

Material Safety Data Sheet

SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: Hydrolyser Reactant – 35% **Part Number:** none
Chemical Family: Hydrogen peroxide solution

Manufacturer's Name: Siemens Industry, Inc. - Water Technologies Business Unit

Manufacturer's Address: 595 Industrial Drive Bradley, IL 60915

Product/Technical Information Phone Number: (815) 932-8154

Medical/Handling Emergency Phone Number: CHEMTREC (800) 424-9300
24 hours a day

Transportation Emergency Phone Number: CHEMTREC (800) 424-9300
24 hours a day

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SECTION 2 – COMPOSITION INFORMATION

<u>Chemical Name</u>	<u>Percent by Weight</u>	<u>CAS#</u>
Hydrogen peroxide	35	722-84-1

The remaining components are considered non hazardous according to the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

SECTION 3 – HAZARDS IDENTIFICATION

Appearance & Odor: colorless liquid with slightly pungent odor

Emergency Overview: **WARNING!** Strong oxidizer. Corrosive. Causes eye, skin, respiratory tract and digestive tract irritation and possible burns. Eye contact may result in permanent eye damage and effects may be delayed. May be harmful or fatal if swallowed.

Fire & Explosion Hazards: Strong oxidizer. May cause spontaneous ignition with combustible materials. Contact with flammable materials may cause fire or explosions. May decompose explosively when heated or involved in a fire. Oxygen released on exothermic decomposition may support combustion in case of surrounding fire. Pressure burst may occur due to decomposition in confined spaces/containers. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Primary Route(s) of Exposure: inhalation of vapor or mist, ingestion, eye and skin contact

Inhalation – Acute Effects: Inhalation causes nose and throat irritation and coughing. May cause burns to the respiratory tract.

Skin Contact – Acute Effects: Skin contact causes severe skin irritation and possible burns. May cause discoloration, redness, swelling, and blisters.

Eye Contact – Acute Effects: Eye contact causes severe eye irritation, watering, redness and swelling of the eyelids. May cause severe burns. Contact with eyes may cause serious and permanent eye lesions.

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Ingestion – Acute Effects: May be harmful or fatal if swallowed. Ingestion causes gastrointestinal irritation or burns with nausea, vomiting and diarrhea; paleness and cyanosis of the face; perforation of the gastrointestinal tract accompanied by shock; excessive fluid in the mouth and nose with risk of suffocation; throat edema; bloating of the stomach and belching; coughing; and risk of chemical pneumonitis. May cause damage to the red blood cells.

SECTION 4 – FIRST AID MEASURES

Inhalation First Aid: Remove affected person from the contaminated area and consult with a physician in case of respiratory symptoms.

Skin Contact First Aid: Immediately remove contaminated shoes, socks and clothing (under a shower if necessary). Wash skin with flowing water. Consult with a physician in all cases. Do not dry soiled clothing near an open flame or incandescent heat source. Submerge soiled clothing in water prior to drying. Wash contaminated clothing before reuse and destroy contaminated shoes.

Eye Contact First Aid: In case of product splashing into the eyes and face, treat eyes first. Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. In the case of difficulty of opening the lids, administer an analgesic eye wash (oxyfuprocaine). Contacts should be removed before or during flushing. Consult with an ophthalmologist in all cases.

Ingestion First Aid: In all cases, immediately consult with a physician and take person to hospital if necessary. If the subject is completely conscious, rinse mouth and administer fresh water. Do not induce vomiting. If the subject is unconscious, loosen collar and tight clothing and lay the affected person on their left side. Qualified personnel should administer oxygen or pulmonary resuscitation if necessary. Keep person warm.

Medical Conditions Aggravated: Individuals with eye, skin, and chronic respiratory diseases may be at an increased risk of adverse effects.

Note to Physician: Treat symptomatically and supportively. Ingestion may require oxygen therapy via intra-tracheal intubation; tracheotomy; placement of gastric catheter to release stomach gases; urgent digestive endoscopy with aspiration of the product; or treatment of gastrointestinal tract burns and resulting effects. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. May require prevention or treatment for shock and/or pulmonary edema. To treat corneal damage, careful ophthalmologic evaluation is recommended.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point/Method: non-flammable

Auto Ignition Temperature: non-flammable

Upper/Lower Explosion Limits: not determined

Extinguishing Media: Use water only! Do NOT use carbon dioxide or dry chemical.

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Fire Fighting Procedures: Evacuate all non-essential personnel. Intervention only by capable personnel who are trained and aware of the product hazards. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear with acid resistant oversuit. Stay upwind. Keep at a safe distance in a protected location. Use water spray to keep fire-exposed containers cool. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Water runoff can cause environmental damage. Dike and collect water used to fight fire. After intervention, proceed to clean the equipment. Take a shower, remove clothing carefully, clean and check. Never approach containers which have been exposed to fire without cooling them sufficiently. If safe to do so, remove the exposed containers, or cool with large quantities of water.

Fire & Explosion Hazards: Strong oxidizer. May cause spontaneous ignition with combustible materials. Contact with flammable materials may cause fire or explosions. May decompose explosively when heated or involved in a fire. Oxygen released on exothermic decomposition may support combustion in case of surrounding fire. Pressure burst may occur due to decomposition in confined spaces/containers. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Hazardous Products of Decomposition and/or Combustion: Oxygen, steam and heat.

NFPA Ratings: HEALTH- 3 FLAMMABILITY- 0 REACTIVITY- 1 OTHER- OX

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Isolate the area. Wear all recommended personal protective equipment (see Section 8). Avoid incompatible materials (see Section 10). If safe to do so without exposing personnel, try to stop the spillage and clean up spills immediately. If possible, dike large spills with sand or earth. Use water spray to disperse vapors. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Flush spill area with large quantities of water. Do not add chemical products. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material. In case of contact with combustible materials, avoid product drying out by dilution with water.

In order to avoid the risk of contamination, the recovered product must not be returned to the original container.

Precautions for protection of the environment: Avoid runoff into storm sewers and ditches which lead to waterways. Immediately notify the appropriate authorities in case of reportable spill.

The National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have requested the following information to be provided: Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

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SECTION 7 – HANDLING AND STORAGE

Handling: Operate in a well-ventilated area. Wash thoroughly after handling. Do not ingest or inhale. Do not get in eyes, on skin, or on clothing. Remove contaminated clothing and wash before reuse. Discard contaminated shoes. Keep away from heat sources and incompatible products. Prevent all contact with organics. Use compatible equipment and containers. Before all operations, passivate the piping circuits and vessels. Never return unused product to original storage container. Ensure an adequate supply of water is available in the event of an accident. Containers and equipment used to handle hydrogen peroxide should be used exclusively for hydrogen peroxide.

Storage: Store in a ventilated, cool area. Keep away from heat, sparks, and flame. Keep away from incompatible products (see Section 10). Keep away from combustible substances. Keep in container fitted with safety valve or vent. Keep closed and in original packaging. Provide containment diking for storage of the packages and transfer installation. Regularly check the condition and temperature of the containers. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Contents may develop pressure upon prolonged storage. Rinse empty drums and containers thoroughly with water before discarding.

General Comments: Warn personnel of the dangers of the product. Follow protective measures in Section 8. Do not confine the product in the circuit, between closed valves, or in a container without a vent.

SECTION 8 –PERSONAL PROTECTION/ EXPOSURE CONTROL

Respiratory Protection: Wear NIOSH approved full-face supplied air respirator for excessive concentrations.

Skin Protection: Wear chemical resistant protective gloves made of PVC or rubber. Wear coveralls. If a risk of splashing exists, wear chemical resistant slicker suit and boots of PVC or rubber.

Eye Protection: Wear protective goggles for all industrial operations. If a risk of splashing exists, wear goggles and face shield.

Ventilation Protection: Provide local ventilation. Provide ventilation in work areas to keep exposure below exposure limits.

Other Protection: Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather.

The National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have requested the following information to be provided: Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood, or other combustibles can cause the material to ignite and result in a fire.

Exposure Limits: Hydrogen peroxide CAS# 7722-84-1

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ACGIH TLV: 1 ppm; (as TWA)
OSHA PEL: TWA 1 ppm (1.4 mg/m³)
NIOSH REL: TWA 1 ppm (1.4 mg/m³)
NIOSH IDLH: 75 ppm

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: colorless liquid with slightly pungent odor

Vapor Pressure: Total H₂O₂ + H₂O: 12 mbar (9.0 mmHg) @ 20°C (68°F) for 50% hydrogen peroxide;

72 mbar (54 mmHg) @ 50°C (122°F) for 50% hydrogen peroxide

Partial H₂O₂: 1 mbar (0.75 mmHg) @ 30°C (86°F) for 50% hydrogen peroxide

Vapor Density (Air=1): 1.0 for 50% hydrogen peroxide

Boiling Point: 108°C (226°F) @ 1.013 bar (760 mmHg) for 35% hydrogen peroxide;

115°C (239°F) @ 1.013 bar (760 mmHg) for 50% hydrogen peroxide

Freezing Point: -33°C (-27°F) for 35% hydrogen peroxide; -52°C (-62°F) for 50% hydrogen peroxide

Specific Gravity: 1.1 @ 20°C (68°F) for 27.5% hydrogen peroxide;

1.2 @ 20°C (68°F) for 50% hydrogen peroxide

Viscosity: 1.07 mPas @ 20°C (68°F) for 27.5% hydrogen peroxide;

1.17 mPas @ 20°C (68°F) for 50% hydrogen peroxide

Decomposition Temperature: ≥ 60°C (140°F) Self-accelerated decomposition temperature (SADT) with oxygen release

Surface Tension: 74 mN/m @ 20°C (68°F) for 27.5% hydrogen peroxide;

75.6 mN/m @ 20°C (68°F) for 50% hydrogen peroxide

Solubility in Water: complete

Molecular Weight: 34.01

pH: 1 - 4

Flash Point/method: non-flammable

Auto Ignition Temperature: non-flammable

Upper/Lower Explosion Limits: not determined

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SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use. Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.

Incompatibilities: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.

Polymerization: Will not occur.

Hazardous Decomposition Products: Oxygen, steam and heat.

Conditions to Avoid: Avoid incompatible materials, flammable substances, combustible materials, mechanical shock, light, ignition sources, heat, contamination and pH > 4.0.

SECTION 11 – TOXICOLOGICAL INFORMATION

Inhalation – Acute: Inhalation LC₅₀ (4 hrs, rat) 2000 mg/m³; inhalation LC₅₀ (1 hr, mouse) 2170 mg/m³. Mouse, Respiratory Irritation (RD₅₀), 665 mg/ m³.

Inhalation – Chronic: Repeated or prolonged exposure may cause sore throat, nosebleeds and chronic bronchitis.

Skin Contact – Acute: Dermal LD₅₀ (rabbit) > 2000 mg/kg for 35% hydrogen peroxide.

Skin Contact – Chronic: Prolonged or repeated skin contact may cause dermatitis. Guinea Pig, Nonsensitizing (skin).

Eye Contact – Acute: Rabbit, Serious damage (eyes) for 70% hydrogen peroxide. Repeated contact may cause corneal damage.

Ingestion – Acute: Oral LD₅₀ (rat) 1232 mg/kg for 35% hydrogen peroxide.

Ingestion – Chronic: No data available.

Carcinogenicity/Mutagenicity: Laboratory experiments have resulted in mutagenic effects. IARC Group 3 – not classifiable as to its carcinogenicity to humans. ACGIH A3- Animal carcinogen: Agent is carcinogenic in experimental animals at relatively high doses, by route(s) of administration at site(s) of histologic type(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in

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exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

Reproductive Effects: There are no known reproductive effects.

Neurotoxicity: May affect the central nervous system.

Other Effects: Toxic effects are linked with corrosive properties.

Target Organs: blood, central nervous system

SECTION 12 – ECOLOGICAL INFORMATION

Acute ecotoxicity: Fish, *Pimephales promelas*: LC₅₀, 96 hours, 16.4 mg/L

NOEC, 96 hours, 5 mg/L

Crustaceans, *Daphnia pulex*: EC₅₀, 48 hours, 2.4 mg/L

NOEC, 48 hours, 1 mg/L

Algae, various species: EC₅₀ 72 to 96 hours, 3.7 to 160 mg/L in fresh water

Algae, *Nitzschia closterium*: EC₅₀ 72 to 96 hours, 0.85 mg/L in salt water

Mobility: Air, Henry's law constant (H) – 1 mPa.m³/mol @ 20°C (68°F)

Result: non-significant volatility.

Air, condensation on contact with water droplets

Result: rain washout.

Water – Non-significant evaporation.

Soil/sediments – Non-significant evaporation and adsorption.

Abiotic degradation: Air, indirect photo-oxidation, t₇₂ 10 to 20 hours.

Conditions: sensitizer: OH radical

Water, redox reaction, t₉₆ 2.5 days, 10,000 ppm.

Conditions: mineral and enzymatic catalysis/fresh water.

Water, redox reaction, t₉₆ 20 days, 100 ppm.

Conditions: mineral and enzymatic catalysis/fresh water.

Water, redox reaction, t₉₆ 60 hours.

Conditions: mineral and enzymatic catalysis/salt water.

Soil, redox reaction, t₉₆ 15 hours.

Conditions: mineral catalysis.

Biotic degradation: Aerobic, t₉₆ < 1 minute in biological treatment sludge.

Result: rapid and considerable biodegradation.

Aerobic, t₉₆ between 0.3 to 2 days in fresh water.

Result: rapid and considerable biodegradation.

Effects on biological treatment plants, > 200 mg/L.

Result: inhibitory action.

Potential for bioaccumulation: Result: non-bioaccumulable (enzymatic metabolism).

Comments: Toxic for aquatic organisms. Nevertheless, hazard for the environment is limited due to product properties. No bioaccumulation. Considerable abiotic and biotic degradability. No toxicity of degradation products (H₂O and O₂).

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SECTION 13 – DISPOSAL CONSIDERATIONS

Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied and rinsed before disposal. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations. RCRA Waste Number: D001, D002. NOTE: State and local regulations may be more stringent than federal regulations.

SECTION 14 – TRANSPORTATION INFORMATION

DOT Shipping Description: Hydrogen peroxide, aqueous solution
5.1, UN 2014, PG II
Subsidiary Hazard: 8
Labels: Oxidizer, Corrosive

SECTION 15 – REGULATORY INFORMATION

TSCA Inventory List: Yes

CERCLA Hazardous Substance (40 CFR Part 302)

Listed Substance: No
Unlisted Substance: Yes
Characteristic: Ignitability, corrosivity
RCRA Waste Number: D001, D002
Reportable Quantity: 100 pounds

SARA, Title III, Sections 302/303 (40 CFR Part 355 – Emergency Planning and Notification)

Extremely Hazardous Substance: Yes, > 52% hydrogen peroxide
Reportable Quantity: 1000 pounds
Threshold Planning Quantity: 1000 pounds

SARA, Title III, Sections 311/312 (40 CFR Part 370 – Hazardous Chemical Reporting: Community Right-To-Know)

Hazard Category: Immediate (acute) health hazard, Fire Hazard
Threshold Planning Quantity: 10,000 pounds for <52% hydrogen peroxide; 500 pounds for >52% hydrogen peroxide

SARA, Title III, Section 313 (40 CFR Part 372 – Toxic Chemical Release Reporting: Community Right-To-Know)

Toxic Chemical: No

WHMIS Classification: C Oxidizing Material; E Corrosive; F Dangerously Reactive Chemical

Canadian Domestic Substances List: DSL / Non Confidential #6764

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

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OSHA requirements for process safety management must be followed anytime at least 7,500 pounds of hydrogen peroxide at concentrations of at least 52% are used or stored. Refer to 29 CFR 1910.119 for specific details.

SECTION 16 – OTHER INFORMATION

Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

Revision Indicator: April 2011, Revised Section 1 (Updated manufacturer's name)