubChem

12 Use and Manufacturing

12.1 Uses

EPA CPDat Chemical and Product Categories

The Chemical and Products Database, a resource for exposure-relevant data on chemicals in consumer products, Scientific Data, volume 5, Article number: 180125 (2018), DOI:10.1038/sdata.2018.125

- EPA Chemical and Products Database (CPDat)

Sources/Uses

Used for the bleaching, disinfecting, and producing other chemicals; H2O2 is used in the textile, wood pulp, food, hairdressing, fur, and water treatment industries; [ACGIH] Used in photography (hypo eliminator); [www.ci.tucson.az.us/arthazards/medium.html] Used in

the deliming and dyeing stages of leather production; [PMID 21938525]

ACGIH - Documentation of the TLVs and BEIs, 7th Ed. Cincinnati: ACGIH Worldwide, 2020.

PMID:21938525

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

Industrial Processes with risk of exposure

Semiconductor Manufacturing [Category: Industry]

Pulp and Paper Processing [Category: Industry]

Textiles (Fiber & Fabric Manufacturing) [Category: Industry]

Using Disinfectants or Biocides [Category: Clean]

Sewer and Wastewater Treatment [Category: Industry]

Leather Tanning and Processing [Category: Industry]

Photographic Processing [Category: Other]

Fur Dressing and Dyeing [Category: Industry]

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

Activities with risk of exposure

Applying metallic patinas [Category: Hobbies]

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

Anti-Infective Agents, Local; Oxidants

National Library of Medicine's Medical Subject Headings. Hydrogen peroxide. Online file (MeSH, 2017). Available from, as of October 2, 2017: ***https://www.nlm.nih.gov/mesh/2017/mesh_browser/MBrowser.html***

▸ **Hazardous Substances Data Bank (HSDB)**

For hydrogen peroxide (USEPA/OPP PC Code: 000595) active products with label matches. /SRP: Registered for use in the U.S. but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses./

National Pesticide Information Retrieval System's Database on Hydrogen Peroxide (7722-84-1). Available from, as of October 10, 2017: ***https://npirspublic.ceris.purdue.edu/ppis/***

▸ **Hazardous Substances Data Bank (HSDB)**

Environmentally friendly oxidant. Bleaching agent in foods, textiles, and personal care

products; oxidant in wastewater treatment. Catalyst. Used in analytical chemistry for trace metal analysis. A 90% solution is used in rocket propulsion.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

- Hazardous Substances Data Bank (HSDB)

Hydrogen peroxide is used in the manufacture of acetone, antichlor, antiseptics, benzoyl peroxide, buttons, disinfectants, pharmaceuticals, felt hats, plastic foam, rocket fuel, sponge rubber and pesticides. It is also used in bleaching bone, feathers, flour, fruit, fur, gelatin, glue, hair, ivory, silk, soap, straw, textiles, was, and wood pulp, and as an oxygen source in respiratory protective equipment.

Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 510

- Hazardous Substances Data Bank (HSDB)

For more Uses (Complete) data for Hydrogen peroxide (10 total), please visit the HSDB record page.

- Hazardous Substances Data Bank (HSDB)

12.1.1 Use Classification

EPA Safer Chemical Functional Use Classes -> Antimicrobial Actives;Oxidants and Oxidant Stabilizers

- EPA Safer Choice

Safer Chemical Classes -> Green circle - The chemical has been verified to be of low concern

- EPA Safer Choice

Agrochemicals -> Pesticides

- EU Pesticides Database

Human Drugs -> EU pediatric investigation plans

- European Medicines Agency (EMA)

Animal Drugs -> FDA Approved Animal Drug Products (Green Book) -> Active Ingredients

- FDA Approved Animal Drug Products (Green Book)

Human Drugs -> FDA Approved Drug Products with Therapeutic Equivalence Evaluations (Orange Book) -> Active Ingredients

- FDA Orange Book

Food Additives -> PRESERVATIVE; -> JECFA Functional Classes

- Joint FAO/WHO Expert Committee on Food Additives (JECFA)

Hazard Classes and Categories -> Corrosives, Mutagens, Reactive - 3rd degree

- NJDOH RTK Hazardous Substance List

Cosmetics -> Oxidising; Antimicrobial

S13 | EUCOSMETICS | Combined Inventory of Ingredients Employed in Cosmetic Products (2000) and Revised Inventory (2006) | DOI:10.5281/zenodo.2624118

- NORMAN Suspect List Exchange

12.1.2 Industry Uses

Abrasives	Oxidizing agent
Bleaching agent	Oxidizing/reducing agents
Bleaching agents	Plating agents and surface treating agents
Cleaning agent	Processing aids, not otherwise listed
Corrosion inhibitor	Solvents (for cleaning or degreasing)
Corrosion inhibitors and anti-scaling agents	
Etching agent	
Hardener	
Intermediate	
Not Known or Reasonably Ascertainable	
Other (specify)	

https://www.epa.gov/chemical-data-reporting

- EPA Chemicals under the TSCA

12.1.3 Consumer Uses

Bleaching agent
Cleaning agent
Etching agent
Not Known or Reasonably Ascertainable
Oxidizing agent
Oxidizing/reducing agents
Processing aids not otherwise specified
Softener and conditioner
Solvents (for cleaning or degreasing)

https://www.epa.gov/chemical-data-reporting

▸ **EPA Chemicals under the TSCA**

12.1.4 Household Products

Household & Commercial/Institutional Products

Information on 517 consumer products that contain Hydrogen peroxide in the following categories is provided:

• Auto Products
• Commercial / Institutional
• Home Maintenance
• Inside the Home
• Landscaping/Yard
• Personal Care
• Pet Care

▸ **Consumer Product Information Database (CPID)**

12.2 Methods of Manufacturing

In the AO /Antraquinone/ process, 2-alkyl-9,10-anthraquinones react with **hydrogen** in the presence of a catalyst to form the corresponding hydroquinones. After the catalyst is removed (otherwise, the hydrogen peroxide would decompose), the hydroquinones are oxidized to quinones with **oxygen** (usually air) with simultaneous quantitative formation of hydrogen peroxide. Hydrogen peroxide is extracted with **water**, and the quinones are returned to the hydrogenator to complete the loop. The AO process, therefore, leads to

the net formation of hydrogen peroxide from gaseous hydrogen and oxygen.

Goor G et al; Hydrogen Peroxide. Ullmann's Encyclopedia of Industrial Chemistry 7th ed. (1999-2017). NY, NY: John Wiley & Sons. Online Posting Date: April 15, 2007

▸ Hazardous Substances Data Bank (HSDB)

Prepared by treating barium peroxide with acid.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Production of anhydrous hydrogen peroxide by continuous fractional crystallization: Crewson, Ryan, United States of America patent 2724640 (1955 to Becco).

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

(1) Autoxidation of an alkyl anthrahydroquinone such as the 2-ethyl derivative in a cyclic continuous process in which the quinone formed in the oxidation step is reduced to the starting material by hydrogen in the presence of a supported palladium catalyst; (2) by electrolytic processes in which aqueous sulfuric acid or acidic ammonium bisulfate is converted electrolytically to the peroxydisulfate, which is then hydrolyzed to form hydrogen peroxide; by autoxidation of isopropyl alcohol. Method (1) is the most widely used.

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 735

▸ Hazardous Substances Data Bank (HSDB)

For more Methods of Manufacturing (Complete) data for Hydrogen peroxide (7 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

12.3 Formulations / Preparations

The National Pesticide Information Retrieval System (NPIRS) identifies 70 companies with active labels for products containing the chemical hydrogen peroxide. To view the complete list of companies, product names and percent hydrogen peroxide in formulated

products click the following url and enter the CAS Registry number in the Active Ingredient field.

National Pesticide Information Retrieval System's Database on Hydrogen Peroxide (7722-84-1). Available from, as of October 10, 2017: https://npirspublic.ceris.purdue.edu/ppis/

▸ Hazardous Substances Data Bank (HSDB)

Valsterane Aseptic 35 Bio (Arkema Inc.): Active ingredient: hydrogen peroxide 35.00%.

National Pesticide Information Retrieval System's Database on Hydrogen Peroxide (7722-84-1). Available from, as of October 10, 2017: https://npirspublic.ceris.purdue.edu/ppis/

▸ Hazardous Substances Data Bank (HSDB)

Edelweiss TBC II (Reckitt Benckiser LLC): Active ingredient: hydrogen peroxide 1.2%.

National Pesticide Information Retrieval System's Database on Hydrogen Peroxide (7722-84-1). Available from, as of October 10, 2017: https://npirspublic.ceris.purdue.edu/ppis/

▸ Hazardous Substances Data Bank (HSDB)

Spor-Klenz Concentrate (Steris Corporation): Active ingredient: hydrogen peroxide 22.0%; ethaneperoxoic acid 4.5%.

National Pesticide Information Retrieval System's Database on Hydrogen Peroxide (7722-84-1). Available from, as of October 10, 2017: https://npirspublic.ceris.purdue.edu/ppis/

▸ Hazardous Substances Data Bank (HSDB)

For more Formulations/Preparations (Complete) data for Hydrogen peroxide (29 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

12.4 Consumption Patterns

30% IN TEXTILES; 28% IN PLASTICIZERS & OTHER CHEMS; 9% FOR GLYCERIN; 8% FOR PULP & PAPER; 4% IN WASTEWATER TREATMENT; 21% IN MISC APPLICATIONS (1974).

SRI

▸ Hazardous Substances Data Bank (HSDB)

Pulp and paper, 25%; Chemical synthesis, 25%; Environmental, 20%; Textile, 10%; Mining and Uranium, 5%; Miscellaneous, 15% (1984).

CHEMICAL PRODUCTS SYNOPSIS: Hydrogen Peroxide (1984)

▸ Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Hydrogen Peroxide. Chemical synthesis, 24%; pulp and paper, 23%; environmental uses (includes municipal and industrial water treatment and geothermal steam treatment), 18%; textiles, 14%; mining, 3%; electronics, 3%; miscellaneous (including food and cosmetic uses and the distribution market, 15%.

Kavaler AR; Chemical Marketing Reporter 230 (17): 58 (1986)

▸ Hazardous Substances Data Bank (HSDB)

CHEMICAL PROFILE: Hydrogen peroxide. Demand: 1985: 300 million lb; 1986: 320 million lb; 1990 /projected/: 410 million lb. (Canada and US)

Kavaler AR; Chemical Marketing Reporter 230 (17): 58 (1986)

▸ Hazardous Substances Data Bank (HSDB)

For more Consumption Patterns (Complete) data for Hydrogen peroxide (8 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

12.5 U.S. Production

Aggregated Product Volume

2019: 1,000,000,000 - <5,000,000,000 lb

2018: 1,000,000,000 - <5,000,000,000 lb

2017: 1,000,000,000 - <5,000,000,000 lb

2016: 1,000,000,000 - <5,000,000,000 lb

https://www.epa.gov/chemical-data-reporting

▸ EPA Chemicals under the TSCA

(1972) 6.83X10+10 GRAMS

SRI

▸ Hazardous Substances Data Bank (HSDB)

(1984) 1.26X10+11 g

BUREAU OF THE CENSUS. CURRENT INDUSTRIAL REPORTS: INORGANIC CHEMICALS 1984 p.9

▸ Hazardous Substances Data Bank (HSDB)

Fort Howard Corp.: 3X10+3 tons/year

Kirk-Othmer Encyclopedia of Chemical Technology. 4th ed. Volumes 1: New York, NY. John Wiley and Sons, 1991-Present., p. V13 (95) 982

▸ Hazardous Substances Data Bank (HSDB)

3.58X10+3 tons/yr (estimated US capacity)

Kirk-Othmer Encyclopedia of Chemical Technology. 4th ed. Volumes 1: New York, NY. John Wiley and Sons, 1991-Present., p. V13 (95) 982

▸ Hazardous Substances Data Bank (HSDB)

For more U.S. Production (Complete) data for Hydrogen peroxide (8 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

12.6 U.S. Imports

(1972) 3.84X10+9 GRAMS

SRI

▸ Hazardous Substances Data Bank (HSDB)

(1984) 1.74X109+10 g

BUREAU OF THE CENSUS. U.S. IMPORTS FOR CONSUMPTION AND GENERAL IMPORTS 1984 p.1-353

▸ Hazardous Substances Data Bank (HSDB)

1996: 174 million lbs (includes U.S. and Canada)

Chemical Marketing Reporter; Chemical Profile Hydrogen Peroxide. August 24. NY, NY: Schnell Pub Co (1998)

▸ Hazardous Substances Data Bank (HSDB)

12.7 U.S. Exports

(1984) 2.32X10+10 g

BUREAU OF THE CENSUS. U.S. EXPORTS, SCHEDULE E, 1984 p.2-94

- Hazardous Substances Data Bank (HSDB)

1996: 60 million lbs (includes U.S. and Canada)

Chemical Marketing Reporter; Chemical Profile Hydrogen Peroxide. August 24. NY, NY: Schnell Pub Co (1998)

- Hazardous Substances Data Bank (HSDB)

12.8 General Manufacturing Information

Industry Processing Sectors

All Other Basic Inorganic Chemical Manufacturing	Pesticide, Fertilizer, and Other Agricultu
All Other Basic Organic Chemical Manufacturing	Pharmaceutical and Medicine Manufact
All Other Chemical Product and Preparation Manufacturing	Plastics Product Manufacturing
Computer and Electronic Product Manufacturing	Services
Food, beverage, and tobacco product manufacturing	Soap, Cleaning Compound, and Toilet P
Mining (except Oil and Gas) and support activities	Textiles, apparel, and leather manufact
Miscellaneous Manufacturing	Utilities
Not Known or Reasonably Ascertainable	Wholesale and Retail Trade
Oil and Gas Drilling, Extraction, and Support activities	
Other (requires additional information)	
Paper Manufacturing	

- EPA Chemicals under the TSCA

EPA TSCA Commercial Activity Status

Hydrogen peroxide (H2O2): ACTIVE

https://www.epa.gov/tsca-inventory

- EPA Chemicals under the TSCA

... A low percentage of an inhibitor such as acetanilide or sodium stannate, is usually added to counteract the catalytic effect of traces of impurities such as iron, copper, and other heavy metals.

Larranaga, M.D., Lewis, R.J. Sr., Lewis, R.A.; Hawley's Condensed Chemical Dictionary 16th Edition. John Wiley & Sons, Inc. Hoboken, NJ 2016., p. 735

- Hazardous Substances Data Bank (HSDB)

Marketed as a solution in water in concentrations of 3-90% by weight.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Potency of hydrogen peroxide is often described in terms of volume of active oxygen it yields. Each 1% w/w hydrogen peroxide is equivalent to 3.3% by volume; 100 volume hydrogen peroxide is approximately equivalent to 30% w/w, 30 volume to 9% w/w, and 10 volume to 3% w/w, respectively.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ Hazardous Substances Data Bank (HSDB)

13 Identification

13.1 Analytic Laboratory Methods

Method: OSHA 1019; Procedure: spectrophotometry; Analyte: hydrogen peroxide; Matrix: air; Detection Limit: 36.6 ppb.

U.S. Department of Labor/Occupational Safety and Health Administration's Index of Sampling and Analytical Methods. Hydrogen Peroxide (7722-84-1). Available from, as of October 11, 2017: https://www.osha.gov/dts/sltc/methods/toc.html

▸ Hazardous Substances Data Bank (HSDB)

In this work we describe the fabrication of nanostructured electrocatalytic surfaces based on polyethyleneimine (PEI)-supported rhodium nanoparticles (Rh-NP) over graphite screen-printed electrodes (SPEs) for the determination of hydrogen peroxide in the presence of oxygen. Rh-NP, electrostatically stabilized by citrate anions, were immobilized over graphite SPEs, through coulombic attraction on a thin film of positively charged PEI. The functionalized sensors, polarized at 0.0 V vs. Ag/AgCl/3 M KCl, exhibited a linear response to H2O2 over the concentration range from 5 to 600 umol/L H2O2 in the presence of oxygen. The 3sigma limit of detection was 2 umol/L H2O2, while the reproducibility of the method at the concentration level of 10 umol/L H2O2 (n=10) and between different sensors (n=4) was lower than 3 and 5%, respectively. Most importantly, the sensors showed an excellent working and storage stability at ambient conditions and they were successfully applied to the determination of H2O2 produced by autooxidation of polylphenols in tea extracts with ageing. Recovery rates ranged between 97 and 104% suggesting that the as-prepared electrodes can be used for the

development of small-scale, low-cost chemical sensors for use in on-site applications.

PMID:25618697

Gatselou VA et al; Talanta 134: 482-7 (2015)

▸ **Hazardous Substances Data Bank (HSDB)**

A headspace gas chromatographic (HS-GC) method has been developed for the determination of residual hydrogen peroxide in pulp bleaching effluents. The method is based on the reaction of hydrogen peroxide and **permanganate** in an acidic medium (0.1 mol/L), in which hydrogen peroxide is quantitatively converted to **oxygen** within 10 min at 60 °C in a sealed headspace sample vial. The released **oxygen** is then determined by GC equipped with a thermal conductivity detector. The method is robust, sensitive, and accurate, with reproducibility characterized by a relative standard deviation of <0.5%, a sensitivity whose limit of quantification (LOQ) is 0.96 umol, and a demonstrated recovery ranging from 98 to 103%. Further, the method is simple, rapid, and automated.

PMID:22444430

Hu HC et al; J Chromatogr A 1235: 182-4 (2012)

▸ **Hazardous Substances Data Bank (HSDB)**

Hydrogen peroxide is commonly used in the food processing industry as a **chlorine**-free bleaching and sterilizing agent, but excessive amounts of residual hydrogen peroxide have led to cases of food poisoning. Here we describe the development of a novel nonenzymatic colorimetric method for the determination of residual hydrogen peroxide in foods and agricultural products. Nitrophenylboronic acids chemoselectively react with hydrogen peroxide under alkaline conditions to produce yellow nitrophenolates. Of the three **nitrophenylboronic acid** isomers tested, the p-isomer displayed the highest sensitivity for hydrogen peroxide and the fastest reaction kinetics. The reaction product, **p-nitrophenolate**, has an absorption maximum at 405 nm and a good linear correlation between the hydrogen peroxide concentration and the A(405) values was obtained. We successfully applied this convenient and rapid method for hydrogen peroxide determination to samples of dried bean curds and disposable chopsticks, thereby demonstrating its potential in foods and agricultural industries.

PMID:21967291

Lu CP et al; J Agric Food Chem 59 (21): 11403-6 (2011)

▸ **Hazardous Substances Data Bank (HSDB)**

For more Analytic Laboratory Methods (Complete) data for Hydrogen peroxide (11 total), please visit the **HSDB record page**.

▸ Hazardous Substances Data Bank (HSDB)

13.2 Clinical Laboratory Methods

Carbon nanomaterials are typically used in electrochemical biosensing applications for their unique properties. We report a hollow graphitic nanocapsule (HGN) utilized as an efficient electrode material for sensitive hydrogen peroxide detection. Methylene blue (MB) molecules could be efficiently adsorbed on the HGN surfaces, and this adsorption capability remained very stable under different pH regimes. HGNs were used as three-dimensional matrices for coimmobilization of MB electron mediators and horseradish peroxidase (HRP) to build an HGN-HRP-MB reagentless amperometric sensing platform to detect hydrogen peroxide. This simple HGN-HRP-MB complex demonstrated very sensitive and selective hydrogen peroxide detection capability, as well as high reproducibility and stability. The HGNs could also be utilized as matrices for immobilization of other enzymes, proteins or small molecules and for different biomedical applications.

PMID:24035356

Liu WN et al; Biosens Bioelectron 52: 438-44 (2014)

▸ Hazardous Substances Data Bank (HSDB)

We describe the construction of a polyaniline (PANI), multiwalled carbon nanotubes (MWCNTs) and gold nanoparticles (AuNPs) modified Au electrode for determination of hydrogen peroxide without using peroxidase (HRP). The AuNPs/MWCNT/PANI composite film deposited on Au electrode was characterized by Scanning Electron Microscopy (SEM) and electrochemical methods. Cyclic voltammetric (CV) studies of the electrode at different stages of construction demonstrated that the modified electrode had enhanced electrochemical oxidation of H(2)O(2), which offers a number of attractive features to develop amperometric sensors based on split of H(2)O(2). The amperometric response to H(2)O(2) showed a linear relationship in the range from 3.0 uM to 600.0 uM with a detection limit of 0.3 uM (S/N = 3) and with high sensitivity of 3.3 mA/uM. The sensor gave accurate and satisfactory results, when employed for determination of H(2)O(2) in milk and urine.

PMID:21901213

Narang J et al; Analyst 136 (21):4460-6 (2011)

▸ Hazardous Substances Data Bank (HSDB)

Nowadays, hydrogen peroxide (H(2)O(2)) has attracted more and more attentions in

biochemical fields owing to its important role in biological systems. In this contribution, we propose a novel assay for the detection of H(2)O(2) based on the cleavage of ssDNA on gold nanoparticles (AuNPs). It was known that AuNPs could be stable in the presence of single-stranded DNA (ssDNA) which prevents the salt-induced aggregation of AuNPs in solution owing to the electrostatic repulsion. However, hydroxyl radical (HO*) generated from Fenton reaction could cleave the ssDNA and induce the aggregation of AuNPs. Therefore, color change from red to blue owing to the plasmon resonance absorption (PRA) of AuNPs can be observed by the naked eyes and enhancement of plasmon resonance light scattering could be measured with a common spectrofluorometer. The values of A(650)/A(520) of the PRA band were found to be linearly proportional to the concentration of H(2)O(2) in the range of 2.0 x 10(-7) to 8.0 x 10(-6) mol/L with the limit of determination (LOD) being 40 nmol/L (S/N=3), and thus the content of H(2)O(2) in rat encephalon extraction could be successfully detected with the recovery in the range of 98-103%.

PMID:20103128

Sang Y et al; Anal Chim Acta 659 (1-2): 224-8 (2010)

▸ **Hazardous Substances Data Bank (HSDB)**

Silver nanowires synthesized through a polyol process using polyvinylpyrrolidone as protection (PVP-AgNWs) were used as a new electrode material for constructing a sensor. Hydrogen peroxide (H(2)O(2)) and glucose were used as analytes to demonstrate the sensor performance of the PVP-AgNWs. It is found that the PVP-AgNWs-modified glassy carbon electrode (PVP-AgNWs/GCE) exhibits remarkable catalytic performance toward H(2)O(2) reduction. This sensor has a fast amperometric response time of less than 2 sec and the catalytic current is linear over the concentration of H(2)O(2) ranging from 20 uM to 3.62 mM (R = 0.998) with a detection limit of 2.3 uM estimated on a signal-to-noise ratio of 3. A glucose biosensor was constructed by immobilizing glucose oxidase (GOD) onto the surface of the PVP-AgNWs/GCE. The resultant glucose biosensor can be used for glucose detection in human blood serum with a sensitivity of 15.86 uA/mM/sq cm and good selectivity and stability.

PMID:22858619

Yang X et al; Analyst 137 (18): 4362-7 (2012)

▸ **Hazardous Substances Data Bank (HSDB)**

Overabundance of hydrogen peroxide originating from environmental stress and/or genetic mutation can lead to pathological conditions. Thus, the highly sensitive detection of H2 O2 is important. Herein, supramolecular fluorescent nanoparticles self-assembled from fluorescein isothiocyanate modified beta-cyclodextrin (FITC-beta-CD)/rhodamine B

modified ferrocene (Fc-RB) amphiphile were prepared through host-guest interaction between FITC-beta-CD host and Fc-RB guest for H2 O2 detection in cancer cells. The self-assembled nanoparticles based on a combination of multiple non-covalent interactions in aqueous medium showed high sensitivity to H2 O2 while maintaining stability under physiological condition. Owing to the fluorescence resonance energy transfer (FRET) effect, addition of H2 O2 led to obvious fluorescence change of nanoparticles from red (RB) to green (FITC) in fluorescent experiments. In vitro study showed the fluorescent nanoparticles could be efficiently internalized by cancer cells and then disrupted by endogenous H2 O2, accompanying with FRET from "on" to "off". These supramolecular fluorescent nanoparticles constructed via multiple non-covalent interactions are expected to have potential applications in diagnosis and imaging of diseases caused by oxidative stresses.

PMID:26133314

Wei X et al; Chemistry 21 (32): 11427-34 (2015)

▸ Hazardous Substances Data Bank (HSDB)

14 Safety and Hazards

14.1 Hazards Identification

14.1.1 GHS Classification

1 of 6 View All

Pictogram(s)	 Oxidizer Corrosive Irritant
Signal	**Danger**
GHS Hazard Statements	H271 (90.55%): May cause fire or explosion; strong Oxidizer [**Danger** Oxidizing liquids; Oxidizing solids] H302 (97.92%): Harmful if swallowed [**Warning** Acute toxicity, oral] H314 (99.7%): Causes severe skin burns and eye damage [**Danger** Skin corrosion/irritation] H318 (35.72%): Causes serious eye damage [**Danger** Serious eye damage/eye irritation] H332 (94.05%): Harmful if inhaled [**Warning** Acute toxicity, inhalation]

	H335 (31.5%): May cause respiratory irritation [**Warning** Specific target organ toxicity, single exposure; Respiratory tract irritation] H412 (18.34%): Harmful to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P210, P220, P260, P261, P264, P264+P265, P270, P271, P273, P280, P283, P301+P317, P301+P330+P331, P302+P361+P354, P304+P340, P305+P354+P338, P306+P360, P316, P317, P319, P321, P330, P363, P370+P378, P371+P380+P375, P403+P233, P405, P420, and P501 (The corresponding statement to each P-code can be found at the **GHS Classification** page.)
ECHA C&L Notifications Summary	*Aggregated GHS information provided by 1970 companies from 81 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.* *Reported as not meeting GHS hazard criteria by 2 of 1970 companies. For more detailed information, please visit **ECHA C&L website.*** *Of the 80 notification(s) provided by 1968 of 1970 companies with hazard statement code(s).* *Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.*

▸ European Chemicals Agency (ECHA)

14.1.2 Hazard Classes and Categories

Ox. Liq. 1 (90.55%)

Acute Tox. 4 (97.92%)

Skin Corr. 1A (99.7%)

Eye Dam. 1 (35.72%)

Acute Tox. 4 (94.05%)

STOT SE 3 (31.5%)

Aquatic Chronic 3 (18.34%)

▸ European Chemicals Agency (ECHA)

Oxidising liquid - category 1

Acute toxicity - category 4

Acute toxicity - category 4

Skin corrosion - category 1A

Specific target organ toxicity (single exposure) - category 3

▸ Hazardous Chemical Information System (HCIS), Safe Work Australia

View More...

14.1.3 NFPA Hazard Classification

NFPA 704 Diamond	 3-0-3-OX
NFPA Health Rating	3 - Materials that, under emergency conditions, can cause serious or permanent injury.
NFPA Fire Rating	0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.
NFPA Instability Rating	3 - Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction but that require a strong initiating source or must be heated under confinement before initiation.
NFPA Specific Notice	OX - Oxidizer: Materials that possess oxidizing properties.

▸ Occupational Safety and Health Administration (OSHA)

14.1.4 EPA Safer Chemical

Chemical: Hydrogen peroxide

● Green circle - The chemical has been verified to be of low concern based on experimental and modeled data.

▸ EPA Safer Choice

14.1.5 Highly Hazardous Substance

OSHA Highly Hazardous Chemicals, Toxics and Reactives

Chemical: Hydrogen Peroxide (52% by weight or greater)

Threshold: 7500 [lb]

Note: Hydrogen Peroxide (52% by weight or greater) in quantities at or above above 7500lb presents a potential for a catastrophic event as a toxic or reactive highly hazardous chemical.

▸ Occupational Safety and Health Administration (OSHA)

14.1.6 Health Hazards

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death. Fire may produce irritating and/or toxic gases. Toxic fumes or dust may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.). Runoff from fire control or dilution water may cause environmental contamination. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause environmental contamination. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ CAMEO Chemicals

Strong irritant to skin, eyes, and mucous membranes. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

CAMEO Chemicals

ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may cause environmental contamination.

Emergency Response Guidebook (ERG)

ERG 2020, Guide 143 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

- TOXIC; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.
- Fire may produce irritating and/or toxic gases.
- Toxic fumes or dust may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).
- Runoff from fire control or dilution water may cause environmental contamination.

Emergency Response Guidebook (ERG)

14.1.7 Fire Hazards

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

May explode from friction, heat or contamination. These substances will accelerate burning when involved in a fire. May ignite combustibles (wood, paper, oil, clothing, etc.). Some will react explosively with hydrocarbons (fuels). Containers may explode when heated. Runoff may create fire or explosion hazard. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

These substances will accelerate burning when involved in a fire. Some may decompose

explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

Spontaneous ignition may occur when contact with combustible materials is made. Oxygen released in decomposition will promote combustion. Fires can be of the flaring type but are not explosive unless confined. Vapor concentration greater than 40 percent by weight can be decomposed explosively at 1 atmosphere pressure. Severe explosion hazard when it is exposed to heat, mechanical impact, detonation of a blasting cap, or caused to decompose catalytically. Decomposition can build up large pressures of oxygen and water which may then burst explosively. Avoid oxidizable materials including iron, copper, brass, bronze, chromium, zinc, lead, manganese, silver, catalytic metals. Avoid mechanical impact, uncovering the container, contact with combustible materials, light, temperatures above 95F, hot wires, catalytic impurities. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- These substances will accelerate burning when involved in a fire.
- Some may decompose explosively when heated or involved in a fire.
- May explode from heat or contamination.
- Some will react explosively with hydrocarbons (fuels).
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Containers may explode when heated.
- Runoff may create fire or explosion hazard.

▸ Emergency Response Guidebook (ERG)

ERG 2020, Guide 143 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

- May explode from friction, heat or contamination.
- These substances will accelerate burning when involved in a fire.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Some will react explosively with hydrocarbons (fuels).
- Containers may explode when heated.
- Runoff may create fire or explosion hazard.

▸ Emergency Response Guidebook (ERG)

Not combustible. The substance may ignite combustible materials. Risk of fire and explosion on contact with heat or metal catalysts.

▸ ILO-WHO International Chemical Safety Cards (ICSCs)

14.1.8 Hazards Summary

Hydrogen peroxide is a colorless liquid at room temperature with a bitter taste. Small amounts of gaseous hydrogen peroxide occur naturally in the air. Hydrogen peroxide is unstable, decomposing readily to oxygen and water with release of heat. Although nonflammable, it is a powerful oxidizing agent that can cause spontaneous combustion when it comes in contact with organic material. Hydrogen peroxide is found in many households at low concentrations (3-9%) for medicinal applications and as a clothes and hair bleach. In industry, hydrogen peroxide in higher concentrations is used as a bleach for textiles and paper, as a component of rocket fuels, and for producing foam rubber and organic chemicals.

▸ Agency for Toxic Substances and Disease Registry (ATSDR)

Liquid causes second degree burns after a few minutes of contact; [CHRIS] Hydrogen peroxide 30-70% is corrosive to the skin. [Quick CPC] When used for household disinfectant purposes (3% to 5%), it is mildly irritating to the skin and mucous membranes. At a concentration of 10%, which is found in some hair-bleaching solutions, it is strongly irritating and may be corrosive. [ATSDR Medical Management] Corrosive to the skin and eyes and irritating to the respiratory tract; [ICSC] Hydrogen peroxide solutions 35% and greater could cause pulmonary edema after inhalation; [CHEMINFO]

Quick CPC - Forsberg K, Mansdorf SZ. Quick Selection Guide to Chemical Protective Clothing, 5th Ed. Hoboken, NJ: Wiley-Interscience, 2007.

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

14.1.9 Fire Potential

A dangerous fire hazard by chemical reaction with flammable materials. Hydrogen peroxide is a powerful oxidizer, particularly in the concentrated state. It is important to keep containers covered because the contents of uncovered containers are much more prone to react with flammable vapors, gases, etc.; and, if uncovered, the water from a hydrogen peroxide solution can evaporate, concentrating the material and thus increasing the fire hazard.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

... Solutions of hydrogen peroxide in concentration in excess of 65 wt% heat up spontaneously when decomposed to water + 1/2 oxygen. Thus, 90 wt% soln, when caused to decompose rapidly due to the introduction of a catalytic decomposition agent, can get quite hot and perhaps start fires.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

Since the compound is such a strong oxidizer, when spilled on combustible materials it can set fire to them. Detonation can occur if the peroxide is mixed with incompatible (most) organic compounds.

International Labour Office. Encyclopaedia of Occupational Health and Safety. 4th edition, Volumes 1-4 1998. Geneva, Switzerland: International Labour Office, 1998., p. 104.350

▸ **Hazardous Substances Data Bank (HSDB)**

Leakage from drums of 35% hydrogen peroxide onto a wooden pallet caused ignition of the latter when it was moved. Combustion, though limited in area, was fierce and took some time to extinguish. Leakage of 50% peroxide onto supporting pallets under polythene sheeting led to spontaneous ignition and a fierce fire. Contact of 50% peroxide with wood does not usually lead to spontaneous ignition, but hot weather, dry wood and the thermal insulation of the cover may have contributed to ignition.

Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 1214

▸ **Hazardous Substances Data Bank (HSDB)**

14.1.10 Skin, Eye, and Respiratory Irritations

Pure hydrogen peroxide, its solutions, vapors, and mists are very irritating to body tissue. This irritation can vary from mild to severe depending upon the concentration of hydrogen peroxide.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

A corrosive irritant to skin, eyes, and mucous membranes.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

14.2 Safety and Hazard Properties

14.2.1 Flammable Limits

Flammability

Noncombustible Liquid, but a powerful oxidizer.

▸ **The National Institute for Occupational Safety and Health (NIOSH)**

14.2.2 Critical Temperature & Pressure

Critical temperature: 457 °C; critical pressure: 20.99 Mpa

Goor G et al; Hydrogen Peroxide. Ullmann's Encyclopedia of Industrial Chemistry. 7th ed. (1999-2017). New York, NY: John Wiley & Sons. Online Posting Date: 15 Apr 2007

▸ **Hazardous Substances Data Bank (HSDB)**

14.2.3 Explosive Limits and Potential

Although pure hydrogen peroxide solutions are not usually explosive at atmospheric pressure, equilibrium vapor concentrations of hydrogen peroxide above 26 mol per cent (40 weight per cent) become explosive in a temperature range below the boiling point of the liquid.

International Labour Office. Encyclopaedia of Occupational Health and Safety. 4th edition, Volumes 1-4 1998. Geneva, Switzerland: International Labour Office, 1998., p. 104.350

▸ **Hazardous Substances Data Bank (HSDB)**

A severe explosion hazard when highly concentrated or when pure hydrogen peroxide is exposed to: heat, mechanical impact, or detonation of a blasting cap, or is caused to decompose catalytically by metals (in order of decreasing effectiveness: **osmium**; **palladium**; **platinum**; **iridium**; **gold**; **silver**; **manganese**; **cobalt**; **copper**; lead).

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

Explodes on contact with alcohols + **sulfuric acid**; acetal + **acetic acid** + heat; **acetic acid** + n-heterocycles (above 50 °C); **2-amino-4-methyloxazole** + **iron(II)** catalyst; aromatic hydrocarbons + **trifluoroacetic acid**; azeliac acid + **sulfuric acid** (above 45 °C); **benzenesulfonic anhydride**; **tert-butanol** + **sulfuric acid**; carboxylic acids; **3,5-dimethyl-3-hexanol** + **sulfuric acid**; **diphenyl diselenide** (above 53 °C); **2-ethoxyethanol** + polyacrylamide gel + **toluene** + heat; **gadolinium hydroxide** (above 80 °C); **gallium** + **hydrochloric acid**; **hydrogen** + **palladium** catalysts (has caused major industrial explosions); **iron(II) sulfate** + **2-methylpyridine** + **sulfuric acid**; **iron(II) sulfate** + **nitric acid** + **sodium carboxymethylcellulose** (when evaporated); **nitric acid** + ketones (e.g., **2-butanone**, **3-pentanone**, **cyclopentanone**, **cyclohexanone**, **3-methylcyclohexanone**), **trioxane** (sensitive to heat, shock, or on contact with lead), **methanol** + tert-amines + **platinum** catalysts; **nitric acid** + soils; nitrogenous bases (e.g., **ammonia**, **hydrazine hydrate**, **1,1-dimethylhydrazine**); organic compounds (e.g., **glycerol**, **acetic acid**, **ethanol**, **aniline**, **quinoline**, 2-phenyl-1,1-dimethylethanol, **cellulose**, **charcoal**); organic materials + **sulfuric acid** (especially if confined); **water** + oxygenated compounds (e.g., **acetaldehyde**, **acetic acid**, **acetone**, **ethanol**, **formaldehyde**, **formic acid**, **methanol**, **2-propanol**, **propionaldehyde**); **sulfuric acid** (during evaporation); **tetrahydrothiophene**; **vinyl acetate**; alcohols + tin chloride; **phosphorus pentoxide**; **phosphorous**; **nitric acid**; stibnite; **arsenic trisulfide**; **chlorine** + **potassium hydroxide** + **chlorosulfonic acid**; copper sulfide; **iron(II) sulfide**; **formic acid** + organic matter; **hydrogen selenide**; **hydrazine**; **lead dioxide**;

lead monoxide; lead(II) sulfide; manganese dioxide; mercuric oxide; mercury(I) oxide; molybdenum disulfide; organic matter, (2-methyl-1-phenyl-2-propanol + sulfuric acid); potassium permanganate; sodium iodate; thiodiglycol; uns-dimethyl hydrazine; iron(II) sulfate + 2-methylpyridine + sulfuric acid; mercuric oxide + nitric acid.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ Hazardous Substances Data Bank (HSDB)

Forms unstable explosive products in reaction with acetaldehyde + desiccants (forms polyethylidine peroxide); acetic acid (forms peracetic acid); acetic + 3-thietanol; acetic anhydride; acetone (forms explosive peroxides); alcohols (products are shock- and heat-sensitive); carboxylic acids (e.g., formic acid, acetic acid, tararic acid), diethyl ether, ethyl acetate, formic acid + metaboric acid, ketene (forms diacetyl peroxide); mercury(II) oxide + nitric acid (forms mercury(II) peroxide); thiourea + nitric acid; polyacetoxyacrylic acid lactone + poly(2-hydroxyacrylic acid) + sodium hydroxide.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ Hazardous Substances Data Bank (HSDB)

For more Explosive Limits and Potential (Complete) data for Hydrogen peroxide (18 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

14.2.4 OSHA Standards

Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 1 ppm (1.4 mg/cu m).

29 CFR 1910.1000 (USDOL); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

▸ Hazardous Substances Data Bank (HSDB)

14.2.5 NIOSH Recommendations

Recommended Exposure Limit: 10 Hour Time-Weighted Average: 1 ppm (1.4 mg/cu m).

NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: https://www.cdc.gov/niosh/npg

▸ Hazardous Substances Data Bank (HSDB)

14.3 First Aid Measures

14.3.1 First Aid

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

Call 911 or emergency medical service. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Move victim to fresh air if it can be done safely. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. Contaminated clothing may be a fire risk when dry. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Keep victim calm and warm. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. Transport the victim IMMEDIATELY to a hospital. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina: NTP.

▸ **CAMEO Chemicals**

Excerpt from ERG Guide 140 [Oxidizers]:

Call 911 or emergency medical service. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Move victim to fresh air if it can be done safely. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. Contaminated clothing may be a fire risk when dry. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Keep victim calm and warm. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ **CAMEO Chemicals**

Signs and Symptoms of Acute Hydrogen Peroxide Exposure: Signs and symptoms of acute exposure to hydrogen peroxide may be severe and include irritation or burns to the skin, eyes, respiratory tract, mouth, esophagus, stomach, and intestines. Distension or rupture of the stomach and other hollow viscera may occur; vomiting is common. Corneal ulceration may develop.

Emergency Life-Support Procedures: Acute exposure to hydrogen peroxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen peroxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self- exposure to hydrogen peroxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

- CAMEO Chemicals

ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- Call 911 or emergency medical service.

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

- Move victim to fresh air if it can be done safely.

- Give artificial respiration if victim is not breathing.

- Administer oxygen if breathing is difficult.

- Remove and isolate contaminated clothing and shoes.

- Contaminated clothing may be a fire risk when dry.

- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

- Keep victim calm and warm.

- Emergency Response Guidebook (ERG)

(See procedures)

Eye: Irrigate immediately - If this chemical contacts the eyes, immediately wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.

Skin: Water flush immediately - If this chemical contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.

Breathing: Respiratory support

Swallow: Medical attention immediately - If this chemical has been swallowed, get medical attention immediately.

- The National Institute for Occupational Safety and Health (NIOSH)

14.3.2 Inhalation First Aid

Fresh air, rest. Half-upright position. Refer immediately for medical attention.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.3.3 Skin First Aid

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. Refer immediately for medical attention .

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.3.4 Eye First Aid

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.3.5 Ingestion First Aid

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.4 Fire Fighting

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

SMALL FIRE: Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

LARGE FIRE: Flood fire area with water from a distance. Do not move cargo or vehicle if cargo has been exposed to heat. If it can be done safely, move undamaged containers away from the area around the fire. Do not get water inside containers: a violent reaction may occur.

FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Cool containers with flooding quantities of water until well after fire is out. Dike runoff from fire control for later disposal. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

SMALL FIRE: Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

LARGE FIRE: Flood fire area with water from a distance. Do not move cargo or vehicle if cargo has been exposed to heat. If it can be done safely, move undamaged containers away from the area around the fire.

FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. For massive fire in cargo area, use unamnned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Not flammable. Fires should be fought with water since the use of chemical extinguishants may accelerate decomposition. Small fires: water only; no dry chemical or carbon dioxide. Large fires: flood fire area with water. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▸ CAMEO Chemicals

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.4.1 Fire Fighting Procedures

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

- Hazardous Substances Data Bank (HSDB)

Advice for firefighters: Wear self-contained breathing apparatus for firefighting if necessary. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

- Hazardous Substances Data Bank (HSDB)

If material involved in fire: Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. /Hydrogen peroxide, aqueous solutions/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 482

- Hazardous Substances Data Bank (HSDB)

Evacuation: If fire becomes uncontrollable - consider evacuation of one-half (1/2) mile radius. /Hydrogen peroxide, aqueous solutions/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 482

- Hazardous Substances Data Bank (HSDB)

14.5 Accidental Release Measures

Public Safety: ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as

necessary))

- CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

- Keep unauthorized personnel away.

- Stay upwind, uphill and/or upstream.

- Ventilate closed spaces before entering, but only if properly trained and equipped.

▸ **Emergency Response Guidebook (ERG)**

Spill or Leak: ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

- Stop leak if you can do it without risk.

- Do not get water inside containers.

Small Dry Spill

- With clean shovel, place material into clean, dry container and cover loosely; move containers from spill area.

Small Liquid Spill

- Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

Large Spill

- Dike far ahead of liquid spill for later disposal.

▸ **Emergency Response Guidebook (ERG)**

Spill or Leak: ERG 2020, Guide 143 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

- Keep combustibles (wood, paper, oil, etc.) away from spilled material.

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

- Use water spray to reduce vapors or divert vapor cloud drift.

- Prevent entry into waterways, sewers, basements or confined areas.

Small Spill

- Flush area with large amounts of water.

Large Spill

- DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.

▸ Emergency Response Guidebook (ERG)

14.5.1 Isolation and Evacuation

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2020)

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

*U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

LARGE SPILL: Consider initial downwind evacuation for at least 100 meters (330 feet).

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. If ammonium nitrate is in a tank, rail car or tank truck and involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para

Emergencias. 2020 Emergency Response Guidebook. https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg (accessed December 14, 2023).

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg (accessed December 14, 2023).

▸ CAMEO Chemicals

Evacuation:ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

Immediate precautionary measure

- Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

- If ammonium nitrate is in a tank, rail car or tank truck and involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions.

- [FLAG] In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the ERAP Program Section (page 390).

▸ Emergency Response Guidebook (ERG)

Evacuation:ERG 2020, Guide 143 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

Immediate precautionary measure

- Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

Spill

- For highlighted materials: see Table 1 - Initial Isolation and Protective Action Distances.

- For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

- [FLAG] In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the ERAP Program Section (page 390).

▸ **Emergency Response Guidebook (ERG)**

14.5.2 Spillage Disposal

Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Absorb liquid in sand or inert absorbent. Do NOT absorb in saw-dust or other combustible absorbents. Carefully collect remainder. Store and dispose of according to local regulations.

▸ **ILO-WHO International Chemical Safety Cards (ICSCs)**

14.5.3 Cleanup Methods

ACCIDENTAL RELEASE MEASURES: Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. Methods and materials for containment and cleaning up: Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. /Hydrogen peroxide solution (>/= 30% to <50%)/

*Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: **https://www.sigmaaldrich.com/safety-center.html***

▸ **Hazardous Substances Data Bank (HSDB)**

Environmental considerations - land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Dilute slowly with water. Absorb bulk liquid with fly ash or cement powder. /Hydrogen peroxide, aqueous solutions/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 482

▸ Hazardous Substances Data Bank (HSDB)

/LABORATORY QUANTITIES/ Wear face shield and goggles, laboratory coat, and butyl rubber gloves. Cover spill with a 1:1:1 mixture by weight of **sodium carbonate** or **calcium carbonate**, clay cat litter (bentonite), and sand. Dampen with **water**. Using a soft plastic scoop, transfer the mix into a container. Transport to the fume hood. Slowly add to a pail of cold **water**. Gradually add to an excess of aqueous **sodium metabisulfite** solution. Decant the liquid to the drain. Treat the solid as normal refuse.

M.A. Armour; Hazardous Laboratory Chemicals Disposal Guide 3RD Edition. Lewis Publishers, Boca Raton, FL 2003, p. 257

▸ Hazardous Substances Data Bank (HSDB)

14.5.4 Disposal Methods

SRP: Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in air, soil or **water**; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. If it is possible or reasonable use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination.

▸ Hazardous Substances Data Bank (HSDB)

Product: Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company; Contaminated packaging: Dispose of as unused product. /Hydrogen peroxide solution (>/= 30% to <50%)/

*Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: **https://www.sigmaaldrich.com/safety-center.html***

▸ Hazardous Substances Data Bank (HSDB)

Wear butyl rubber gloves, eye protection, and laboratory coat. A body shield should be available. In the fume hood, prepare a dilute solution (5%) of peroxide by cautiously adding to a large volume of **water**. Gradually, while stirring, add to a 50% excess of

aqueous **sodium metabisulfite** in a round-bottom flask equipped with a thermometer. An increase in temperature indicates that reaction is taking place. Acidify the reaction if it does not proceed spontaneously. Neutralize the reaction mixture and wash it into the drain.

M.A. Armour; Hazardous Laboratory Chemicals Disposal Guide 3RD Edition. Lewis Publishers, Boca Raton, FL 2003, p. 258

▸ **Hazardous Substances Data Bank (HSDB)**

Dilute and drain with abundant **water**. Recommended method: Discharge to sewer. Recommendable method: Discharge to sewer. Not recommendable methods: Evaporation & oxidation. Peer-review: Extreme caution - potentially explosive. Strong oxidizing agent. Handle in new glass or polished clean **aluminum**. Avoid inhalation. Highly unstable material. (Peer-review conclusions of an IRPTC expert consultation (May 1985))

United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 191

▸ **Hazardous Substances Data Bank (HSDB)**

SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

▸ **Hazardous Substances Data Bank (HSDB)**

14.5.5 Preventive Measures

ACCIDENTAL RELEASE MEASURES: Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. /Hydrogen peroxide solution

(>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Precautions for safe handling: Avoid contact with skin and eyes. Avoid inhalation of vapor or mist. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Appropriate engineering controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

For more Preventive Measures (Complete) data for Hydrogen peroxide (10 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

14.6 Handling and Storage

14.6.1 Nonfire Spill Response

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewers, basements or confined areas.

SMALL SPILL: Flush area with large amounts of water.

LARGE SPILL: DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Do not get water inside containers.

SMALL DRY SPILL: With clean shovel, place material into clean, dry container and cover loosely; move containers from spill area.

SMALL LIQUID SPILL: Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

LARGE SPILL: Dike far ahead of liquid spill for later disposal. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

Caution : Explosion potential is high. Hydrogen peroxide may ignite combustable materials.

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep

out of low areas. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; do not get water inside container.

Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area.

Small spills: flush area with flooding amounts of water.

Large spills: dike far ahead of spill for later disposal. (EPA, 1998)

U.S. Environmental Protection Agency. 1998. Extremely Hazardous Substances (EHS) Chemical Profiles and Emergency First Aid Guides. Washington, D.C.: U.S. Government Printing Office.

▸ **CAMEO Chemicals**

14.6.2 Safe Storage

Store in an area without drain or sewer access. Separated from food and feedstuffs. See Chemical Dangers. Cool. Keep in the dark. Store in vented containers. Store only if stabilized.

▸ **ILO-WHO International Chemical Safety Cards (ICSCs)**

14.6.3 Storage Conditions

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Recommended storage temperature 2 - 8 °C. /Hydrogen peroxide solution (>/= 30% to <50%)/

*Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: **https://www.sigmaaldrich.com/safety-center.html***

▸ **Hazardous Substances Data Bank (HSDB)**

Store in original closed container. Be sure that the container vent is working properly. Do not add any other compound to the container. When empty, flush container thoroughly with clean water.

M.A. Armour; Hazardous Laboratory Chemicals Disposal Guide 3RD Edition. Lewis Publishers, Boca Raton, FL 2003, p. 256

▸ **Hazardous Substances Data Bank (HSDB)**

Keep protected from light and in a cool place.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

Hydrogen peroxide topical solution should be stored in tight, light-resistant containers at 15-30 °C. To ensure greater stability, the inside surfaces of containers should be as free as possible from rough points since these promote decomposition.

American Society of Health-System Pharmacists 2017; Drug Information 2017. Bethesda, MD. 2017

▸ Hazardous Substances Data Bank (HSDB)

14.7 Exposure Control and Personal Protection

Protective Clothing: ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

- Wear positive pressure self-contained breathing apparatus (SCBA).

- Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.

- Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

▸ Emergency Response Guidebook (ERG)

Maximum Allowable Concentration (MAK)

0.5 [ppm]

▸ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

14.7.1 Recommended Exposure Limit (REL)

REL-TWA (Time Weighted Average)

1 ppm (1.4 mg/m³)

▸ Occupational Safety and Health Administration (OSHA)

TWA 1 ppm (1.4 mg/m^3)

- The National Institute for Occupational Safety and Health (NIOSH)

14.7.2 Permissible Exposure Limit (PEL)

1.0 [ppm]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

PEL-TWA (8-Hour Time Weighted Average)

1 ppm (1.4 mg/m³)

- Occupational Safety and Health Administration (OSHA)

TWA 1 ppm (1.4 mg/m^3)

- The National Institute for Occupational Safety and Health (NIOSH)

14.7.3 Immediately Dangerous to Life or Health (IDLH)

75 ppm [From NPG: Hydrogen peroxide] (NIOSH, 2023)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). **https://www.cdc.gov/niosh/npg**.*

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). **https://www.cdc.gov/niosh/npg**.*

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). **https://www.cdc.gov/niosh/npg**.*

- CAMEO Chemicals

75 ppm (NIOSH, 2023)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). **https://www.cdc.gov/niosh/npg**.*

- CAMEO Chemicals

75.0 [ppm]

Excerpts from Documentation for IDLHs: Other animal data: It has been reported that mice tolerated a single 4hour exposure to 75 ppm [Svirbely]. \\ Human data: It has been stated that although the shortterm exposure tolerance is unknown, it is probably about 75 ppm [AIHA 1957]. Death has resulted in a man who drank 100 ml [Raukhverger and

Solodko 1974].

AIHA - Workplace Environmental Exposure Level Guides, Complete Set and Update Set. Fairfax, VA: AIHA, 2008. 1957

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

75 ppm

*NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: **https://www.cdc.gov/niosh/npg***

▸ **Hazardous Substances Data Bank (HSDB); Occupational Safety and Health Administration (...**

75 ppm

See: 772841

▸ **The National Institute for Occupational Safety and Health (NIOSH)**

14.7.4 Threshold Limit Values (TLV)

1.0 [ppm]

▸ **Haz-Map, Information on Hazardous Chemicals and Occupational Diseases**

8 hr Time Weighted Avg (TWA): 1 ppm

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH 2017, p. 36

▸ **Hazardous Substances Data Bank (HSDB)**

Peak Exposure Recommendation: Transient increases in workers' exposure levels may exceed 3 times the value of the TLV-TWA level for no more than 15 minutes at a time, on no more than 4 occasions spaced 1 hour apart during a workday, and under no circumstances should they exceed 5 times the value of the TLV-TWA level. In addition, the 8-hour TWA is not to be exceeded for an 8-hour work period.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH 2017, p. 5

▸ **Hazardous Substances Data Bank (HSDB)**

A3; Confirmed animal carcinogen with unknown relevance to humans.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for

Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH 2017, p. 36

- Hazardous Substances Data Bank (HSDB)

1 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans).

- ILO-WHO International Chemical Safety Cards (ICSCs)

0.71 mg/m

- ILO-WHO International Chemical Safety Cards (ICSCs)

TLV-TWA (Time Weighted Average)

1 ppm [1990]

- Occupational Safety and Health Administration (OSHA)

14.7.5 Emergency Response Planning Guidelines

Emergency Response: ERG 2020, Guide 140 (Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary))

Small Fire

- Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

Large Fire

- Flood fire area with water from a distance.

- Do not move cargo or vehicle if cargo has been exposed to heat.

- If it can be done safely, move undamaged containers away from the area around the fire.

Fire Involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.

- Cool containers with flooding quantities of water until well after fire is out.

- ALWAYS stay away from tanks engulfed in fire.

- For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

- Emergency Response Guidebook (ERG)

Emergency Response: ERG 2020, Guide 143 (Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution, stabilized, with more than 60% Hydrogen peroxide)

Small Fire

- Use water. Do not use dry chemicals or foams. CO2 or Halon® may provide limited control.

Large Fire

- Flood fire area with water from a distance.
- Do not move cargo or vehicle if cargo has been exposed to heat.
- If it can be done safely, move undamaged containers away from the area around the fire.
- Do not get water inside containers: a violent reaction may occur.

Fire Involving Tanks or Car/Trailer Loads

- Cool containers with flooding quantities of water until well after fire is out.
- Dike runoff from fire control for later disposal.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

- Emergency Response Guidebook (ERG)

ERPG-1: 10 ppm - one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]

ERPG-2: 50 ppm - one hour exposure limit: 2 = impaired ability to take protective action [AIHA]

ERPG-3: 100 ppm - one hour exposure limit: 3 = life threatening health effects [AIHA]

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

14.7.6 Other Standards Regulations and Guidelines

Emergency Response Planning Guidlines (ERPGs) for hydrogen peroxide:

ERPG / LEL	Airborne Concentration	Notations
ERPG-1: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour	10 ppm	

ERPG / LEL	Airborne Concentration	Notations
without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.		
ERPG-2: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.	50 ppm	
ERPG-3: The maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.	100 ppm	
LEL (Lower Explosive Limit): The minimum concentration in air of a flammable gas or vapor at which ignition can occur.	None	

2015 Emergency Response Planning Guidelines (ERPG) & Workplace Exposure Level (WEEL). American Industrial Hygiene Association, Falls Church, VA 2015, p. 26

- **Hazardous Substances Data Bank (HSDB)**

14.7.7 Inhalation Risk

A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20 °C.

- **ILO-WHO International Chemical Safety Cards (ICSCs)**

14.7.8 Effects of Short Term Exposure

The substance is corrosive to the eyes, skin and respiratory tract. Corrosive on ingestion. The vapour is severely irritating to the respiratory tract. Ingestion may cause strong foam formation with risk of asphyxiation and aspiration. Exposure to this substance may produce oxygen bubbles (embolism) in the blood, resulting in shock.

- **ILO-WHO International Chemical Safety Cards (ICSCs)**

14.7.9 Effects of Long Term Exposure

Repeated or chronic inhalation of the vapour may cause chronic inflammation of the upper respiratory tract. Lungs may be affected by repeated or prolongated exposure. The substance may have effects on the hair. This may result in bleaching.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.10 Allowable Tolerances

An exemption from the requirement of a tolerance is established for residues of hydrogen peroxide in or on all food commodities at the rate of

40 CFR 180.1197 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

- Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. (a) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Food-contact surfaces in public eating places, dairy-processing equipment, and food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 91 ppm.

40 CFR 180.940(a) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

- Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. ... (b) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Dairy processing equipment, and food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 465 ppm.

40 CFR 180.940(b) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

▸ Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. ... (c) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 1100 ppm.

40 CFR 180.940(c) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: ***https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

14.7.11 Personal Protective Equipment (PPE)

Excerpt from ERG Guide 143 [Oxidizers (Unstable)]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE. Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

▸ CAMEO Chemicals

Excerpt from ERG Guide 140 [Oxidizers]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE. Structural firefighters' protective clothing provides thermal protection but only limited chemical protection. (ERG, 2020)

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para Emergencias. 2020 Emergency Response Guidebook. ***https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg*** *(accessed December 14, 2023).*

U.S. Department of Transportation, Transport Canada, and Secretariat of Communications and Transport of Mexico, with collaboration from Argentina's Centro de Información Química para

*Emergencias. 2020 Emergency Response Guidebook. **https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg** (accessed December 14, 2023).*

▸ **CAMEO Chemicals**

Excerpt from NIOSH Pocket Guide for Hydrogen peroxide:

Skin: PREVENT SKIN CONTACT - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin: WHEN CONTAMINATED - The worker should immediately wash the skin when it becomes contaminated.

Remove: WHEN WET OR CONTAMINATED - Work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide:

• EYEWASH - Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances; this is irrespective of the recommendation involving the wearing of eye protection.

• QUICK DRENCH - Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] (NIOSH, 2023)

*National Institute of Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards (full website version). **https://www.cdc.gov/niosh/npg**.*

▸ **CAMEO Chemicals**

Eye/face protection: Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). /Hydrogen peroxide solution (>/= 30% to <50%)/

*Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: **https://www.sigmaaldrich.com/safety-center.html***

▸ Hazardous Substances Data Bank (HSDB)

Skin protection: Handle with gloves. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Body Protection: Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Respiratory protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

For more Personal Protective Equipment (PPE) (Complete) data for Hydrogen peroxide (14 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

(See protection codes)

Skin: Prevent skin contact - Wear appropriate personal protective clothing to prevent skin contact.

Eyes: Prevent eye contact - Wear appropriate eye protection to prevent eye contact.

Wash skin: When contaminated

Remove: When wet or contaminated

Change: No recommendation

Provide: Eyewash, Quick drench

- The National Institute for Occupational Safety and Health (NIOSH)

14.7.12 Respirator Recommendations

NIOSH/OSHA

Up to 10 ppm:

(APF = 10) Any supplied-air respirator*

Up to 25 ppm:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 50 ppm:

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 ppm:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

- The National Institute for Occupational Safety and Health (NIOSH)

14.7.13 Fire Prevention

NO contact with hot surfaces. NO contact with incompatible materials: See Chemical Dangers

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.14 Exposure Prevention

PREVENT GENERATION OF MISTS! AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.15 Inhalation Prevention

Use ventilation, local exhaust or breathing protection.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.16 Skin Prevention

Protective gloves. Protective clothing.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.17 Eye Prevention

Wear safety goggles or face shield.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.7.18 Ingestion Prevention

Do not eat, drink, or smoke during work.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.8 Stability and Reactivity

14.8.1 Air and Water Reactions

An aqueous solution.

- CAMEO Chemicals

An aqueous solution that is readily diluted.

- CAMEO Chemicals

Water soluble.

- CAMEO Chemicals

14.8.2 Reactive Group

Oxidizing Agents, Strong

Water and Aqueous Solutions

- CAMEO Chemicals

Oxidizing Agents, Strong

- CAMEO Chemicals

14.8.3 Reactivity Alerts

Explosive

Strong Oxidizing Agent

- CAMEO Chemicals

Strong Oxidizing Agent

- CAMEO Chemicals

14.8.1 CSL Reaction Information

1 of 5	
CSL No	CSL00009
Reactants/Reagents	ACETONE; Hydrogen peroxide

GHS Category	Explosive
Warning Message	Formation of acetone peroxides possible. Try to avoid combination or check for peroxides
Source Reference	ACS Safety Letters
CSL Status	Approved
Modified Date	6/29/2018

▸ Pistoia Alliance Chemical Safety Library

2 of 5	
CSL No	CSL00021
Reactants/Reagents	Acetic anhydride; Hydrogen peroxide
Reaction Class	oxidation
GHS Category	Explosive
Warning Message	explosion hazard: anhydride could have combined with peracetic acid to form diacetyl peroxide. This organic peroxide is known to be a shock-sensitive explosive
Source Reference	C&EN
CSL Status	Approved
Modified Date	8/7/2018

▸ Pistoia Alliance Chemical Safety Library

3 of 5	
CSL No	CSL00022
Reactants/Reagents	Hydrogen peroxide; DMSO
GHS Category	Gas Under Pressure
Warning Message	Overpressurization Hazard if heated above 150 degrees C
Source Reference	C&EN
CSL Status	Approved

Modified Date	8/7/2018

▸ Pistoia Alliance Chemical Safety Library

4 of 5	
CSL No	CSL00041
Reactants/Reagents	Steel Drum; Hydrogen peroxide
Function Group	peroxide
GHS Category	Explosive
Warning Message	Steel drum burst when used for storing peroxide waste
Source Reference	User-Reported
CSL Status	Approved
Modified Date	5/31/2018

▸ Pistoia Alliance Chemical Safety Library

5 of 5	
CSL No	CSL00050
Reactants/Reagents	Hydrogen peroxide
Reaction Class	oxidation
GHS Category	Explosive,Oxidizer
Warning Message	When using hydrogen peroxide make sure to completely quench all of the unreacted hydrogen peroxide before concentrating the reaction solution (or workup) to avoid an explosion.
Source Reference	User-Reported
CSL Status	Approved
Modified Date	5/24/2018

▸ Pistoia Alliance Chemical Safety Library

14.8.4 Reactivity Profile

HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED, WITH MORE THAN 60% HYDROGEN PEROXIDE is a powerful oxidizing agent. Will react or decompose violently and exothermically with readily oxidizable materials or alkaline substances. May decompose violently in contact with **iron**, **copper**, **chromium**, and most other metals or their salts, which act as catalysts for this reaction, and with ordinary dust (which frequently contain rust, also a catalyst for this reaction). Stabilization operates against such reactions, but does not eliminate their possibility. Contact with combustible materials may result in their spontaneous ignition. Solutions containing over 30% hydrogen peroxide can detonate when mixed with organic solvents (such as **acetone**, **ethanol**, **glycerol**); the violence of the explosion increases with increasing concentration of the hydrogen peroxide. Concentration of solutions of hydrogen peroxide under vacuum led to violent explosions when the concentration was sufficiently high (>90%) [Bretherick 2nd ed., 1979]. Mixtures of aqueous hydrogen peroxide with 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% **sulfuric acid** [Chem. Eng. News 45(43):73(1967); J, Org. Chem. 28:1893(1963)]. **Hydrogen selenide** and hydrogen peroxide undergo a very rapid reaction [Mellor 1:941(1946-1947)].

▸ CAMEO Chemicals

The hazards associated with the use of HYDROGEN PEROXIDE (especially highly concentrated solutions) are well documented. There is a release of enough energy during the catalytic decomposition of 65% peroxide to evaporate all **water** and ignite nearby combustible materials. Most **cellulose** materials contain enough catalyst to cause spontaneous ignition with 90% peroxide. Contamination of concentrated peroxide causes the possibility of explosion. Readily oxidizable materials, or alkaline substances containing heavy metals may react violently. Solvents(**acetone**, **ethanol**, **glycerol**) will detonate on mixture with peroxide of over 30% concentration, the violence increasing with concentration. Concentrated peroxide may decompose violently in contact with **iron**, **copper**, **chromium**, and most other metals or their salts, and dust(which frequently contain rust). During concentration under vacuum of aqueous or of aqueous-alcoholic solutions of hydrogen peroxide, violent explosions occurred when the concentration was sufficiently high(>90%), [Bretherick 2nd ed., 1979]. Mixtures of alcohols with concentrated **sulfuric acid** and strong hydrogen peroxide can cause explosions. Example: An explosion will occur if **dimethylbenzylcarbinol** is added to 90% hydrogen peroxide then acidified with concentrated **sulfuric acid**. Mixtures of **ethyl alcohol** with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70%

sulfuric acid, [Chem. Eng. News 45(43):73(1967); J, Org. Chem. 28:1893(1963)]. Hydrogen selenide and hydrogen peroxide undergo a very rapid decomposition, [Mellor 1:941(1946-1947)].

▸ CAMEO Chemicals

14.8.5 Hazardous Reactivities and Incompatibilities

Incompatible materials: Zinc, powdered metals, iron, copper, nickel, brass, iron and iron salts. /Hydrogen peroxide solution (>/= 30% to <50%)/

Sigma-Aldrich; Safety Data Sheet for Hydrogen peroxide solution. Product Number: 95321, Version 4.19 (Revision Date 06/27/2016). Available from, as of September 29, 2017: https://www.sigmaaldrich.com/safety-center.html

▸ Hazardous Substances Data Bank (HSDB)

Ignition on contact with furfuryl alcohol; powdered metals (e.g., magnesium; iron); wood. Violent reaction with aluminum isopropoxide + heavy metal salts; charcoal; coal; dimethylphenylphosphine; hydrogen selenide; lithium tetrahydroaluminate; metals (e.g., potassium, sodium, lithium); metal oxides (e.g., cobalt oxide, iron oxide, lead oxide, lead hydroxide, manganese oxide, mercury oxide, nickel oxide); metal salts (e.g., calcium permanganate); methanol + phosphoric acid; 4-methyl-2,4,6-triazatricyclo [5.2.2.0(2,6)] undeca-8-ene-3,5-dione + potassium hydroxide; alpha-phenylselenoketones; phosphorus; phosphorus(V) oxide; tin(II) chloride; unsaturated organic compounds.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1989

▸ Hazardous Substances Data Bank (HSDB)

Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, silver, manganese [Note: Contact with combustible material may result in SPONTANEOUS combustion].

NIOSH. NIOSH Pocket Guide to Chemical Hazards. Department of Health & Human Services, Centers for Disease Control & Prevention. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2010-168 (2010). Available from: https://www.cdc.gov/niosh/npg

▸ Hazardous Substances Data Bank (HSDB)

Most cellulose materials contain enough catalyst to cause spontaneous ignition with 90% peroxide. ... Soluble fuels (acetone, ethanol, and glycerol) will detonate on admixture with peroxide of over 30% concentration, the violence increasing with concentration. Handling systems must exclude fittings of iron, brass, copper, Monel, and screwed joints

caulked with red lead. ... Addition of charcoal to concentrated hydrogen peroxide results in violent decompositon.

M.A. Armour; Hazardous Laboratory Chemicals Disposal Guide 3RD Edition. Lewis Publishers, Boca Raton, FL 2003, p. 256-7

▸ Hazardous Substances Data Bank (HSDB)

For more Hazardous Reactivities and Incompatibilities (Complete) data for Hydrogen peroxide (7 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

14.9 Transport Information

14.9.1 DOT Emergency Guidelines

/GUIDE 140 OXIDIZERS/ Fire or Explosion: These substances will accelerate burning when involved in a fire. Some may decompose explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. /Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide/

U.S. Department of Transportation. 2016 Emergency Response Guidebook. Washington, D.C. 2016

▸ Hazardous Substances Data Bank (HSDB)

/GUIDE 140 OXIDIZERS/ Health: Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause pollution. /Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide/

U.S. Department of Transportation. 2016 Emergency Response Guidebook. Washington, D.C. 2016

▸ Hazardous Substances Data Bank (HSDB)

/GUIDE 140 OXIDIZERS/ Public Safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate

telephone number listed on the inside back cover. As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids. Keep unauthorized personnel away. Stay upwind, uphill and/or upstream. Ventilate closed spaces before entering. /Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide/

U.S. Department of Transportation. 2016 Emergency Response Guidebook. Washington, D.C. 2016

- **Hazardous Substances Data Bank (HSDB)**

/GUIDE 140 OXIDIZERS/ Protective Clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing will only provide limited protection. /Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide/

U.S. Department of Transportation. 2016 Emergency Response Guidebook. Washington, D.C. 2016

- **Hazardous Substances Data Bank (HSDB)**

For more DOT Emergency Guidelines (Complete) data for Hydrogen peroxide (16 total), please visit the **HSDB record page**.

- **Hazardous Substances Data Bank (HSDB)**

14.9.2 DOT ID and Guide

2984 140 (8-20% solution)
2014 140 (20-60% solution)
2015 143 (>60% solution)

- **The National Institute for Occupational Safety and Health (NIOSH)**

14.9.3 Shipping Name / Number DOT/UN/NA/IMO

UN 2014; **Hydrogen**, peroxide, aqueous solutions with more than 40 percent but not more than 60 percent hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solutions with not less than 20 percent but not more than 40 percent hydrogen

peroxide (stabilized as necessary)

- Hazardous Substances Data Bank (HSDB)

UN 2015; Hydrogen peroxide, stabilized or Hydrogen peroxide aqueous solutions, stabilized with more than 60 percent hydrogen peroxide

- Hazardous Substances Data Bank (HSDB)

UN 2984; Hydrogen, peroxide, aqueous solutions with not less than 8 percent but less than 20 percent hydrogen peroxide (stabilized as necessary)

- Hazardous Substances Data Bank (HSDB)

IMO 5.1; Hydrogen peroxide, aqueous solution with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, stabilized or hydrogen peroxide, aqueous solution, stabilized with more than 60% hydrogen peroxide; Hydrogen peroxide, aqueous solution with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)

- Hazardous Substances Data Bank (HSDB)

14.9.4 Shipment Methods and Regulations

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

*49 CFR 171.2 (USDOT); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 9, 2017: **https://www.ecfr.gov***

- Hazardous Substances Data Bank (HSDB)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. Hydrogen peroxide, aqueous solution with 20% or more but 40% or less hydrogen peroxide (stabilized as necessary); Hydrogen peroxide with more than 40% but 60% or less hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, stabilized with more than 60% hydrogen peroxide; Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution with 8% or more but less than 20% hydrogen peroxide (stabilized as necessary) are

included on the dangerous goods list. /Hydrogen peroxide, aqueous solution with 20% or more but 40% or less hydrogen peroxide (stabilized as necessary); Hydrogen peroxide with more than 40% but 60% or less hydrogen peroxide (stabilized as necessary); Hydrogen peroxide, aqueous solution, stabilized with more than 60% hydrogen peroxide; Hydrogen peroxide, stabilized; Hydrogen peroxide, aqueous solution with 8% or more but less than 20% hydrogen peroxide (stabilized as necessary)/

International Air Transport Association. Dangerous Goods Regulations. 57th Edition. Montreal, Quebec Canada. 2016., p. 264

▸ **Hazardous Substances Data Bank (HSDB)**

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. Hydrogen peroxide, aqueous solution with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary); Hydrogen peroxide stabilized or hydrogen peroxide, aqueous solution, stabilized with more than 60% hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary) are included on the dangerous goods list. /Hydrogen peroxide, aqueous solution with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary); Hydrogen peroxide stabilized or hydrogen peroxide, aqueous solution, stabilized with more than 60% hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)/

International Maritime Organization. IMDG Code. International Maritime Dangerous Goods Code Volume 2 2014, p. 98, 145

▸ **Hazardous Substances Data Bank (HSDB)**

14.9.5 DOT Label

Oxidizer Corrosive

▸ **CAMEO Chemicals**

Oxidizer

▸ **CAMEO Chemicals**

14.9.6 Packaging and Labelling

Special material.

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.9.7 UN Classification

UN Hazard Class: 5.1; UN Subsidiary Risks: 8; UN Pack Group: I

- ILO-WHO International Chemical Safety Cards (ICSCs)

14.10 Regulatory Information

REACH Registered Substance

Status: Active Update: 06-10-2022 https://echa.europa.eu/registration-dossier/-/registered-dossier/15701

Status: Active Update: 07-07-2020 https://echa.europa.eu/registration-dossier/-/registered-dossier/23353

- European Chemicals Agency (ECHA)

New Zealand EPA Inventory of Chemical Status

Hydrogen peroxide (H2O2) - do not use: Does not have an individual approval but may be used under an appropriate group standard

- New Zealand Environmental Protection Authority (EPA)

14.10.1 CERCLA Reportable Quantities

Releases of CERCLA hazardous substances are subject to the release reporting requirement of CERCLA section 103, codified at 40 CFR part 302, in addition to the requirements of 40 CFR part 355. Hydrogen peroxide (Conc >52%) is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 1,000 lbs.

40 CFR 355 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

▸ Hazardous Substances Data Bank (HSDB)

14.10.2 FIFRA Requirements

An exemption from the requirement of a tolerance is established for residues of hydrogen peroxide in or on all food commodities at the rate of

40 CFR 180.1197 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: ***https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. (a) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Food-contact surfaces in public eating places, dairy-processing equipment, and food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 91 ppm.

40 CFR 180.940(a) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: ***https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. ... (b) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Dairy processing equipment, and food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 465 ppm.

40 CFR 180.940(b) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: ***https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

Residues of the following chemical substances are exempted from the requirement of a

tolerance when used in accordance with good manufacturing practice as ingredients in an antimicrobial pesticide formulation, provided that the substance is applied on a semi-permanent or permanent food-contact surface (other than being applied on food packaging) with adequate draining before contact with food. ... (c) The following chemical substances when used as ingredients in an antimicrobial pesticide formulation may be applied to: Food-processing equipment and utensils. Hydrogen peroxide is included on this list. Limit: When ready for use, the end-use concentration is not to exceed 1100 ppm.

40 CFR 180.940(c) (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

- **Hazardous Substances Data Bank (HSDB)**

For more FIFRA Requirements (Complete) data for Hydrogen peroxide (6 total), please visit the HSDB record page.

- **Hazardous Substances Data Bank (HSDB)**

14.10.3 FDA Requirements

Hydrogen peroxide is an indirect food additive for use only as a component of adhesives.

21 CFR 175.105 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

- **Hazardous Substances Data Bank (HSDB)**

Substance added directly to human food affirmed as generally recognized as safe (GRAS). In accordance with section184.1(b)(2), the ingredient is used to treat food only within the following specific limitations:

Food	Maximum treatment level in food (percent)	Functional use
Milk, intended for use during the cheesemaking process as permitted in the appropriate standards of identity for cheese and related cheese products under part 133 of this chapter	0.05	Antimicrobial agent as defined in section 170.3 (o)(2) of this chapter
Whey, during the preparation of modified whey by electrodialysis methods	0.04	Antimicrobial agent as defined in section 170.3 (o)(2) of this chapter

Food	Maximum treatment level in food (percent)	Functional use
Dried eggs, dried egg whites, and dried egg yolks as in sections 160.105, 160.145, and 160.185 of this chapter	Amount sufficient for the purpose	Oxidizing and reducing agent as defined in section 170.3 (o)(22) of this chapter
Tripe	Amount sufficient for the purpose	Bleaching agent
Beef feet	Amount sufficient for the purpose. (Hydrogen peroxide may be in the form of a compound salt, sodium carbonate peroxide)	Bleaching agent
Herring	Amount sufficient for the purpose	Bleaching agent
Wine	Ammount sufficient for the purpose	Oxidizing and reducing agent as defined in section 170.3 (o)(22) of this chapter.
Starch	0.15	Antimicrobial agent as defined in section 170.3 (o)(2) of this chapter, to produce thermophile-free starch; Remove sulfur dioxide from starch slurry following steeping and grinding operations of corn refining.
Instant tea	Amount sufficient for the purpose	Bleaching agent
Corn syrup	0.15	Reduce sulfur dioxide levels in the finished corn syrup.
Wine vinegar	Amount sufficient for the purpose	Remove sulfur dioxide from wine prior to fermentation to produce vinegar.
Emulsifiers containing fatty acid esters	1.25	Bleaching agent

*21 CFR 184.1366 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: **https://www.ecfr.gov***

▸ Hazardous Substances Data Bank (HSDB)

Hydrogen peroxide used as a bleaching agent in animal drugs, feeds, and related products is generally recognized as safe when used in accordance with good manufacturing or feeding practice.

21 CFR 582.1366 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of October 2, 2017: https://www.ecfr.gov

▸ Hazardous Substances Data Bank (HSDB)

The Generic Animal Drug and Patent Restoration act requires that each sponsor of an approved animal drug must submit to the FDA certain information regarding patents held for the animal drug or its method of use. The Act requires that this information, as well as a list of all animal drug products approved for safety and effectiveness, be made available to the public. Hydrogen peroxide is included on this list.

US FDA/Center for Veterinary Medicine; The Green Book - On Line, Active Ingredients. Hydrogen Peroxide (7722-84-1). Available from, as of November 27, 2017: https://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/default.htm

▸ Hazardous Substances Data Bank (HSDB)

14.11 Other Safety Information

14.11.1 Other Hazardous Reactions

A very powerful oxidizer.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ Hazardous Substances Data Bank (HSDB)

Highly dangerous; when heated, shocked, or contaminated, the concentrated material can explode or start fires.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1989

▸ Hazardous Substances Data Bank (HSDB)

14.11.2 Special Reports

USEPA/Office of Pesticide Programs; Reregistration Eligibility Decision Document - Peroxy Compounds (December 1993). The RED summarizes the risk assessment conclusions and outlines any risk reduction measures necessary for the pesticide to continue to be registered in the USA.[Available from, as of October 11, 2017: http://www.epa.gov/pesticides/reregistration/status.htm]

- Hazardous Substances Data Bank (HSDB)

Cantoni O et al; Role of Metal Ions in Oxidant Cell Injury. Biol Trace Elem Res 21): 277-81 (1989). This paper represents a short review of recent data on the molecular mechanism(s) of hydrogen peroxide cytotoxicity.

- Hazardous Substances Data Bank (HSDB)

Ward PA; Mechanisms of Endothelial Cell Killing by H2O2 or Products of Activated Neutrophils. Am J Med 91 (3C): 89S-94S (1991).

- Hazardous Substances Data Bank (HSDB)

15 Toxicity

15.1 Toxicological Information

15.1.1 Toxicity Summary

IDENTIFICATION AND USE: Hydrogen peroxide is a colorless liquid. It is an oxidizing agent which, in the presence of organic matter or if permitted to become alkaline, vigorously decomposes to oxygen and water. Hydrogen peroxide is used as a 6% solution for bleaching hair, and some disinfectant solutions for contact lenses contain a 3% hydrogen peroxide. Chlorine-free bleaches contain 6% hydrogen peroxide. Some newer fabric stain removers and bleaches contain 5% to 15% hydrogen peroxide. Industrial strengths of hydrogen peroxide are manufactured up to 90%. They are used mainly as bleaching and oxidizing agents. Solutions of 90% are used as rocket fuel. HUMAN STUDIES: The dissociation of hydrogen peroxide is a violent and exothermic reaction. Ingestion results in gastrointestinal irritation, the severity of which depends on the concentration of the solution. There is also a risk for a gas embolism. A number of deaths have been reported in the literature. In most cases the exposures were to concentrated solutions of 30% to 40%. Other reactions include vomiting (the vomitus may be frothy due to the liberation of oxygen), hematemesis, burning of the throat, and gastric distension due to the release

of oxygen. Lethargy, coma, convulsions, shock and respiratory arrest have also been reported. Gastrointestinal bleeding and burns to the stomach and duodenum may occur. In severe cases ischemic ECG changes and EMD (electromechanical dissociation) may be observed because of embolization of the heart restricting blood flow. Hydrogen peroxide is an irritant to the skin with paraesthesia, blistering and whitening; solutions >10% may cause burns. Hydrogen peroxide is irritating to the eyes with a burning sensation, conjunctival hyperemia, lacrimation, and severe pain which resolves within a few hours. There are rare cases of temporary corneal injury resulting from the application of 3% solution to the eye on contact lenses including punctuate staining of the cornea, decreased vision, corneal opacity and edema. Cerebral infarction resulting from gas embolization of the cerebral vasculature has been reported in an 84-year-old man. Multiple brain embolisms occurred in a 63-year-old who ingested hydrogen peroxide. DNA strand breaks and chromosomal aberrations were studied in human cells treated with hydrogen peroxide. DNA strand breaks could be produced at dose levels of hydrogen peroxide much lower than those which induced chromosomal aberrations. ANIMAL STUDIES: After ip injection of 0.5 mL of 5% hydrogen peroxide into adult mice, a radiation-like effect was observed; pyknotic nuclei were induced in the intestine and thymus within 2 hr and persisted for up to 24 hr. In rabbits and cats that died after iv administration of hydrogen peroxide, the lungs were found to be pale and emphysematous, with considerable amounts of gas in the great veins and in the right side of the heart. Application of a drop of 10 to 30% to rabbit's eye caused superficial corneal haze, and, if there were defects in the epithelium, could cause localized swelling and opacities in the corneal stroma. Also, 5% solution caused superficial corneal haze and much conjunctival reaction, but these effects were gone in 24 hr. Hydrogen peroxide was mutagenic to Salmonella typhimurium TA92 and TA102 and was positive in a forward mutation test in Salmonella typhimurium SV50. Single strand scissions were produced in T7 DNA upon incubation with hydrogen peroxide in aqueous solution at neutral pH. ECOTOXICITY STUDIES: Hydrogen peroxide was not teratogenic in Xenopus developing embryos.

- Hazardous Substances Data Bank (HSDB)

15.1.2 NIOSH Toxicity Data

- The National Institute for Occupational Safety and Health (NIOSH)

15.1.3 Evidence for Carcinogenicity

Evaluation: There is inadequate evidence in humans for the carcinogenicity of hydrogen peroxide. There is limited evidence in experimental animals for the carcinogenicity of hydrogen peroxide. Overall evaluation: Hydrogen peroxide is not classifiable as to its carcinogenicity to humans (Group 3).

*IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: **https://monographs.iarc.fr/ENG/Classification/index.php**, p. 71 683 (1999)*

▸ **Hazardous Substances Data Bank (HSDB)**

A3. Confirmed animal carcinogen with unknown relevance to humans.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH 2017, p. 36

▸ **Hazardous Substances Data Bank (HSDB)**

15.1.4 Carcinogen Classification

IARC Carcinogenic Agent	Hydrogen peroxide
IARC Carcinogenic Classes	Group 3: Not classifiable as to its carcinogenicity to humans
IARC Monographs	Volume 36: (1985) Allyl Compounds, Aldehydes, Epoxides and Peroxides Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print) Volume 71: (1999) Re-evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide (Part 1, Part 2, Part 3)

▸ **International Agency for Research on Cancer (IARC)**

15.1.5 Exposure Routes

The substance can be absorbed into the body by inhalation of its vapour, by ingestion and through the skin.

▸ **ILO-WHO International Chemical Safety Cards (ICSCs)**

inhalation, ingestion, skin and/or eye contact

- The National Institute for Occupational Safety and Health (NIOSH)

15.1.6 Symptoms

irritation eyes, nose, throat; corneal ulcer; erythema (skin redness), vesiculation skin; bleaching hair

- The National Institute for Occupational Safety and Health (NIOSH)

15.1.7 Inhalation Symptoms

Sore throat. Cough. Dizziness. Headache. Nausea. Shortness of breath.

- ILO-WHO International Chemical Safety Cards (ICSCs)

15.1.8 Skin Symptoms

MAY BE ABSORBED! Skin discoloration. Swelling. Redness. Pain. Skin burns.

- ILO-WHO International Chemical Safety Cards (ICSCs)

15.1.9 Eye Symptoms

Redness. Pain. Blurred vision. Corneal damage. Burns.

- ILO-WHO International Chemical Safety Cards (ICSCs)

15.1.10 Ingestion Symptoms

Aspiration hazard! Sore throat. Abdominal pain. Abdominal distension. Shock or collapse.

- ILO-WHO International Chemical Safety Cards (ICSCs)

15.1.11 Target Organs

Eyes, skin, respiratory system

- The National Institute for Occupational Safety and Health (NIOSH)

15.1.12 Adverse Effects

Dermatotoxin - Skin burns.

Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

ACGIH Carcinogen - Confirmed Animal.

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

15.1.13 Acute Effects

- ChemIDplus

15.1.14 Toxicity Data

LC50 (rat) = 2,000 mg/m3/4 hr

- Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

15.1.15 Interactions

To explore the cardiac effects of iron with or without hydrogen peroxide, the isolated perfused rat heart and enzymatically isolated ventricular cardiomyocyte were used. It was shown that treatment with cell-permeable iron (Fe-HQ) for 10 min reduced the contractile amplitude and velocity and end diastolic cell length in the cardiomyocyte and increased the contents of lactate dehydrogenase (LDH) and creatine kinase (CK) in the coronary effluent and malondialdehyde (MDA) in the myocardium. The left ventricular developed pressure (LVDP), +/-dP/dtmax, and heart rate and coronary flow showed a biphasic phase, an increase at first followed by a decline. Treatment with hydrogen peroxide for 10 min following Fe-HQ augmented the effect of iron with an increase in coronary LDH and CK release and myocardial MDA content, and decrease in LVDP, +/-dP/dtmax and heart rate. Perfusion of reduced glutathione with hydrogen peroxide counteracted these effects of Fe-HQ and hydrogen peroxide while dimethyl sulfoxide had no effect on the injury induced by Fe-HQ and hydrogen peroxide in the isolated rat

heart. This suggests that augmentation of myocardial injury as a result of an increase in intracellular iron by hydrogen peroxide might involve the dysfunction of sulfydryl group containing proteins but not the hydroxyl radicals.

PMID:11952166

Chen YY et al; Mol Cell Biochem 231 (1-2): 61-8 (2002)

▸ Hazardous Substances Data Bank (HSDB)

It has been shown that the mucolytic agent erdosteine (N-carboxymethylthio-acetyl-homocysteine thiolactone) has anti-inflammatory and anti-oxidant properties, and an active metabolite I (MET I) containing pharmacologically active sulphydryl group has been found to have a free radical scavenging activity. The aim of this study was to assess the ability of erdosteine metabolite I to protect A549 human lung adenocarcinoma cell against hydrogen peroxide (H2O2)-mediated oxidative stress and oxidative DNA damage. When A549 cells were pre-treated with the active metabolite I (2.5-5-10 ug/mL) for 10-30 min and then exposed to H2O2 (1-4 mM) for two additional hours at 37 degrees C, 5% at CO2, the intracellular peroxide production, reflected by dichlorofluorescein (DCF) fluorescence, decreased in a concentration-dependent manner. Furthermore, using a comet assay as an indicator for oxidative DNA damage, it was found that the metabolite I prevented damage to cells exposed to short-term H2O2 treatment. The data suggest that this compound is effective in preventing H2O2-induced oxidative stress and DNA damage in A549 cells. The underlying mechanisms involve the scavenging of intracellular reactive oxygen species (ROS).

PMID:22282957

Marabini L et al; Arzneimittelforschung 61 (12): 700-6 (2011)

▸ Hazardous Substances Data Bank (HSDB)

Oxidative stress reduces cell viability and contributes to disease processes. Flavonoids including anthocyanins and proanthocyanidins reportedly induce intracellular antioxidant defense systems. Thus, in this study, we examined the antioxidant effects of a commercial extract from black soybean seed coats (BE), which are rich in anthocyanin and proanthocyanidin, and investigated the associated intracellular mechanisms in HepG2 cells. HepG2 cells treated with hydrogen peroxide (HPO) showed 60% viability, whereas pretreatment with BE-containing media for 2 hr ameliorated HPO-mediated cell death by up to 90%. Pretreatment with BE for 2 hr partially blocked HPO-mediated activation of extracellular-signal-regulated kinase (ERK) in HepG2 cells, and that for 1 hr led to a 20% increase in intracellular total protein phosphatase (PP) activity, which is known to deactivate protein kinases. These results indicate that BE prevents HPO-mediated cell damage by inhibiting ERK signaling, potentially via PPs.

PMID:26226966

Hashimoto N et al; J Nutr Sci Vitaminol (Tokyo) 61 (3): 275-9 (2015)

▸ Hazardous Substances Data Bank (HSDB)

Hydrogen peroxide (HP) or cyanide (CN) are bacteriostatic at low-millimolar concentrations for growing Escherichia coli, whereas CN+HP mixture is strongly bactericidal. We show that this synergistic toxicity is associated with ... chromosomal fragmentation. Since CN alone does not kill at any concentration, while HP alone kills at 20 mM, CN must potentiate HP poisoning. The CN+HP killing is blocked by iron chelators, suggesting Fenton's reaction. Indeed, we show that CN enhances plasmid DNA relaxation due to Fenton's reaction in vitro. However, mutants with elevated iron or HP pools are not acutely sensitive to HP-alone treatment, suggesting that, in addition, in vivo CN recruits iron from intracellular depots. We found that part of the CN-recruited iron pool is managed by ferritin and Dps: ferritin releases iron on cue from CN, while Dps sequesters it, quelling Fenton's reaction. We propose that disrupting intracellular iron trafficking is a common strategy employed by the immune system to kill microbes.

PMID:25598241

Full text: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4414041

Mahaseth T, Kuzminov A; Mol Microbiol 96 (2): 349-67 (2015)

▸ Hazardous Substances Data Bank (HSDB)

For more Interactions (Complete) data for Hydrogen peroxide (9 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

15.1.16 Antidote and Emergency Treatment

Immediate first aid: Ensure adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Oxidizers/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 152-3

▸ Hazardous Substances Data Bank (HSDB)

Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer **oxygen** by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary ... . Monitor for shock and treat if necessary ... . For eye contamination, flush eyes immediately with **water**. Irrigate each eye continuously with 0.9% saline (NS) during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of **water** for dilution if the patient can swallow, has a strong gag reflex, and does not drool ... . Do not attempt to neutralize because of exothermic reaction. Cover skin burns with dry, sterile dressings after decontamination ... . /Oxidizers/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 153

▸ Hazardous Substances Data Bank (HSDB)

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Early intubation, at the first sign of upper airway obstruction, may be necessary. Positive-pressure ventilation techniques with a bag-valve-mask device may be beneficial. Consider drug therapy for pulmonary edema ... . Monitor cardiac rhythm and treat arrhythmias as necessary ... . Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload. ... . Use **proparacaine hydrochloride** to assist eye irrigation ... . /Oxidizers/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3rd revised edition, Elsevier Mosby, St. Louis, MO 2007, p. 153

▸ Hazardous Substances Data Bank (HSDB)

15.1.17 Human Toxicity Excerpts

/SIGNS AND SYMPTOMS/ Potential symptoms of overexposure are irritation of eyes, nose and throat; corneal ulceration; erythema, vesicles on skin; bleaching of hair.

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Cambridge, UK: Royal Society of Chemistry, 2013., p. 889

▸ Hazardous Substances Data Bank (HSDB)

/SIGNS AND SYMPTOMS/ Pure hydrogen peroxide, its solutions, vapors, and mists are very irritating to body tissue. This irritation can vary from mild to severe depending upon the concentration of hydrogen peroxide. For instance, solutions of hydrogen peroxide of 35 wt% and over can easily cause blistering of the skin. ... The eyes are particularly sensitive to this material.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ **Hazardous Substances Data Bank (HSDB)**

/SIGNS AND SYMPTOMS/ Large doses presumably produce gastritis and esophagitis. Cases of rupture of the colon, proctitis and ulcerative colitis have been reported following hydrogen peroxide enemas.

Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984., p. II-107

▸ **Hazardous Substances Data Bank (HSDB)**

/SIGNS AND SYMPTOMS/ Workers exposed to vapors from 90% hydrogen peroxide have noted primarily respiratory irritation, but splash of such high concentration is generally feared as a potential cause of severe corneal damage.

Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 492

▸ **Hazardous Substances Data Bank (HSDB)**

For more Human Toxicity Excerpts (Complete) data for Hydrogen peroxide (33 total), please visit the **HSDB record page**.

▸ **Hazardous Substances Data Bank (HSDB)**

15.1.18 Non-Human Toxicity Excerpts

/LABORATORY ANIMALS: Acute Exposure/ There is so far no generally accepted animal model of chronic cystitis by which potential therapies can be evaluated. In this study, we aimed to establish a new mouse model of cystitis based on the proinflammatory effects of reactive oxygen species. A single intravesical injection of 1.5% hydrogen peroxide (H2O2) significantly increased the numbers of voids by 1 day after injection in female mice, which lasted up to 7 days. The H2O2 injection rapidly increased the bladder weight by 3 hr in parallel with the histological damage and hyperpermeability of urothelial barrier. Although the urothelial dysfunction was recovered to normal by 7 days, increase in bladder weight, edematous thickening of the submucosa, and vascular

hyperpermeability were apparent even 7 days after injection. During the time course, massive infiltration of neutrophils and increased expression of inflammatory cytokines were observed in the bladder. An intraperitoneal administration of **oxybutynin**, **amitriptyline**, **indomethacin**, or **morphine** attenuated the H2O2-induced frequent urination. These findings suggest that an intravesical injection of H2O2 induces relatively long-lasting inflammatory and overactive bladder, compared with existing cystitis models. The intravesical H2O2 injection model may be a simple and useful tool in the pathological study and drug discovery for chronic cystitis.

PMID:23545478

Homan T et al; J Pharmacol Sci 121 (4): 327-37 (2013)

▸ **Hazardous Substances Data Bank (HSDB)**

/LABORATORY ANIMALS: Acute Exposure/ Some clinicians use hydrogen peroxide (H2O2) to clear the lumen of ventilation tubes that become blocked postoperatively. The ototoxicity associated with H2O2 has been controversial. We designed an experiment to test if H2O2 damages the cochlear hair cells using a Chinchilla laniger animal model. Nine chinchillas (18 ears) were included in this study. Each animal was used as its own control. Following the insertion of ventilation tubes in both ears and baseline recordings of the auditory brain stem responses (ABR), we instilled 2 mL of 3 percent H2O2 into their right external auditory canals (experimental ears). H2O2 was left in the external auditory canal for a total of 5 minutes and then was drained. We instilled a **normal saline** control solution in their left ears (control ears) in a similar fashion. ABR recordings were performed 1 day after the last instillation of H2O2 and 5 days later. There was no statistically significant difference in the ABR thresholds of the experimental and control ears. H2O2 did not appear to cause ototoxicity in chinchilla ears with tympanostomy tubes exposed to H2O2 instillation using a standard clinical protocol.

PMID:17275542

Nader ME et al; Otolaryngol Head Neck Surg 136 (2): 216-20 (2007)

▸ **Hazardous Substances Data Bank (HSDB)**

/LABORATORY ANIMALS: Acute Exposure/ We previously established a long-lasting cystitis model by an intravesical injection of hydrogen peroxide (H2O2) into mice. In this study, we assessed the pain-related behaviors in the cystitis model. An intravesical injection of 1.5% H2O2 transiently decreased spontaneous locomotor activity at 3 hr after injection, indicative of acute spontaneous pain. In contrast, licking response to a bladder distention was slowly observed as licks to the lower abdomen at 7 and 14 days after injection, which was attenuated by **amitriptyline** and **morphine**, but not by **oxybutynin**. These results suggest that H2O2-induced chronic cystitis model shows

delayed and long-lasting painful pathological condition.

PMID:26685753

Dogishi K et al; J Pharmacol Sci 129 (4): 244-6 (2015)

▸ Hazardous Substances Data Bank (HSDB)

/LABORATORY ANIMALS: Acute Exposure/ After ip injection of 0.5 mL of 5% hydrogen peroxide into adult mice, a radiation like effect was observed; pyknotic nuclei were induced in the intestine and thymus within 2 hr and persisted for up to 24 hr.

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: https://monographs.iarc.fr/ENG/Classification/index.php, p. V36 297 (1985)

▸ Hazardous Substances Data Bank (HSDB)

For more Non-Human Toxicity Excerpts (Complete) data for Hydrogen peroxide (31 total), please visit the HSDB record page.

▸ Hazardous Substances Data Bank (HSDB)

15.1.19 Non-Human Toxicity Values

LD50 Rabbit iv 15 g/kg

▸ Hazardous Substances Data Bank (HSDB)

LD50 Rat dermal 4060 mg/kg

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 1988

▸ Hazardous Substances Data Bank (HSDB)

15.1.20 Ecotoxicity Values

LD50; Species: Anas platyrhynchos (Mallard Duck) age 16 wk; oral via capsule 1049 mg/kg (95% confidence interval: 830-1332 mg/kg) /35% purity/

USEPA/OPP; Pesticide Ecotoxicity Database (1992) as cited in the ECOTOX database. Available from, as of October 10, 2017

▸ Hazardous Substances Data Bank (HSDB)

LC50; Species: Anas platyrhynchos (Mallard Duck) age 5 days; dietary >5000 ppm for 8 days /35% purity/

USEPA/OPP; Pesticide Ecotoxicity Database (1992) as cited in the ECOTOX database. Available from, as of October 10, 2017

- Hazardous Substances Data Bank (HSDB)

LC50; Species: Colinus virginianus (Northern Bobwhite Quail) age 11 days; dietary >5000 ppm for 8 days /35% purity/

USEPA/OPP; Pesticide Ecotoxicity Database (1992) as cited in the ECOTOX database. Available from, as of October 10, 2017

- Hazardous Substances Data Bank (HSDB)

15.1.21 Populations at Special Risk

Individuals with eye, skin, and chronic respiratory diseases /may be/ at an increased risk.

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 1

- Hazardous Substances Data Bank (HSDB)

15.2 Ecological Information

15.2.1 EPA Ecotoxicity

Pesticide Ecotoxicity Data from EPA

- EPA Pesticide Ecotoxicity Database

15.2.2 ICSC Environmental Data

The substance is toxic to aquatic organisms.

- ILO-WHO International Chemical Safety Cards (ICSCs)

15.2.3 Natural Pollution Sources

Gaseous hydrogen peroxide is a key component and product of the earth's lower atmospheric photochemical reactions, in both clean and polluted atmospheres. Atmospheric hydrogen peroxide is believed to be generated exclusively by gas-phase photochemical reactions. It has been found in rain and surface water, in human and plant tissues, in foods and beverages and in bacteria(1). Hydrogen peroxide occurs in cloud water with higher values generally occurring in the vicinity of lightning activity(2).

(1) IARC; Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. V71: 671 (1999). Available from, as of Jan 25, 2018: https://monographs.iarc.fr/ENG/Classification/index.php
(2) Barth MC et al; Tellus 41B: 61-9 (1989)

- **Hazardous Substances Data Bank (HSDB)**

15.2.4 Environmental Fate

TERRESTRIAL FATE: Hydrogen peroxide is unstable and breaks down rapidly to oxygen and water(1). Therefore, adsorption to soil, volatilization and biodegradation are not important environmental fate processes in soil(SRC).

(1) ATSDR; ToxFAQs for Hydrogen Peroxide. Atlanta, GA: Agency for Toxic Substances and Disease Registry, US Public Health Service. Available from, as of Oct 23, 2017: https://www.atsdr.cdc.gov/toxprofiles/index.asp

▸ Hazardous Substances Data Bank (HSDB)

AQUATIC FATE: Hydrogen peroxide is unstable and breaks down rapidly to oxygen and water(1). Therefore, adsorption to suspended solids and sediment, volatilization, biodegradation and bioconcentration are not important environmental fate processes in water(SRC).

(1) ATSDR; ToxFAQs for Hydrogen Peroxide. Atlanta, GA: Agency for Toxic Substances and Disease Registry, US Public Health Service. Available from, as of Oct 23, 2017: https://www.atsdr.cdc.gov/toxprofiles/index.asp

▸ Hazardous Substances Data Bank (HSDB)

ATMOSPHERIC FATE: Hydrogen peroxide is unstable and breaks down rapidly to oxygen and water. It is expected to be broken down by sunlight(1).

(1) ATSDR; ToxFAQs for Hydrogen Peroxide. Atlanta, GA: Agency for Toxic Substances and Disease Registry, US Public Health Service. Available from, as of Oct 23, 2017: https://www.atsdr.cdc.gov/toxprofiles/index.asp

▸ Hazardous Substances Data Bank (HSDB)

15.2.5 Atmospheric Concentrations

Measurements of hydrogen peroxide concentrations in the gas-phase and in cloud water were obtained in the vicinity of the USA Carolinas coast between late Jan and early Mar 1986. Gas phase concentrations, determined by a fluorometric method, were always less than 2.4 ppb and generally less than 1 ppb. Vertical profiles of hydrogen peroxide in the clear air around clouds and storm systems were highly variable. Concentrations of hydrogen peroxide in cloud water ranged from the detection limit of 0.3 uM to 112 uM, with higher values generally occurring in the vicinity of lightning activity. Hydrogen peroxide concentrations in cloud water were well below those calculated to be in Henry's law equilibrium with gas-phase concentrations of hydrogen peroxide in the cloudy air.

Barth MC et al; Tellus 41B (1): 61-9 (1989)

▸ Hazardous Substances Data Bank (HSDB)

15.2.6 Probable Routes of Human Exposure

According to the 2016 TSCA Inventory Update Reporting data, 20 reporting facilities estimate the number of persons reasonably likely to be exposed during the manufacturing, processing, or use of hydrogen peroxide in the United States may be as low as 10 workers to less than 10,000 but unknown or unreasonably ascertainable as to how many workers per plant; the data may be greatly underestimated due to confidential business information (CBI) or unknown values(1).

(1) US EPA; Chemical Data Reporting (CDR). Non-confidential 2016 Chemical Data Reporting information on chemical production and use in the United States. Available from, as of Oct 23, 2017: https://www.epa.gov/chemical-data-reporting

▸ Hazardous Substances Data Bank (HSDB)

NIOSH (NOES Survey 1981-1983) has statistically estimated that 1,006,752 workers (727,702 of these are female) are potentially exposed to 90% solution hydrogen peroxide in the US(1). Occupational exposure to hydrogen peroxide may occur through inhalation and dermal contact with this compound at workplaces where hydrogen peroxide is produced or used(SRC). The general population is expected to be exposed to hydroperoxide through the use of consumer products containing this compound(SRC).

(1) CDC; International Chemical Safety Cards (ICSC) 2012. Atlanta, GA: Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health (NIOSH). Ed Info Div. Available from, as of Oct 23, 2017: https://web.archive.org/web/20110717195709/https://www.cdc.gov:80/noes/noes1/agtindex.html

▸ Hazardous Substances Data Bank (HSDB)

16 Associated Disorders and Diseases

▸ Comparative Toxicogenomics Database (CTD)

▸ Therapeutic Target Database (TTD)

Disease	References
Coronary heart disease	PubMed: 7767505, 7858766

- Human Metabolome Database (HMDB)

17 Literature

17.1 Consolidated References

- PubChem

17.2 NLM Curated PubMed Citations

- PubChem

17.3 Springer Nature References

- Springer Nature

17.4 Thieme References

- Thieme Chemistry

17.5 Wiley References

- Wiley

17.6 Chemical Co-Occurrences in Literature

- PubChem

17.7 Chemical-Gene Co-Occurrences in Literature

PubChem

17.8 Chemical-Disease Co-Occurrences in Literature

PubChem

18 Patents

US7381427
US9675639
US9980983
US10098910
US10493103
US10729720

DrugBank

18.1 Depositor-Supplied Patent Identifiers

PubChem

Link to all deposited patent identifiers

PubChem

18.2 WIPO PATENTSCOPE

Patents are available for this chemical structure:

https://patentscope.wipo.int/search/en/result.jsf?inchikey=MHAJPDPJQMAIIY-UHFFFAOYSA-N

PATENTSCOPE (WIPO)

18.3 FDA Orange Book Patents

- FDA Orange Book

18.4 Chemical Co-Occurrences in Patents

- PubChem

18.5 Chemical-Disease Co-Occurrences in Patents

- PubChem

18.6 Chemical-Gene Co-Occurrences in Patents

- PubChem

19 Interactions and Pathways

19.1 Protein Bound 3D Structures

- RCSB Protein Data Bank (RCSB PDB)

View 219 proteins in NCBI Structure

- PubChem

19.1.1 Ligands from Protein Bound 3D Structures

PDBe Ligand Code	PEO
PDBe Structure Code	1D6Z
PDBe Conformer	

- Protein Data Bank in Europe (PDBe)

19.2 Chemical-Target Interactions

- Comparative Toxicogenomics Database (CTD); Drug Gene Interaction database (DGIdb); Dru...

19.3 Drug-Drug Interactions

- DrugBank

19.4 Pathways

- PubChem

20 Biological Test Results

20.1 BioAssay Results

- PubChem

21 Taxonomy

- E. coli Metabolome Database (ECMDB)

22 Classification

22.1 MeSH Tree

- Medical Subject Headings (MeSH)

22.2 NCI Thesaurus Tree

- NCI Thesaurus (NCIt)

22.3 ChEBI Ontology

- ChEBI

22.4 KEGG: Drug

- KEGG

22.5 KEGG: ATC

- KEGG

22.6 KEGG: JP15

- KEGG

22.7 KEGG: Risk Category of Japanese OTC Drugs

- KEGG

22.8 KEGG: OTC drugs

- KEGG

22.9 KEGG: Animal Drugs

- KEGG

22.10 WHO ATC Classification System

- WHO Anatomical Therapeutic Chemical (ATC) Classification

22.11 EPA Safer Choice

- EPA Safer Choice

22.12 ChemIDplus

- ChemIDplus

22.13 CAMEO Chemicals

- CAMEO Chemicals

22.14 IUPHAR / BPS Guide to PHARMACOLOGY Target Classification

- IUPHAR/BPS Guide to PHARMACOLOGY

22.15 ChEMBL Target Tree

- ChEMBL

22.16 UN GHS Classification

- UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

22.17 EPA CPDat Classification

- EPA Chemical and Products Database (CPDat)

22.18 NORMAN Suspect List Exchange Classification

- NORMAN Suspect List Exchange

22.19 EPA DSSTox Classification

- EPA DSSTox

22.20 International Agency for Research on Cancer (IARC) Classification

- International Agency for Research on Cancer (IARC)

22.21 Consumer Product Information Database Classification

- Consumer Product Information Database (CPID)

22.22 LOTUS Tree

- LOTUS - the natural products occurrence database

22.23 EPA Substance Registry Services Tree

EPA Substance Registry Services

23 Information Sources

FILTER BY SOURCE

ALL SOURCES

1. ### Agency for Toxic Substances and Disease Registry (ATSDR)

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https://www.cdc.gov/Other/disclaimer.html

Hydrogen Peroxide
https://wwwn.cdc.gov/TSP/substances/ToxSubstance.aspx?toxid=55

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https://haz-map.com/About

Hydrogen peroxide
https://haz-map.com/Agents/515

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https://cameochemicals.noaa.gov/help/reference/terms_and_conditions.htm?d_f=false

HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED, WITH MORE THAN 60% HYDROGEN PEROXIDE
https://cameochemicals.noaa.gov/chemical/19279

HYDROGEN PEROXIDE, AQUEOUS SOLUTION, WITH NOT LESS THAN 20% BUT NOT MORE THAN 60% HYDROGEN PEROXIDE (STABILIZED AS NECESSARY)
https://cameochemicals.noaa.gov/chemical/890

HYDROGEN PEROXIDE, AQUEOUS SOLUTION, WITH NOT LESS THAN 8% BUT LESS THAN 20% HYDROGEN PEROXIDE
https://cameochemicals.noaa.gov/chemical/891

HYDROGEN PEROXIDE, STABILIZED
https://cameochemicals.noaa.gov/chemical/5023

CAMEO Chemical Reactivity Classification
https://cameochemicals.noaa.gov/browse/react

4. ChEBI

Peroxides
http://www.ebi.ac.uk/chebi/searchId.do?chebiId=CHEBI:25940

ChEBI Ontology
http://www.ebi.ac.uk/chebi/userManualForward.do#ChEBI%20Ontology

5. DrugBank

Hydrogen peroxide
https://www.drugbank.ca/drugs/DB11091

6. E. coli Metabolome Database (ECMDB)

https://ecmdb.ca/compounds/M2MDB001640

7. NCI Thesaurus (NCIt)

https://ncithesaurus.nci.nih.gov/ncitbrowser/ConceptReport.jsp?dictionary=NCI_Thesaurus&ns=ncit&code=C28156

NCI Thesaurus Tree
https://ncit.nci.nih.gov

8. RRUFF Project

hydrogen peroxide
https://rruff.info/

9. CAS Common Chemistry

Hydrogen peroxide (H2O2), radical ion(1+)
https://commonchemistry.cas.org/detail?cas_rn=12325-10-9

Hydrogen peroxide
https://commonchemistry.cas.org/detail?cas_rn=7722-84-1

10. ChemIDplus

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https://www.nlm.nih.gov/copyright.html

Hydrogen peroxide [USP]
https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0007722841

ChemIDplus Chemical Information Classification
https://pubchem.ncbi.nlm.nih.gov/source/ChemIDplus

11. DTP/NCI

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hydrogen peroxide
https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=19892

12. EPA Chemicals under the TSCA

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Hydrogen peroxide (H2O2)
https://www.epa.gov/chemicals-under-tsca

13. EPA DSSTox

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

Hydrogen peroxide
https://comptox.epa.gov/dashboard/DTXSID2020715

CompTox Chemicals Dashboard Chemical Lists
https://comptox.epa.gov/dashboard/chemical-lists/

14. European Chemicals Agency (ECHA)

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https://echa.europa.eu/web/guest/legal-notice

Hydrogen peroxide

https://echa.europa.eu/substance-information/-/substanceinfo/100.028.878

Hydrogen peroxide

https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/53297

15. FDA Global Substance Registration System (GSRS)

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https://www.fda.gov/about-fda/about-website/website-policies#linking

Hydrogen peroxide

https://gsrs.ncats.nih.gov/ginas/app/beta/substances/BBX060AN9V

16. Hazardous Substances Data Bank (HSDB)

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https://www.nlm.nih.gov/web_policies.html

Hydrogen peroxide

https://pubchem.ncbi.nlm.nih.gov/source/hsdb/547

17. Human Metabolome Database (HMDB)

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http://www.hmdb.ca/citing

Hydrogen peroxide

http://www.hmdb.ca/metabolites/HMDB0003125

18. ILO-WHO International Chemical Safety Cards (ICSCs)

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https://www.ilo.org/global/copyright/lang--en/index.htm

HYDROGEN PEROXIDE (>60% SOLUTION IN WATER)

https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=0164

19. New Zealand Environmental Protection Authority (EPA)

LICENSE

Hydrogen peroxide (H2O2) - do not use

https://www.epa.govt.nz/industry-areas/hazardous-substances/guidance-for-importers-and-manufacturers/hazardous-substances-databases/

20. Occupational Safety and Health Administration (OSHA)

HYDROGEN PEROXIDE

https://www.osha.gov/chemicaldata/630

Hydrogen Peroxide (52% by weight or greater)

https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.119AppA

21. The National Institute for Occupational Safety and Health (NIOSH)

Hydrogen peroxide, 90%

https://www.cdc.gov/niosh-rtecs/MXDBBA0.html

Hydrogen peroxide

https://www.cdc.gov/niosh/npg/npgd0335.html

22. Wikipedia

hydrogen peroxide

https://en.wikipedia.org/wiki/Hydrogen_peroxide

23. Emergency Response Guidebook (ERG)

https://pubchem.ncbi.nlm.nih.gov/erg/

24. NJDOH RTK Hazardous Substance List

hydrogen peroxide

http://nj.gov/health/eoh/rtkweb/documents/fs/1015.pdf

25. ChEMBL

https://www.ebi.ac.uk/chembl/compound_report_card/CHEMBL71595/

ChEMBL Protein Target Tree
https://www.ebi.ac.uk/chembl/g/#browse/targets

26. ClinicalTrials.gov

https://clinicaltrials.gov/

27. Comparative Toxicogenomics Database (CTD)

Hioxyl
https://ctdbase.org/detail.go?type=chem&acc=C051288

Hydrogen Peroxide
https://ctdbase.org/detail.go?type=chem&acc=D006861

Peroxides
https://ctdbase.org/detail.go?type=chem&acc=D010545

28. Therapeutic Target Database (TTD)

Hydrogen peroxide
https://idrblab.net/ttd/data/drug/details/D03IDU

29. Drug Gene Interaction database (DGIdb)

HYDROGEN PEROXIDE
https://www.dgidb.org/drugs/HYDROGEN PEROXIDE

30. IUPHAR/BPS Guide to PHARMACOLOGY

H2O2

https://www.guidetopharmacology.org/GRAC/LigandDisplayForward?ligandId=2448

Guide to Pharmacology Target Classification

https://www.guidetopharmacology.org/targets.jsp

31. Consumer Product Information Database (CPID)

Hydrogen peroxide

https://www.whatsinproducts.com/chemicals/view/1/35/007722-84-1

Consumer Products Category Classification

https://www.whatsinproducts.com/

32. Crystallography Open Database (COD)

https://www.crystallography.net/cod/1008189.html

33. DailyMed

HYDROGEN PEROXIDE

https://dailymed.nlm.nih.gov/dailymed/search.cfm?labeltype=all&query=HYDROGEN+PEROXIDE

34. European Medicines Agency (EMA)

Hydrogen Peroxide (P/0268/2019)

https://www.ema.europa.eu/en/medicines/human/paediatric-investigation-plans/emea-001884-pip03-18

Hydrogen Peroxide (P/0143/2016)

https://www.ema.europa.eu/en/medicines/human/paediatric-investigation-plans/emea-001884-pip02-15

35. Drugs@FDA

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https://www.accessdata.fda.gov/scripts/cder/daf/

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https://comptox.epa.gov/dashboard/DTXSID2020715#exposure

EPA CPDat Classification
https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat

37. EPA Pesticide Ecotoxicity Database

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https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources

https://ecotox.ipmcenters.org/

38. EU Pesticides Database

Hydrogen peroxide
https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/?event=as.details&as_id=131

39. EPA Safer Choice

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Hydrogen peroxide
https://www.epa.gov/saferchoice/safer-ingredients

EPA Safer Chemical Ingredients Classification
https://www.epa.gov/saferchoice

40. FDA Approved Animal Drug Products (Green Book)

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https://www.fda.gov/animal-veterinary/products/approved-animal-drug-products-green-book

41. FDA Orange Book

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https://www.fda.gov/drugs/drug-approvals-and-databases/approved-drug-products-therapeutic-equivalence-evaluations-orange-book

42. Joint FAO/WHO Expert Committee on Food Additives (JECFA)

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43. NORMAN Suspect List Exchange

NORMAN Suspect List Exchange Classification

https://www.norman-network.com/nds/SLE/

44. EU Clinical Trials Register

https://www.clinicaltrialsregister.eu/

45. Hazardous Chemical Information System (HCIS), Safe Work Australia

hydrogen peroxide solution

http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=2530

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Hydrogen peroxide - FY2013

https://www.nite.go.jp/chem/english/ghs/13-mhlw-2044e.html

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https://monographs.iarc.who.int/list-of-classifications

IARC Classification
https://www.iarc.fr/

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https://www.rhea-db.org/rhea?query=CHEBI:16240

51. KEGG

https://www.kegg.jp/entry/C00027

https://www.kegg.jp/entry/D00008

Therapeutic category of drugs in Japan
http://www.genome.jp/kegg-bin/get_htext?br08301.keg

Anatomical Therapeutic Chemical (ATC) classification
http://www.genome.jp/kegg-bin/get_htext?br08303.keg

Drugs listed in the Japanese Pharmacopoeia
http://www.genome.jp/kegg-bin/get_htext?br08311.keg

Risk category of Japanese OTC drugs
http://www.genome.jp/kegg-bin/get_htext?br08312.keg

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http://www.genome.jp/kegg-bin/get_htext?br08313.keg

Animal drugs in Japan
http://www.genome.jp/kegg-bin/get_htext?br08331.keg

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53. National Drug Code (NDC) Directory

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https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory

54. ## NIPH Clinical Trials Search of Japan

https://rctportal.niph.go.jp/en/

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https://www.nlm.nih.gov/research/umls/rxnorm/docs/termsofservice.html

hydrogen peroxide
https://rxnav.nlm.nih.gov/id/rxnorm/5499

56. ## Pharos

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https://pharos.nih.gov/about

H₂O₂
https://pharos.nih.gov/ligands/2448

57. ## Pistoia Alliance Chemical Safety Library

LICENSE
https://www.cas.org/sites/default/files/documents/chemical-safety-library-terms.pdf

ACETONE; Hydrogen peroxide
http://www.pistoiaalliance.org/projects/chemical-safety-library/

58. ## Protein Data Bank in Europe (PDBe)

http://www.ebi.ac.uk/pdbe-srv/pdbechem/chemicalCompound/show/PEO

59. ## RCSB Protein Data Bank (RCSB PDB)

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https://www.rcsb.org/pages/policies

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https://spectrabase.com/spectrum/3TOrzgVKeyW

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https://spectrabase.com/spectrum/FfKvNNo74VR

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https://spectrabase.com/spectrum/KdrZO4eUhUq

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61. Springer Nature

https://pubchem.ncbi.nlm.nih.gov/substance/?source=15745&sourceid=2031614-728669644

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https://materials.springer.com/substance/105248/hydrogen_peroxide

63. Thieme Chemistry

https://pubchem.ncbi.nlm.nih.gov/substance/?source=22163&sourceid=2031614-728669644

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https://www.whocc.no/atc_ddd_index/?code=S02AA06

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https://www.whocc.no/atc_ddd_index/?code=D11AX25

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https://www.whocc.no/atc_ddd_index/?code=A01AB02

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https://www.whocc.no/atc_ddd_index/

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https://www.wikidata.org/wiki/Q171877

Hydroperoxyl

https://www.wikidata.org/wiki/Q1088474

66. ## Wiley

https://pubchem.ncbi.nlm.nih.gov/substance/?source=wiley&sourceid=129004

67. ## Medical Subject Headings (MeSH)

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https://www.ncbi.nlm.nih.gov/mesh/68006861

MeSH Tree

http://www.nlm.nih.gov/mesh/meshhome.html

Anti-Infective Agents, Local

https://www.ncbi.nlm.nih.gov/mesh/68000891

Oxidants

https://www.ncbi.nlm.nih.gov/mesh/68016877

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https://pubchem.ncbi.nlm.nih.gov

69. ## UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

GHS Classification Tree

http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

70. ## LOTUS - the natural products occurrence database

LOTUS Tree

https://lotus.naturalproducts.net/

71. ## EPA Substance Registry Services

EPA SRS List Classification

https://sor.epa.gov/sor_internet/registry/substreg/LandingPage.do

72. **PATENTSCOPE (WIPO)**

SID 403030002

https://pubchem.ncbi.nlm.nih.gov/substance/403030002

73. NCBI

https://www.ncbi.nlm.nih.gov/projects/linkout

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