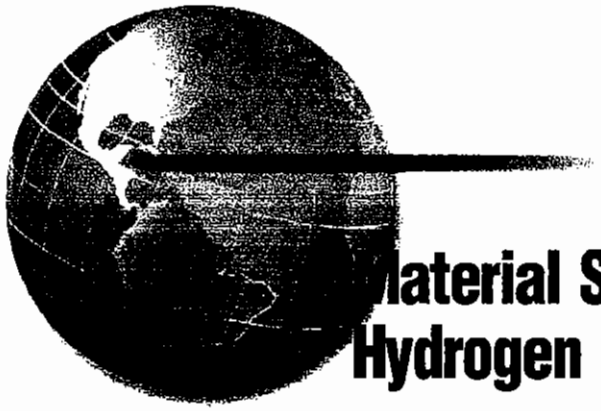

Material Safety Data Sheet
Hydrogen Peroxide 20% - 60%

1. Chemical Product and Supplier Identification

Product Name: Hydrogen Peroxide, 20%-60%

Chemical Name: Hydrogen peroxide, aqueous solution

Synonyms: Hydrogen dioxide, hydroperoxide, peroxide

Grades/Trade Names: 27.5% - Technical
31% - Electronic , Electronic Low Carbon, UltraPure, UltraHigh Purity, UltraPure Plus, Pico-Pure™
35% - Technical, Technical 35/D Cosmetic, Food, PFP™, Chemical, High Purity Food
40% - Technical
50% - Technical, Technical 50/D Dilution, Cosmetic, Electronic, Food, PFP™, UltraPure,
Chemical, Chemical LP, SVP-HP®(1)

Manufacturer: Solvay Interox, Inc.
3333 Richmond Avenue
Houston, Texas 77098

Office: 713/525-6500
(7:30 am-5:00 pm CST M-F)

Emergency: 281/479-2826
(24 hours every day)

CANUTEC: 613/996-6666
(24 hours every day)

CHEMTREC: 800/424-9300
(24 hours every day)

Product Uses: Used in bleaching textiles, food, hair, paper and other materials; used in the manufacture of a wide range of chemicals, plastics, pharmaceuticals; used in photography, electroplating, water treatment and wastewater treatment.

MSDS Number: ZIH20/60-001-04 **Effective Date:** September 1, 2001

Not valid two years after effective date or after issuance of superseding MSDS, whichever is earlier. French or Spanish translations of this MSDS are available. Check www.solvayinterox.com or call Solvay Interox, Inc. to verify the latest version or translation availability.

Material Safety Data Sheets contain country specific regulatory information; therefore, the MSDS's provided are for use only by customers of Solvay Interox, Inc. in the United States of America and, if specifically indicated, Canada and Mexico. If you are located in a country other than the United States, please contact the Solvay Interox Group company in your country for MSDS information applicable to your location.

Solvay Interox

SOLVAY

2. Composition/Information on Ingredients

Components	Formula	CAS No.	Percent
Hydrogen peroxide	H_2O_2	7722-84-1	20-60
Water	H_2O	7732-18-5	Balance

3. Hazards Identification

Emergency Overview:
- Toxicity effects principally related to its corrosive properties.
- Non-combustible, but may contribute to the combustion of other substances and causes violent and sometimes explosive reactions.
- May be fatal if swallowed.

Potential Health Effects

General:
- Corrosive to mucous membranes, eyes and skin.
- The seriousness of the lesions and the prognosis of intoxication depend directly on the concentration and duration of exposure.

Inhalation:
- Nose and throat irritation.
- Cough.
- In case of repeated or prolonged exposure: risk of sore throat, nose bleeds, chronic bronchitis.

Eye contact:
- Severe eye irritation, watering, redness and swelling of the eyelids.
- Risk of serious or permanent eye lesions.

Skin contact:
- Irritation and temporary whitening at contact area.
- Risk of burns.

Ingestion:
- Paleness and cyanosis of the face.
- Severe irritation, risk of burns and perforation of the gastrointestinal tract accompanied by shock.
- Excessive fluid in the mouth and nose, with risk of suffocation.
- Risk of throat edema and suffocation.
- Bloating of stomach, belching.
- Nausea and vomiting (bloody).
- Cough.
- Risk of chemical pneumonitis from product inhalation.

Carcinogen Designation:
- IARC (International Agency for Research on Cancer): 3 - Not Classifiable as to Carcinogenicity to Humans.
- TLV A3 - Animal carcinogen: Agent is carcinogenic in experimental animals at relatively high dose, by route(s) of administration, at site(s), of histologic types(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in 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.

4. First-Aid Measures

General recommendations:
- In case of product splashing into the eyes and face, treat eyes first.
- Do not dry soiled clothing near an open flame or incandescent heat source.
- Submerge soiled clothing in water prior to drying.

Inhalation:
- Remove the subject from the contaminated area.
- Consult with a physician in case of respiratory symptoms.

Eye contact:
- Flush eyes as soon as possible with running water for 15 minutes, while keeping the eyelids open.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).
- Consult with an ophthalmologist in all cases.

Skin contact:
- Remove contaminated shoes, socks and clothing, under a shower if necessary; wash the affected skin with running water.
- Keep warm (blanket) and provide clean clothing.
- Consult with a physician in all cases.

Ingestion:
- Consult with a physician immediately in all cases.
- Take to hospital.

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, lay the victim on his/her left side.
- Oxygen or pulmonary resuscitation if necessary.
- Keep warm (blanket).
- NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Medical Treatment

Inhalation:
- Negligible.

Eye contact:
- On the advice of the ophthalmologist.

Skin contact:
- Usual treatment for burns.

Ingestion:
- Oxygen therapy via intra-tracheal intubation.
- If necessary, tracheotomy.
- Placement of gastric catheter to release stomach gases.
- Avoid gastric lavage risk of perforation.
- In case of intense pain: inject an I.M. morphomimetic drug (piritramide) before taking to hospital.
- Prevention or treatment for shock and pulmonary edema.
- Urgent digestive endoscopy with aspiration of the product.
- Treatment of gastrointestinal tract burns and resulting effects.

5. Fire-Fighting Measures

Flash point: Non-flammable.

Flammability: Non-flammable.

Auto-flammability: Non-flammable.

Danger of explosion:
- With flammable liquids.
- With certain materials (see section 10).
- In case of heating.

Oxidizing properties: Oxidizer.

Common extinguishing methods: Large quantities of water, water spray.

Inappropriate extinguishing methods: No restriction.

Specific hazards:
- Oxygen released on exothermic decomposition may support combustion in case of surrounding fire.
- Oxidizing agent, may cause spontaneous ignition with combustible materials.
- Contact with flammables may cause fire or explosions.
- Pressure burst may occur due to decomposition in confined spaces/ containers.

Protective measures in case of intervention:
- Evacuate all non-essential personnel.
- Intervention only by capable personnel who are trained and aware of the hazards of the product.
- Wear self contained breathing apparatus when in close proximity or in confined spaces.
- When intervention in close proximity, wear acid resistant oversuit.
- After intervention, proceed to clean the equipment.
- Take a shower, remove clothing carefully, clean and check.

Other precautions:
- If safe to do so, remove the exposed containers, or cool with largequantities of water.
- Stay upwind.
- Keep at a safe distance in a protected location.
- Never approach containers which have been exposed to fire, without cooling them sufficiently.

6. Accidental Release Measures

Precautions

- Observe the protection measures given in sections 5 and 8.
- Isolate the area.
- Avoid materials and products which are incompatible with the product (see section 10).
- If safe to do so, without exposing personnel, try to stop the spillage.
- In case of contact with combustible materials, avoid product drying out by dilution with water.

Cleanup methods:

- If possible, dike large quantities of liquid with sand or earth.
- Dilute with large quantities of water.
- Do not add chemical products.
- For disposal methods, refer to section 13.
- In order to avoid the risk of contamination, the recovered product must not be returned to the original tank/container.

Precautions for protection of the environment:

- 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 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.

7. Handling and Storage

Handling:

- Operate in a well-ventilated area.
- Keep away from heat sources.
- Keep away from incompatible products.
- Prevent all contact with organics.
- Use equipment and containers which are compatible with the substance.
- Before all operations, passivate the piping circuits and vessels.
- Never return unused product to 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.
- Store away from heat sources.
- Keep away from incompatible products (see section 10).
- Keep away from combustible substances.
- Keep in container fitted with safety valve or vent.
- Keep in original packaging, closed.
- Provide containment diking for storage of the packages and transfer installation.
- Regularly check the condition and temperature of the containers.
- For bulk storage recommendations, consult Solvay Interox, Inc.

Other precautions:

- Warn personnel of the dangers of the product.
- Follow the protective measures given in section 8.
- Do not confine the product in the circuit, between closed valves, or in a container without a vent.

Packaging:

Consult Solvay Interox for the proper packaging material for specific grades of hydrogen peroxide.

- Aluminum 99.5%.
- Stainless steel 304 L and 316 L.
- Approved grades of HDPE.

8. Exposure Controls/Personal Protection

Engineering controls:

- Provide local ventilation.
- Follow the protective measures given in section 7.
- Provide ventilation in work areas to keep exposure below the following applicable limits:

ACGIH® TLV® (1996)	OSHA PEL	NIOSH REL (1994)
1 ppm TWA	1 ppm TWA	1 ppm TWA
1.4 mg/m³ TWA	1.4 mg/m³ TWA	1.4 mg/m³ TWA

ACGIH® and TLV® are registered trademarks of the American Conference of Governmental Industrial Hygienists.

Respiratory protection:

NIOSH approved full-face supplied air respirator for excessive concentrations.

Hand protection:

Chemical resistant protective gloves made of PVC or rubber.

Eye protection:

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

Skin protection:

Wear coveralls. If a risk of splashing exists, wear chemical resistant slicker suit and boots of PVC or rubber.

Other precautions:

- Provide shower and eyewash stations.
- Consult your industrial hygienist or safety manager for the selection of personal protective equipment suitable for the working conditions.

The National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have requested the following information 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.

9. Physical and Chemical Properties

Appearance: Colorless liquid.

Odor: Slightly pungent.

pH: 1 - 4

Vapor pressure:

Total ($H_2O_2 + H_2O$)
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 (H_2O_2)
1 mbar (0.75 mmHg) @ 30° C (86° F) for 50% hydrogen peroxide.

Vapor density: 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.

Solubility in water: Complete.

Specific gravity: 1.1 @ 20° C (68° F) for 27.5% hydrogen peroxide.
1.2 @ 20° C (68° F) for 50% hydrogen peroxide.

Molecular weight: 34.01

Viscosity: 1.07 mPa·s @ 20° C (68° F) for 27.5% hydrogen peroxide.
1.17 mPa·s @ 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.

10. Stability and Reactivity

Chemical stability: Stable under normal conditions of use with slow gas release.

Conditions to avoid:

- Heat/Sources of heat.
- Contamination.

Materials to avoid:

- Acids.
- Bases.
- Metals.
- Salts of metals.
- Reducing agents.
- Organic materials.
- Flammable substances.

Hazardous decomposition products: Oxygen.

Hazardous polymerization: Will not occur.

Other information: Decomposition releases steam and heat.

11. Toxicological Information

Acute toxicity:
- Oral route, LD_{50}, rat, 1232 mg/kg for 35% hydrogen peroxide.
- Oral route, LD_{50}, rat, 841 mg/kg for 60% hydrogen peroxide.
- Dermal route, LD_{50}, rabbit, > 2000 mg/kg for 35% hydrogen peroxide.
- Inhalation, LC_{50}, 4 hours, rat, 2000 mg/m³.
- Inhalation, LC_{0}, 1 hour, mouse, 2170 mg/m³.

Irritation:
- Rabbit, Serious damage (eyes) for 70% hydrogen peroxide.
- Rabbit, Irritant (skin) for < 50% hydrogen peroxide.
- Rabbit, Corrosive (skin) 1 hour, for ≥ 50% hydrogen peroxide.
- Mouse, Respiratory irritation (RD_{50}), 665 mg/m³.

Sensitization: Guinea Pig, Nonsensitizing (skin).

Chronic toxicity:
- In vitro, without metabolic activation, mutagenic effect.
- In vivo, no mutagenic effect.
- Oral route, after prolonged exposure, mouse.
  Target organ: duodenum, carcinogenic effect.
- Dermal route, after prolonged exposure, mouse, no carcinogenic effect.
- Oral route, after prolonged exposure, rat, no carcinogenic effect.
- Oral route, after prolonged exposure, rat/mouse.
  Target organ: gastro-intestinal system, observed effect.
- Inhalation, after repeated exposure, dog, 7 ppm, irritating effect.

Comments:
- Toxic effect linked with corrosive properties.
- The carcinogenic effect found in animals is not demonstrated in humans.

12. Ecological Information

Acute ecotoxicity:

Fish, Pimephales promelas
  LC_{50} , 96 hours, 16.4 mg/L
  NOEC, 96 hours, 5 mg/L
Crustaceans, Daphnia pulex
  EC_{50}, 48 hours, 2.4 mg/L
  NOEC, 48 hours, 1 mg/L
Algae, various species
  EC_{50}, 72 to 96 hours, 3.7 to 160 mg/L in fresh water.
Algae, Nitzchia closterium
  EC_{50}, 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, $t_{1/2}$ 10 to 20 hours.
Conditions: sensitizer: OH radical.
Water, redox reaction, $t_{1/2}$ 2.5 days, 10,000 ppm.
Conditions: mineral and enzymatic catalysis/fresh water.
Water, redox reaction, $t_{1/2}$ 20 days, 100 ppm.
Conditions: mineral and enzymatic catalysis/fresh water.
Water, redox reaction, $t_{1/2}$ 60 hours.
Conditions: mineral and enzymatic catalysis/salt water.
Soil, redox reaction, $t_{1/2}$ 15 hour(s).
Conditions: mineral catalysis.

Biotic degradation:

Aerobic, $t_{1/2}$ < 1 minutes in biological treatment sludge.
Result: rapid and considerable biodegradation.
Aerobic, $t_{1/2}$ 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 (H_2O and O_2).

13. Disposal Considerations

Waste Disposal Method:

Consult current federal, state and local regulations regarding the proper disposal of this material and its emptied containers.

14. Transport Information

D.O.T. Proper Shipping Name: Hydrogen peroxide, aqueous solution

UN Number: 2014

Primary Hazard: 5.1

Subsidiary Hazard: 8

Label(s): Oxidizer, Corrosive

Packing Group: II

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)
Extremelyhazardous 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 material

Canadian Domestic Substances List: DSL / Non confidential #6754.

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.

Occupational Safety and Health Administration (OSHA) requirements for **process safety management** must be followed anytime at least 7,500 lbs. of hydrogen peroxide at concentrations of at least 52% are used or stored. Refer to **29CFR1910.119** for specific details.

16. Other Information

HMIS® Rating:

Health - 3	Flammability - 0	Reactivity - 1	PPE - Required

HMIS® is a registered trademark of the National Paint and Coating Association.

NFPA® Rating:

Health - 3	Flammability - 0	Reactivity -1	OX

NFPA® is a registered trademark of the National Fire Protection Association.

(1) SVP-HP® is a trademark of EKA Chemicals.

Reason for Issue: Update grades list. Add disclaimers. Make Internet ready.

Supersedes: ZIH20/60-001-03 (May 1, 2001).