




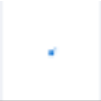



COMPOUND SUMMARY

Sodium permanganate

PubChem CID	23673458
Structure	 2D
Chemical Safety	    Oxidizer Corrosive Irritant Environmental Hazard Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	NaMnO₄ MnNaO₄
Synonyms	SODIUM PERMANGANATE 10101-50-5 sodium;permanganate Sodium permanganate(VII) IZ5356R281 View More...
Molecular Weight	141.925 g/mol <i>Computed by PubChem 2.2 (PubChem release 2021.10.14)</i>
Component Compounds	 CID 5360545 (Sodium)  CID 422689 (Permanganic acid)

Dates	Create: 2008-02-05 Modify: 2024-01-27
Description	<p>Sodium permanganate appears as a purplish colored crystalline solid. Noncombustible but accelerates the burning of combustible material. If the combustible material is finely divided the mixture may be explosive. May spontaneously ignite in contact with liquid combustible materials. Contact with sulfuric acid may cause fires or explosions. Used in medicine, as a disinfectant, and for many other uses.</p> <p>► CAMEO Chemicals</p> <p>Sodium permanganate is a chemical compound of manganese. Its aqueous solutions are used as etchants in printed circuitry. Manganese is a naturally occurring metal with the symbol Mn and the atomic number 25. It does not occur naturally in its pure form, but is found in many types of rocks in combination with other substances such as oxygen, sulfur, or chlorine. Manganese occurs naturally in most foods and small amounts are needed to stay healthy, as manganese ions act as cofactors for a number of enzymes. (L228, L229, L243)</p> <p>► Toxin and Toxin Target Database (T3DB)</p>

1 Structures

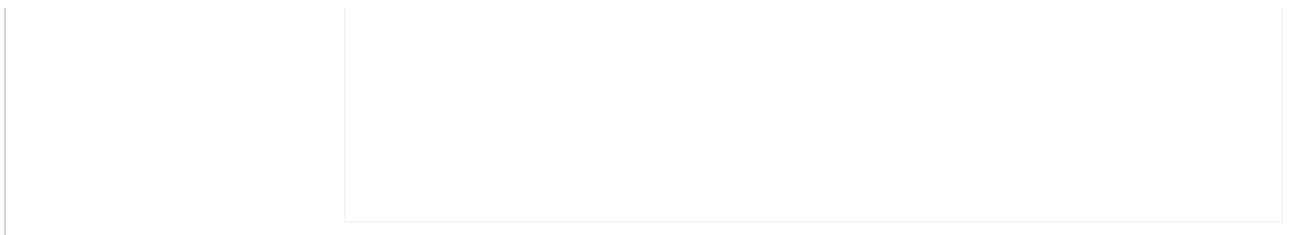


1.1 2D Structure



Structure Search Get Image Download Coordinates

Chemical Structure Depiction



▶ [PubChem](#)

1.2 3D Status



Conformer generation is disallowed since MMFF94s unsupported element, mixture or salt

▶ [PubChem](#)

2 Names and Identifiers



2.1 Computed Descriptors



2.1.1 IUPAC Name



sodium;permanganate

Computed by Lexichem TK 2.7.0 (PubChem release 2021.10.14)

▶ [PubChem](#)

2.1.2 InChI



InChI=1S/Mn.Na.4O/q;+1;;;;-1

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

▶ [PubChem](#)

2.1.3 InChIKey



WPWYHBSOACXYBB-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

▶ [PubChem](#)

2.1.4 Canonical SMILES



[O-][Mn](=O)(=O)=O.[Na+]

Computed by OEChem 2.3.0 (PubChem release 2021.10.14)

▶ [PubChem](#)

2.2 Molecular Formula



NaMnO₄

▶ [CAMEO Chemicals; Wikipedia](#)

MnNaO₄

Computed by PubChem 2.2 (PubChem release 2021.10.14)

▶ [PubChem](#)

2.3 Other Identifiers



2.3.1 CAS



10101-50-5

▶ [CAMEO Chemicals; ChemIDplus; EPA Chemicals under the TSCA; EPA DSSTox; European Che...](#)

2.3.2 Deprecated CAS



1236208-18-6, 2363038-91-7

▶ [ChemIDplus](#)

2.3.3 European Community (EC) Number



[233-251-1](#)

- ▶ [European Chemicals Agency \(ECHA\)](#)

2.3.4 UNII



IZ5356R281

- ▶ [FDA Global Substance Registration System \(GSRS\)](#)

2.3.5 UN Number



1503

- ▶ [CAMEO Chemicals](#)

1503 (Sodium permanganate)

- ▶ [Emergency Response Guidebook \(ERG\)](#)

2.3.6 DEA Code Number



6588 (DEA list II chemical)

21 CFR Section 1310.02(a) <https://www.ecfr.gov/current/title-21/chapter-II/part-1310/section-1310.02>

- ▶ [Drug Enforcement Administration \(DEA\)](#)

2.3.7 DSSTox Substance ID



DTXSID2051504

- ▶ [EPA DSSTox](#)

2.3.8 Wikidata



Q411145

- ▶ [Wikidata](#)

2.3.9 Wikipedia



Sodium permanganate

► [Wikipedia](#)

Sodium_permanganate

► [Wikipedia](#)

2.4 Synonyms



2.4.1 MeSH Entry Terms



sodium permanganate

► [Medical Subject Headings \(MeSH\)](#)

2.4.2 Depositor-Supplied Synonyms



SODIUM PERMANGANATE	Permanganate de sodium [French]	SODIUM PERMANGA
10101-50-5	EINECS 233-251-1	FT-0693945
sodium;permanganate	UN1503	NS00067950
Sodium permanganate(VII)	Permanganic acid (HMnO4), sodium salt	Sodium permangana
IZ5356R281	Permanganic acid, sodium salt	Q411145
Sodium permanganate	Natriumpermanganat	
Permanganato sodico	UNII-IZ5356R281	
Permanganato sodico [Spanish]	EC 233-251-1	
Sodium permanganate (NaMnO4)	DTXSID2051504	
HSDB 762	SODIUM PERMANGANATE [MI]	
Permanganate de sodium	WPWYHBSOACXYBB-UHFFFAOYSA-N	

► [PubChem](#)

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	141.925 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Hydrogen Bond Donor Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Hydrogen Bond Acceptor Count	4	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	141.907471 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Monoisotopic Mass	141.907471 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Topological Polar Surface Area	74.3Å ²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Heavy Atom Count	6	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	118	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	2	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.10.14)

▶ [PubChem](#)

3.2 Experimental Properties



3.2.1 Physical Description



Sodium permanganate appears as a purplish colored crystalline solid. Noncombustible but accelerates the burning of combustible material. If the combustible material is finely divided the mixture may be explosive. May spontaneously ignite in contact with liquid combustible materials. Contact with [sulfuric acid](#) may cause fires or explosions. Used in medicine, as a disinfectant, and for many other uses.

▶ [CAMEO Chemicals](#)

Liquid

▶ [EPA Chemicals under the TSCA](#)

Trihydrate: Reddish-black solid; Very hygroscopic; [Merck Index] Red solid; [HSDB] Purplish solid; [CAMEO] Black-brown crystals; [MSDSonline]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

3.2.2 Color / Form



Red crystals

Hide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 75th ed. Boca Raton, Fl: CRC Press Inc., 1994-1995., p. 4-99

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.3 Melting Point



Decomposes

Hide, D.R. (ed.). CRC Handbook of Chemistry and Physics. 75th ed. Boca Raton, Fl: CRC Press Inc., 1994-1995., p. 4-99

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.4 Solubility



Readily soluble in [water](#) (900 g/l at ambient temperature)

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed. Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA16 (90) 140

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.5 Density



1.972 g/cu cm

Kirk-Othmer Encyclopedia of Chemical Technology. 4th ed. Volumes 1: New York, NY. John Wiley and Sons, 1991-Present., p. V15 (95) 1023

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Red-black hygroscopic crystals; MW 195.972; decompose @ 170 °C; very soluble in [water](#); density 2.47g/cu cm; reacts with [ethanol](#) /Trihydrate/

Lide, DR (ed.). CRC Handbook of Chemistry and Physics. 81st Edition. CRC Press LLC, Boca Raton: FL 2000, p. 4-88

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.6 Other Experimental Properties



Purple to reddish-black crystals or powder /Trihydrate/

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1024

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.7 Chemical Classes



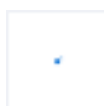
Metals -> [Manganese](#) Compounds, Inorganic

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

4 Related Records



4.1 Component Compounds



CID 5360545 (Sodium)



CID 422689 (Permanganic acid)

▶ [PubChem](#)

4.2 Related Compounds



Mixtures,
Components, and
Neutralized Forms
Count

2

▶ [PubChem](#)

4.3 Substances



4.3.1 Related Substances



Same Count

39

▶ [PubChem](#)

4.3.2 Substances by Category



▶ [PubChem](#)

4.4 NCBI LinkOut



▶ [NCBI](#)

5 Chemical Vendors



▶ [PubChem](#)

6 Drug and Medication Information



6.1 Therapeutic Uses



MANGANOUS ION RESULTING FROM REDN OF **PERMANGANATE** IS ASTRINGENT, & THIS AIDS IN SUPPRESSION OF INFLAMMATION. ... THEIR FORMER EXTENSIVE LOCAL APPLICATION IN TREATMENT OF URETHRITIS HAS BECOME OBSOLETE.

/PERMANGANATES/

Goodman, L.S., and A. Gilman. (eds.) The Pharmacological Basis of Therapeutics. 5th ed. New York: Macmillan Publishing Co., Inc., 1975., p. 998

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

6.2 Drug Warnings



VET: **PERMANGANATE** SOLN DO NOT PENETRATE DEEPLY & HAVE ONLY SUPERFICIAL ACTION. /PERMANGANATES/

Jones, L.M., et al. Veterinary Pharmacology & Therapeutics. 4th ed. Ames: Iowa State University Press, 1977., p. 886

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

6.3 Reported Fatal Dose



5 g for an adult human. (T40)

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

7 Pharmacology and Biochemistry



7.1 Metabolism / Metabolites



Manganese is absorbed mainly via ingestion, but can also be inhaled. It binds to alpha-2-macroglobulin, albumin, or transferrin in the plasma and is distributed to the brain and all other mammalian tissues, though it tends to accumulate more in the liver, pancreas, and kidney. **Manganese** is capable of existing in a number of oxidation states and is believed to undergo changes in oxidation state within the body. **Manganese** oxidation state can influence tissue toxicokinetic behavior, and possibly toxicity. **Manganese** is excreted primarily in the faeces. (L228)

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

8 Use and Manufacturing



8.1 Uses



Sources/Uses

Used as an oxidizing agent, disinfectant, bactericide, and antidote (poisoning by [morphine](#), curare, or [phosphorus](#)); [Hawley] Used to etch plastic parts in printed circuit boards; Formerly used as an astringent in the treatment of urethritis; [HSDB]

Hawley - Lewis R.J. _Hawley's Condensed Chemical Dictionary, _15th Ed. New York: John Wiley & Sons, 2007.

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Oxidizing agent; disinfectant; bactericide; manufacture of [saccharin](#); antidote for poisoning by [morphine](#), curare, and [phosphorus](#). /Trihydrate/

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1024

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Etching of plastic parts such as printed circuit boards, as well as some special organic oxidation reactions, particularly if the presence of [potassium ion](#) is undesirable.

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed. Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA16 (90) 140

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Aqueous solutions of sodium permanganate are used as etchants in printed circuitry. (L243)

► [Toxin and Toxin Target Database \(T3DB\)](#)

8.1.1 DEA Listed Chemicals



Name	Sodium Permanganate
List II Chemical	A chemical, other than a List I chemical, specified by regulation that, in addition to legitimate uses, is used in manufacturing a controlled substance in violation of the Act.

► [Drug Enforcement Administration \(DEA\)](#)

8.1.2 Industry Uses



Deodorizer
 Not Known or Reasonably Ascertainable
 Oxidizing agent
 Oxidizing/reducing agents

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

► [EPA Chemicals under the TSCA](#)

8.1.3 Consumer Uses



Not Known or Reasonably Ascertainable
 Oxidizing agent
 Oxidizing/reducing agents

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

► [EPA Chemicals under the TSCA](#)

8.2 Methods of Manufacturing



Sodium manganate is dissolved in **water** and **chlorine** or **ozone** passed in. The solution is concentrated and crystallized. /Trihydrate/

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1024

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Made by anodic oxidation of ferromanganese in [sodium carbonate](#) solution, via aluminum permanganate, or from [potassium permanganate](#) by the [hexafluorosilicate](#) method. /Monohydrate/

Gerhartz, W. (exec ed.). Ullmann's Encyclopedia of Industrial Chemistry. 5th ed. Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA16 (90) 140

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.3 Formulations / Preparations



Grades: technical; sold commercially in solution. /Trihydrate/

Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 13th ed. New York, NY: John Wiley & Sons, Inc. 1997., p. 1024

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Crystals and 40% solution /available/

Kuney, J.H. and J.N. Nullican (eds.) Chemyclopedia. Washington, DC: American Chemical Society, 1988., p. 212

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.4 U.S. Production



Aggregated Product Volume

2019: 1,000,000 lb - <20,000,000 lb

2018: 1,000,000 lb - <20,000,000 lb

2017: 1,000,000 lb - <20,000,000 lb

2016: 1,000,000 lb - <20,000,000 lb

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

▶ [EPA Chemicals under the TSCA](#)

8.5 General Manufacturing Information



Industry Processing Sectors

All Other Chemical Product and Preparation Manufacturing
 Computer and Electronic Product Manufacturing
 Custom Compounding of Purchased Resins
 Food, beverage, and tobacco product manufacturing
 Not Known or Reasonably Ascertainable
 Oil and Gas Drilling, Extraction, and Support activities
 Other (requires additional information)
 Utilities
 Wholesale and Retail Trade

► [EPA Chemicals under the TSCA](#)

EPA TSCA Commercial Activity Status

Permanganic acid (HMnO4), **sodium** salt: ACTIVE

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

► [EPA Chemicals under the TSCA](#)

9 Safety and Hazards



9.1 Hazards Identification



9.1.1 GHS Classification



Pictogram(s)



Oxidizer

Corrosive

Irritant

Environmental Hazard

Signal

Danger

GHS Hazard Statements

H272 (96.43%): May intensify fire; oxidizer [**Danger** Oxidizing liquids; Oxidizing solids]

H302 (94.64%): Harmful if swallowed [**Warning** Acute toxicity, oral]

H314 (95.54%): Causes severe skin burns and eye damage [**Danger** Skin corrosion/irritation]

H318 (40.18%): Causes serious eye damage [**Danger** Serious eye damage/eye irritation]

H400 (90.18%): Very toxic to aquatic life [**Warning** Hazardous to the

	<p>aquatic environment, acute hazard]</p> <p>H410 (90.18%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]</p>
Precautionary Statement Codes	<p>P210, P220, P260, P264, P264+P265, P270, P273, P280, P301+P317, P301+P330+P331, P302+P361+P354, P304+P340, P305+P354+P338, P316, P317, P321, P330, P363, P370+P378, P391, P405, and P501</p> <p>(The corresponding statement to each P-code can be found at the GHS Classification page.)</p>
ECHA C&L Notifications Summary	<p><i>Aggregated GHS information provided by 115 companies from 10 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.</i></p> <p><i>Reported as not meeting GHS hazard criteria by 3 of 115 companies. For more detailed information, please visit ECHA C&L website.</i></p> <p><i>Of the 9 notification(s) provided by 112 of 115 companies with hazard statement code(s).</i></p> <p><i>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.</i></p>

► [European Chemicals Agency \(ECHA\)](#)

9.1.2 Hazard Classes and Categories



Ox. Sol. 2 (96.43%)

Acute Tox. 4 (94.64%)

Skin Corr. 1B (95.54%)

Eye Dam. 1 (40.18%)

Aquatic Acute 1 (90.18%)

Aquatic Chronic 1 (90.18%)

► [European Chemicals Agency \(ECHA\)](#)

9.1.3 Health Hazards



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).

▶ CAMEO Chemicals

ERG 2020, Guide 140 (Sodium permanganate)

- 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)

9.1.4 Fire Hazards



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).

▶ CAMEO Chemicals

ERG 2020, Guide 140 (Sodium permanganate)

- 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 \(ERG\)](#)

9.1.5 Hazards Summary



A strong oxidizing agent; Fire hazard on contact with organic substances; [Hawley] A strong oxidizing agent; May ignite combustible substances; [CAMEO] Corrosive to skin and eyes; [eChemPortal: ERMA] [Potassium permanganate](#) crystals and concentrated solutions (greater than 1:5000 strength) are corrosive (release [potassium hydroxide](#) when contact [water](#)); Permanganates can induce methemoglobinemia after ingestion; [Olson, p. 133] May cause fire on contact with combustible materials; A severe skin and eye irritant; [MSDSonline] See [Manganese](#) and linked occupational diseases.

Hawley - Lewis R.J. _Hawley's Condensed Chemical Dictionary, _15th Ed. New York: John Wiley & Sons, 2007.

Olson - Olson KR (ed). Poisoning & Drug Overdose, 7th Ed. New York: Lange Medical Books/McGraw-Hill, 2018., p. 133

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

9.1.6 Fire Potential



MODERATE, BY CHEMICAL REACTION; STRONG OXIDIZER.

Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2446

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.2 Safety and Hazard Properties



9.2.1 OSHA Standards



Permissible Exposure Limit: Table Z-1 Ceiling value: 5 mg/cu m. /[Manganese](#) compd (as Mn)/

29 CFR 1910.1000 (7/1/2000)

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.2 NIOSH Recommendations



Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 1 mg/cu m. /[Manganese](#) compounds and fume (as Mn)/

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 190

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 3 mg/cu m. /[Manganese](#) compounds and fume (as Mn)/

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 190

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.3 First Aid Measures



9.3.1 First Aid



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](#)

ERG 2020, Guide 140 (Sodium permanganate)

- 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)**

9.4 Fire Fighting



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).

▶ **CAMEO Chemicals**

9.4.1 Fire Fighting Procedures



If material on fire or involved in fire: Flood with **water**. Cool all affected containers with flooding quantities of **water**. Apply **water** from as far a distance as possible.

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 990

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

Evacuation: If fire becomes uncontrollable - consider evacuation of one-half (1/2) mile

radius.

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.5 Accidental Release Measures



Public Safety: ERG 2020, Guide 140 (Sodium permanganate)

- 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 (Sodium permanganate)

- 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 \(ERG\)](#)

9.5.1 Isolation and Evacuation



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).

► **CAMEO Chemicals**

Evacuation:ERG 2020, Guide 140 (Sodium permanganate)

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)**

9.5.2 Disposal Methods



SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste

residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.5.3 Preventive Measures



SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If material not on fire and not involved in fire: Keep sparks, flames, and other sources of ignition away. Keep material out of **water** sources and sewers.

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Personnel protection: ... Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of **water** or soap and **water**. ...

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.6 Handling and Storage



9.6.1 Nonfire Spill Response



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).

▶ [CAMEO Chemicals](#)

9.7 Exposure Control and Personal Protection



Protective Clothing: ERG 2020, Guide 140 (Sodium permanganate)

- 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)

0.2 [mg/m³], as Mn (inhalable fraction), 0.02 mg/m³, as Mn (respirable fraction)[German Research Foundation (DFG)]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

9.7.1 Immediately Dangerous to Life or Health (IDLH)



500 mg/cu m /[Manganese](#) compounds and fume (as Mn)/

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 190

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.7.2 Threshold Limit Values (TLV)



0.02 [mg/m³], as Mn (respirable fraction), 0.1 mg/m³, as Mn (inhalable fraction)

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

8 hr Time Weighted Avg: 0.2 mg/cu m /[Manganese](#) and inorganic compounds, as Mn/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 37

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded. /[Manganese](#) and inorganic compounds, as Mn/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 5

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.7.3 Emergency Response Planning Guidelines



Emergency Response: ERG 2020, Guide 140 (Sodium permanganate)

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 \(ERG\)](#)

9.7.4 Personal Protective Equipment (PPE)



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).

▶ [CAMEO Chemicals](#)

Personnel protection: Wear appropriate chemical protective gloves, boots and goggles. ...

Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.8 Stability and Reactivity



9.8.1 Air and Water Reactions



Soluble in water.

▶ [CAMEO Chemicals](#)

9.8.2 Reactive Group



Oxidizing Agents, Strong

▶ [CAMEO Chemicals](#)

9.8.3 Reactivity Alerts



Strong Oxidizing Agent

▶ [CAMEO Chemicals](#)

9.8.4 Reactivity Profile



Acetic acid or **acetic anhydride** can explode with permanganates if not kept cold [Von Schwartz 1918 p. 34]. Explosions can occur when permanganates that have been treated with **sulfuric acid** come in contact with **benzene**, **carbon disulfide**, **diethyl ether**, **ethyl alcohol**, petroleum, or organic matter.

▶ [CAMEO Chemicals](#)

9.8.5 Hazardous Reactivities and Incompatibilities



Cooling is necessary to prevent possible explosion from contact of /sodium permanganate/ with **acetic acid** or **acetic anhydride**.

Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 1295

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

CAN REACT VIOLENTLY WITH MOST METAL POWDERS, **AMMONIA** & AMMONIUM SALTS, **PHOSPHORUS**, MANY FINELY DIVIDED ORG CMPD, FLAMMABLE LIQUIDS, ACIDS, & **SULFUR**. /PERMANGANATES/

Association of Official Analytical Chemists. Official Methods of Analysis. 10th ed. and supplements. Washington, DC: Association of Official Analytical Chemists, 1965. New editions through 13th ed. plus supplements, 1982., p. 1014

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

PERMANGANATES ARE EXPLOSIVE WHEN TREATED WITH **SULFURIC ACID**. WHEN BOTH CMPD ARE USED IN AN ABSORPTION TRAIN, AN EMPTY TRAP SHOULD BE PLACED BETWEEN THEM. /PERMANGANATES/

National Research Council. Prudent Practices for Handling Hazardous Chemicals in Laboratories. Washington, DC: National Academy Press, 1981., p. 71

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

MATERIALS SUSCEPTIBLE TO SPONTANEOUS COMBUSTION INCLUDE ... ORGANIC MATERIALS MIXED WITH STRONG OXIDIZING AGENTS (SUCH AS ... PERMANGANATES) ... /PERMANGANATES/

National Research Council. *Prudent Practices for Handling Hazardous Chemicals in Laboratories*. Washington, DC: National Academy Press, 1981., p. 59

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.9 Transport Information



9.9.1 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.

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [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.

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [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. Keep out of low areas. Ventilate closed spaces before entering.

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

► [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.

U.S. Department of Transportation. 2012 Emergency Response Guidebook. Washington, D.C. 2012

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more DOT Emergency Guidelines (Complete) data for SODIUM PERMANGANATE (8 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.9.2 Shipping Name / Number DOT/UN/NA/IMO



UN 1503; Sodium permanganate

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

IMO 5.1; Sodium permanganate

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.9.3 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 (7/1/2000)

▶ [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.

IATA. Dangerous Goods Regulations. 41st Ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Regulations, 2000., p. 220

▶ [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.

IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.5183 (1998)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.9.4 DOT Label



Oxidizer

▶ [CAMEO Chemicals](#)

9.10 Regulatory Information



DEA Listed Chemicals

List II Chemical: A chemical, other than a List I chemical, specified by regulation that, in addition to legitimate uses, is used in manufacturing a controlled substance in violation of the Act.

21 CFR Section 1310.02(a) <https://www.ecfr.gov/current/title-21/chapter-II/part-1310/section-1310.02>

▶ [Drug Enforcement Administration \(DEA\)](#)

REACH Registered Substance

Status: Active Update: 13-07-2022 <https://echa.europa.eu/registration-dossier/-/registered-dossier/2176>

▶ [European Chemicals Agency \(ECHA\)](#)

New Zealand EPA Inventory of Chemical Status

Permanganic acid, sodium salt: [HSNO](#) Approval: HSR001354 Approved with controls

▶ [New Zealand Environmental Protection Authority \(EPA\)](#)

9.10.1 Atmospheric Standards



Listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious

health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Sodium permanganate is included on this list.

Clean Air Act as amended in 1990, Sect. 112 (b) (1) Public Law 101-549 Nov. 15, 1990

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

... Substances for which a Federal Register notice has been published that included consideration of the serious health effects, including cancer, from ambient air exposure to the substance. [Manganese](#) (50 FR 32627; Aug. 13, 1985) is included on this list.

[/Manganese/](#)

40 CFR 61.01(b) (7/1/2000)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.10.2 State Drinking Water Guidelines



(MN) MINNESOTA 300 ug/L [/Manganese/](#)

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.11 Other Safety Information



9.11.1 Special Reports



USEPA; Locating and Estimating Air Emissions from Sources of [Manganese](#) (1985)
EPA-450/4-84-007h

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

USEPA; Health Assessment Document: [Manganese](#) (1984) EPA-600/8-83-013F

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

WHO; Environ Health Criteria: [Manganese](#) (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

WHO; Environ Health Criteria: [Manganese](#)-Executive Summary (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10 Toxicity



10.1 Toxicological Information



10.1.1 Toxicity Summary



Manganese is a cellular toxicant that can impair transport systems, enzyme activities, and receptor functions. It primarily targets the central nervous system, particularly the globus pallidus of the basal ganglia. It is believed that the **manganese ion**, Mn(II), enhances the autoxidation or turnover of various intracellular catecholamines, leading to increased production of free radicals, reactive oxygen species, and other cytotoxic metabolites, along with a depletion of cellular antioxidant defense mechanisms, leading to oxidative damage and selective destruction of dopaminergic neurons. In addition to **dopamine**, **manganese** is thought to perturbations other neurotransmitters, such as **GABA** and **glutamate**. In order to produce oxidative damage, **manganese** must first overwhelm the antioxidant enzyme **manganese superoxide** dismutase. The neurotoxicity of Mn(II) has also been linked to its ability to substitute for Ca(II) under physiological conditions. It can enter mitochondria via the **calcium** uniporter and inhibit mitochondrial oxidative phosphorylation. It may also inhibit the efflux of Ca(II), which can result in a loss of mitochondrial membrane integrity. Mn(II) has been shown to inhibit mitochondrial aconitase activity to a significant level, altering amino acid metabolism and cellular **iron** homeostasis. (L228)

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.2 Carcinogen Classification



**Carcinogen
Classification**

No indication of carcinogenicity to humans (not listed by IARC).

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.3 Health Effects



Manganese mainly affects the nervous system and may cause behavioral changes and other nervous system effects, which include movements that may become slow and clumsy. This combination of symptoms when sufficiently severe is referred to as “manganism”. (L228)

- ▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.4 Exposure Routes



Oral (L228) ; inhalation (L228)

- ▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.5 Symptoms



Manganese mainly affects the nervous system and may cause behavioral changes and other nervous system effects, which include movements that may become slow and clumsy. This combination of symptoms when sufficiently severe is referred to as “manganism”. (L228)

- ▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.6 Adverse Effects



Neurotoxin - Parkinsonism

Occupational hepatotoxin - Secondary hepatotoxins: the potential for toxic effect in the occupational setting is based on cases of poisoning by human ingestion or animal experimentation.

Methemoglobinemia - The presence of increased methemoglobin in the blood; the compound is classified as secondary toxic effect

Dermatotoxin - Skin burns.

- ▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

10.1.7 Minimum Risk Level



Chronic Inhalation: 0.0003 mg/m3 (L134)

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.8 Treatment



EYES: irrigate opened eyes for several minutes under running [water](#). INGESTION: do not induce vomiting. Rinse mouth with [water](#) (never give anything by mouth to an unconscious person). Seek immediate medical advice. SKIN: should be treated immediately by rinsing the affected parts in cold running [water](#) for at least 15 minutes, followed by thorough washing with soap and [water](#). If necessary, the person should shower and change contaminated clothing and shoes, and then must seek medical attention. INHALATION: supply fresh air. If required provide artificial respiration.

▶ [Toxin and Toxin Target Database \(T3DB\)](#)

10.1.9 Antidote and Emergency Treatment



Basic treatment: Establish a patent airway. 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 [normal saline](#) 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 /[Manganese](#) and related compounds/

Bronstein, A.C., P.L. Currence; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 365

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or in severe respiratory distress. Monitor cardiac rhythm and treat arrhythmias if necessary Start an IV with D5W /SRP: "To keep open", minimal flow rate/. Use lactated Ringer's if signs of hypovolemia are present. Consider drug therapy for pulmonary edema For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors for hypotension with a normal fluid volume. Watch for signs of fluid overload Use [proparacaine hydrochloride](#) to assist eye irrigation /[Manganese](#) and related compounds/

Bronstein, A.C., P.L. Currence; *Emergency Care for Hazardous Materials Exposure*. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 365-6

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10.1.10 Non-Human Toxicity Excerpts



PERMANGANATE ... OXIDIZES GASTRIC MUCOSAL CELLS. /PERMANGANATE/

Jones, L.M., et al. *Veterinary Pharmacology & Therapeutics*. 4th ed. Ames: Iowa State University Press, 1977., p. 886

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

MOST BACTERIA ARE KILLED WITHIN 1 HR BY PERMANGANATES IN DILUTION OF 1:10,000, BUT SOME MICROORGANISMS SURVIVE EXPOSURE TO MUCH HIGHER CONCEN. GERMICIDAL EFFICIENCY ... IS GREATLY REDUCED IN PRESENCE OF ORG MATTER. /PERMANGANATES/

Goodman, L.S., and A. Gilman. (eds.) *The Pharmacological Basis of Therapeutics*. 5th ed. New York: Macmillan Publishing Co., Inc., 1975., p. 998

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11 Associated Disorders and Diseases



Associated Occupational Diseases with Exposure to the Compound

[Manganese, chronic toxic effect](#) [Category: Metal Poisoning, Occupational]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

12 Literature



12.1 Consolidated References



▶ [PubChem](#)

12.2 NLM Curated PubMed Citations



▶ [PubChem](#)

12.3 Springer Nature References



▶ [Springer Nature](#)

12.4 Thieme References



▶ [Thieme Chemistry](#)

12.5 Chemical Co-Occurrences in Literature



▶ [PubChem](#)

12.6 Chemical-Gene Co-Occurrences in Literature



▶ [PubChem](#)

12.7 Chemical-Disease Co-Occurrences in Literature



▶ [PubChem](#)

13 Patents



13.1 Depositor-Supplied Patent Identifiers



▶ [PubChem](#)

[Link to all deposited patent identifiers](#)

▶ [PubChem](#)

13.2 WIPO PATENTSCOPE



Patents are available for this chemical structure:

<https://patentscope.wipo.int/search/en/result.jsf?inchikey=WPWYHBSOACXYBB-UHFFFAOYSA-N>

▶ [PATENTSCOPE \(WIPO\)](#)

13.3 Chemical Co-Occurrences in Patents



▶ [PubChem](#)

13.4 Chemical-Disease Co-Occurrences in Patents



▶ [PubChem](#)

13.5 Chemical-Gene Co-Occurrences in Patents



▶ [PubChem](#)

14 Interactions and Pathways



14.1 Chemical-Target Interactions



▶ [Toxin and Toxin Target Database \(T3DB\)](#)

15 Classification



15.1 MeSH Tree



▶ [Medical Subject Headings \(MeSH\)](#)

15.2 ChemIDplus



▶ [ChemIDplus](#)

15.3 CAMEO Chemicals



▶ [CAMEO Chemicals](#)

15.4 UN GHS Classification



▶ [UN Globally Harmonized System of Classification and Labelling of Chemicals \(GHS\)](#)

15.5 Drug Enforcement Administration (DEA) Classification



▶ [Drug Enforcement Administration \(DEA\)](#)

15.6 NORMAN Suspect List Exchange Classification



▶ [NORMAN Suspect List Exchange](#)

15.7 EPA DSSTox Classification



▶ [EPA DSSTox](#)

15.8 EPA Substance Registry Services Tree



▶ [EPA Substance Registry Services](#)

16 Information Sources



FILTER BY SOURCE

ALL SOURCES

1. [CAMEO Chemicals](#)

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https://cameochemicals.noaa.gov/help/reference/terms_and_conditions.htm?d_f=false

SODIUM PERMANGANATE

<https://cameochemicals.noaa.gov/chemical/1515>

CAMEO Chemical Reactivity Classification

<https://cameochemicals.noaa.gov/browse/react>

2. [ChemIDplus](#)

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<https://www.nlm.nih.gov/copyright.html>

Sodium permanganate

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0010101505>

ChemIDplus Chemical Information Classification

<https://pubchem.ncbi.nlm.nih.gov/source/ChemIDplus>

3. [EPA Chemicals under the TSCA](#)

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<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

Permanganic acid (HMnO4), sodium salt

<https://www.epa.gov/chemicals-under-tsca>

4. EPA DSSTox

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<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

Sodium permanganate

<https://comptox.epa.gov/dashboard/DTXSID2051504>

CompTox Chemicals Dashboard Chemical Lists

<https://comptox.epa.gov/dashboard/chemical-lists/>

5. European Chemicals Agency (ECHA)

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<https://echa.europa.eu/web/guest/legal-notice>

Sodium permanganate

<https://echa.europa.eu/substance-information/-/substanceinfo/100.030.215>

Sodium permanganate

<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/129257>

6. FDA Global Substance Registration System (GSRS)

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<https://www.fda.gov/about-fda/about-website/website-policies#linking>

SODIUM PERMANGANATE

<https://gsrs.ncats.nih.gov/ginas/app/beta/substances/IZ5356R281>

7. Hazardous Substances Data Bank (HSDB)

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https://www.nlm.nih.gov/web_policies.html

SODIUM PERMANGANATE

<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/762>

8. New Zealand Environmental Protection Authority (EPA)

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