Material Safety Data Sheet (MSDS)

1. Product and company identification

a) Product Name : Hydrogen Peroxide 50~60%

b) Recommended use of the chemical and restrictions on use :

Paper & Pulp Bleaching, Semiconductor, Reagent

c) Manufacturer/Supplier/Distributor Information :

- Name : OCI Company Ltd.
- Address : 94 Sogong-ro, Jung-gu, Seoul, Korea
- Emergency phone number : 063-830-7777

2. Hazards identification

a) Hazard.Risk Classification

Oxidizing Liquids – Category 2

Acute Toxicity (Oral) – Category 4

Acute Toxicity (Inhalation) – Category 4

Serious Eye Damage / Eye Irritation – Category 1

Skin Corrosion / Irritation – Category 1

Carcinogenicity – Category 2

Specific Target Organ Toxicity (Single Exposure) – Category 1 (Lung)

Specific Target Organ Toxicity (Repeated Exposure) – Category 1 (Lung), Category 2 (Blood)

Hazardous to Aquatic Environment (Chronic) – Category 3

b) Label elements including precautionary statements

- Symbol :

- Signal Word : Danger
- Hazard.Risk Statement :

H272 : May intensify fire; oxidizer.

H302 : Harmful if swallowed.

H314 : Cause severe skin burns and eye damage.

H318 : Cause serious eye damage.

H332 : Harmful if inhaled.

H351 : Suspected of causing cancer.

H370 : Cause damage to organs (lung).

H372 : Causes damage to organs (lung, blood) through prolonged or repeated exposure

H412 : Harmful to aquatic life with long lasting effects

- Precautionary Statement :

- Prevention:

P201 : Obtain special instructions before use.

P202 : Do not handle until all safety precautions have been read and understood.

P210 : Keep away from heat/spark/open flames/hot surface – No Smoking
P220 : Keep / Store away from combustible materials.
P221 : Take any precaution to avoid mixing with combustibles.
P260 : Do not breathe dust/fume/gas/mist/vapours/spray.
P261 : Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 : Wash thoroughly after handling.
P270 : Do not eat, drink or smoke when using this product.
P271 : Use only outdoors or in a well ventilated area.
P273 : Avoid release to the environment.
P280 : Wear protective gloves/protective clothing/eye protection/face protection
- Response:
P301 + P312 + P330 + P331 : If swallowed or feel unwell, rinse mouth. Do not induce vomiting and call a doctor.
P303 + P361 + P353 : If on skin, remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 : If inhaled, remove victim to fresh air and keep at rest in a position comfortable for Breathing.
P305 + P351 + P338 : If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if presented easy to do. Continue rinsing.
P308 + P311 + P313 : If exposed or concerned, call a poison center or doctor/physician and get medical advice/attention.
P310 : Immediately call doctor.
P314 : Get medical advice/attention if you feel unwell.
P321 : Specific treatment reference to supplement first aid instruction.
P363 : Wash contaminated clothing before reuse.
P370 + P378 : In case of fire, Use extinguishing media with H2O or extinguisher for extinction
- Storage :
P405 : Store locked up
- Disposal :
P501 : Dispose of contents in accordance with local/regional/national/international regulations

c) Other Hazard . Risk which are not included in the classification criteria :
- NFPA
Health : 3
Fire : 0
Reactivity : 1

3. Composition/Information on ingredients

Chemical Name	Other name	CAS number or Other identification number	Content (%)
Hydrogen Peroxide	Hydrogen dioxide	7722-84-1	50~60%
Water	Dihydrogen oxide	7732-18-5	40~50%

4. First aid measures

a) Eye contact :

Wash eyes immediately with large amounts of water, occasionally lifting upper and lower lids, until no evidence of chemical remains (at least 15 – 20 minutes).

Continue irrigating with normal saline until the pH has returned to normal (30-60 minutes).

Cover with sterile bandages.

Get medical attention immediately.

b) Skin contact :

Remove contaminated clothing, shoes, etc. immediately.

Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes).

If burns occur, proceed with the following: Cover affected area securely with sterile, dry, loose-fitting dressing.

Treat symptomatically and supportively.

Get medical attention immediately.

c) Inhalation :

Perform artificial respiration if necessary.

Maintain airway, blood pressure and respiration.

Keep warm and at rest. Treat symptomatically and supportively.

Get medical attention immediately.

Qualified medical personnel should consider administering oxygen.

d) Ingestion :

If the person is conscious and not convulsing, give 2-4 glasses of water to dilute the chemical.

Use gastric tube to relieve the pressure caused by evolved oxygen

(Dreisbach, Handbook of Poisoning, 12th Ed.)

Treat symptomatically and supportively.

Intubation should be performed by qualified medical personnel.

Get medical attention immediately.

e) Indication of immediate medical attention and notes for physician :

Move victim to fresh air.

Call 911 or emergency medical service.

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 warm and quiet.

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

5. Fire-Fighting measures

a) Suitable (and unsuitable) extinguishing media :

- 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.

Move containers from fire area if you can do it without risk.

- Fire involving Tanks or Car/Trailer Loads

Fight fire from maximum distance or use unmanned hose holders 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 hose holders or monitor nozzles; if this is impossible,

b) Specific hazards arising from the chemical :

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.

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.

Runoff may create fire or explosion hazard.

c) Special protective equipment and precautions for fire-fighters :

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.

6. Accidental release measures

a) Personal precautions, protective equipment and emergency procedures :

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.

Isolate area.

Approach from upwind.

Avoid materials and products which are incompatible with the product (see section 10).

In case of contact with combustible materials, avoid product drying out by dilution with water.

b) Environmental precautions and protective procedures :

Atmosphere: -

Land: If possible dam large quantities of liquid with sand or earth.

Underwater: Prevent entry into waterways, sewers, basements or confined areas.

c) Methods and materials for containment and cleaning up :

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.

- 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.

Following product recovery, flush area with water.

7. Handling and storage

a) Precautions for safe handling :

Do not get water inside container

Isolate hazard area and deny entry.

Operate in a well-ventilated area.

Prevent all contact with organics.

Use equipment and containers which are compatible with the substances.

Container and equipment used to handle hydrogen peroxide should be used exclusively for hydrogen peroxide.

b) Conditions for safe storage :

Avoid impurities and heat effect.

Keep away from incompatible products.

Before all operations, passivate the piping circuits and vessels.

Never return unused product to storage container.

8. Exposure controls & personal protection

a) Control parameters :

- CEFIC : TWA (8 hours) - 1 ppm (1.4 mg/m3)
  STEL (5~15 min) - 3 mg/m3
- ACGIH : TWA - 1 ppm (1.4 mg/m3)
- NIOSH : TWA - 1 ppm (1.4 mg/m3)
- DFG : MAK - 1.4 mg/m3

* TWA : Time Weighted Average

* ACGIH : United States American Conference of Governmental Industrial Hygienists

b) Appropriate engineering controls :

Operate in a well-ventilated area.

Provide local exhaust or process enclosure ventilation to meet published exposure limits.

c) Personal protective equipment :

Wear personal protective equipment in accordance with Chemical Control Act article 14,

Regulation about wearing personal protective equipment of hazardous handler

- Respiratory protection :

Wear a respirator more than full facepiece respirator for organic compound. (more than 35wt%)

- Eye protection :

Employee must wear splash-proof or dust-resistant safety goggles and a faceshield to prevent contact with this substance.

- Hands protection :

Employee must wear appropriate protective gloves to prevent contact with this substance.
Wear safety gloves for chemical material. (more than 35wt%)

- Body protection :

Wear 3 or 4 form protective clothing for chemical materials (more than 35wt%)
Employee must wear appropriate protective (impervious) clothing and equipment to prevent any possibility of skin contact with this substance.

9. Physical and chemical properties

a) Appearance (physical state, color etc) : Colorless liquid, slightly pungent
b) Odor : Not available
c) Odor threshold : Not available
d) pH : pKa = 11.62 (25℃) (100% pure H2O2), pH < 2 (OCI H2O2)
e) Meting point/freezing point : -67~-50 ℃
f) Initial boiling point and boiling range : 114~119 ℃
g) Flash point : Not applicable (non combustibility)
h) Evaporation rate : Not available
i) Flammability (solid, gas) : Not applicable (non combustibility)
j) Upper/lower flammability or explosive limits : Not applicable (non combustibility)
k) Vapor pressure : 0.99 hPa (30℃)
l) Solubility : miscible in all proportions
m) Vapor density : 1 (air=1)
n) Relative density : 1.199 ~ 1.245 (15℃)
o) Partition coefficient : -1.5 (estimated)
p) Auto-ignition temperature : Not available
q) Decomposition temperature : 150~152 ℃ decomposition (100% pure H2O2)
r) Viscosity : 1.17 (1·10-3 kg/ms)
s) Molecular mass : 34.01

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions :

May decompose on prolonged storage or heating with evolution of oxygen.
Tightly closed containers may rupture due to an increase in internal pressure
Thermal decomposition becomes self-sustaining at 141℃ and is accelerated by agitation, contact with rough surfaces, alkalies, finely divided metals and many other substances.

b) Conditions to avoid (e.g. static discharge, shock or vibration, etc) :

May ignite other combustible materials (wood, paper, oil, etc.).

Reaction with fuels may be violent.
Flammable poisonous gases may accumulate in tanks and hopper cars.
Runoff to sewer may create fire or explosion hazard.

c) Incompatible materials :

Acids, Bases, Metals, Salts of metals, Reducing agents, organic materials, Flammable substances

d) Hazardous decomposition products :

Thermal decomposition releases oxygen and heat.

11. Toxicological information

a) Information on the likely routes of exposure

Inhalation: May cause nasal discharge, oedematous feet, irritation of skin in the groin, hair loss
Oral: May cause burning sensation in the throat, epigastrium and substernal area and vomited
Skin contact: May cause moderate irritation combined with delayed epidermal necrosis and sloughing.
Eye contact: May irreversible corneal injury (corrosion), severe iritis and severe conjunctivitis

b) Health hazards information

- Acute toxic :

Oral - Category 4, Regulation about classification and labeling of chemical material.
LD50 1,193mg/kg Rat (GLP, US EPA Guidelines)
Dermal - Not classified. LD50 >2,000mg/kg Rabbit (OECD TG402, GLP)
Inhalation - Category 4, Regulation about classification and labeling of chemical material.

- Skin corrosive/irritant : Category 1

Regarding a study (35% H_2O_2, New Zealand White rabbits, treated with 0.5 ml for 4 hr), slight to moderate erythema, oedema and/or brown areas in the application sites. Thus, the finding revealed moderate irritation combined with delayed epidermal necrosis and sloughing.

- Serious eye damage/eye irritation : Category 1

The test study (10 and 12% H_2O_2, rabbits) showed severe, penetrating, irreversible corneal injury (corrosion), severe iritis and severe conjunctivitis in rabbit eyes (FHSA method). In other test, it was observed highly irritating with slight corneal opacities, iritis and severe conjunctivitis on unwashed eyes, but severe corneal opacities, severe iritis and conjunctivitis on Washed eyes.

- Respiratory sensitization : Not available
- Skin sensitization : Not classified

3% H_2O_2 preparations was studied appeared not to sensitise with guinea pigs using a modification of the Magnusson-Kligman procedure. Also, some case studies in human show all negative results.

- Carcinogenicity : Category 2

IARC Group 3, ACGIH A3, NTP, OSHA: Not classified

- Germ Cell Mutagenicity : Not classified

in vitro-
1) gene mutation assays (ames test): positive
2) beacterial DNA damage and repair: positive
3) mammalian cell gene mutation assays: positive
4) sister chromatid exchange: positive
5) cytogenetic assays: positive

in vivo-

1) genetic toxicity: negative

Rat (Wistar, male) hepatocyte unscheduled DNA synthesis (UDS)

Mouse (Swiss HIM/OF1) micronucleus assay of bone marrow polychromatic erythrocytes

Drosophila melanogaster drosophila SLRL test

- Reproductive toxicity : Not classified

The study (mice and rats, exposed by drinking water) showed that there is the effect to sperm motility, the effect to estrous cycle of female, the effect to the decrease of the number of delivery maternal animal, and the weight decrease of offspring. But it was presumed that because of the rapid degradation of the substance on absorption and due to local effects, studies would be unlikely to reveal any specific developmental effects.

- Specific target organ toxicity (single exposure) : Category 1 (Lung)

Animal Congestion, pulmonary edema, emphysema, epidermal necrolysis of lung and organs

- Specific target organ toxicity (repeated exposure) : Category 1 (Lung) Category 2 (Blood)

Human both FEV1 and FVC decreased by about 15% in the exposed group

Animal effects on a range of other parameters including decreased red blood cell count, haemocrit, plasma protein concentration and plasma catalase

- Aspiration hazard : Not available

12. Ecological information

a) Aquatic and terrestrial ecotoxicity :

Fish : ECHA LC50 16.4㎎/ℓ 96hr Pimephales promelas(USEPA method)

Crustacea : ECHA LC50 2.4㎎/ℓ 48hr Daphnia pulex(USEPA method)

Algae : ECHA ErC50 1.38㎎/ℓ 72hr Skeletonema costatum(Paris Commission guidelines1990, GLP)

b) Persistence and degradability :

Persistence : log Kow=-1.5 (estimated)

Degradability : Photolysis in air: half-life of 24 hours

Photolysis in water is not expected.

c) Bioaccumulative potential :

Biodegradation : readily biodegradable

Hydrogen peroxide is biologically degradable. Aerobic bacteria produce catalase enzymes that convert H2O2 to water and oxygen. Catalase is present in most aerobic bacteria and therefore biological degradation starts readily when H2O2 is in contact with microbial material.

Bioaccumulation : low potency of bioaccumulation. BCF=1.4(fish), 3.3(earthworm),

d) Mobility in soil : low potency of mobility to soil

log Koc = 0.2 (Mackay Model 1, TGD, QSAR for nonhydrophobics)

e) Other adverse effects : Not available

13. Disposal considerations

a) Disposal method :

Disposal must be in accordance with standards applicable to generators of hazardous waste, 40 CRF 262. EPA Hazardous Waste Number D002.

100 pound CERCLA Section 103 Reportable Quantity.

b) Disposal precaution : Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

a) UN number : 2014

b) UN proper shipping name :

HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary)

c) Transport hazard class : 5.1 (Subsidiary 8)

d) Packing group (if applicable) : II

e) Marine pollution (yes/no) : Not applicable

f) Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises :

Emergency schedule for fire - F-H

Emergency schedule for spillage - S-Q

15. Regulatory information

a) Industrial Safety and Health Act :

Listed in occupational exposure assessment, Hazardous agent, Occupational exposure limits and Health examination agent

b) Chemical Control Act :

Regulation about wearing personal protective equipment of hazardous handler

Regulation about classification and labeling of chemical material, Hazard classification

Specifying hazardous substances, restricted substances, prohibited substances mark 1 "more than 6wt%, toxic"

enforcement regulations mark10 "more than 35wt%, accident preparedness substances"

c) Dangerous Material Safety Control Act :

enforcement ordinance mark 1 note 22 "more than 36wt%, dangerous"

Oxidizing liquids "600kg"

d) Wastes Management Act : Designated waste

e) Other requirements in domestic and other countries :

- Domestic requirements

Persistent organic pollutants control act : Not applicable

- Other countries requirements

EU classification :

EU classification (Classification) : R5 O; R8, C; R35, Xn; R20/22

EU classification (Risk phrases) : R5, R8, R20/22, R35

EU classification (Safety phrases) : S1/2, S17, S26, S28, S36/37/39, S45

U.S.A. management information :

TSCA Inventory : Y

CERCLA Section 103 (40CFR 302.4) : N

SARA Section 302 (40CFR 355.30) : Y, TPQ – 1000 lb

SARA Section 304 (40CFR 355.40) : Y, RQ – 1 lb

SARA Section 313 (40CFR 372.65) : N

OSHA Process Safety (29CRF 1910.119) : more than 52%, TQ = 7500 lb

California Proposition 65 : N

SARA Hazard Categories : SARA Sections 311/312 (40CRF 370.21)

Acute Hazard/Fire Hazard/Reactivity Hazard : Y

Chronic Hazard/Sudden Release Hazard : N

16. Other information

a) Information source and references :

ECB : ESIS (European chemical Substances Information System)

European Union Risk Assessment Report (RAR)

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man Geneva-World Health Organization, International Agency for Research on Cancer, 1972-Present (Multivolume work)., p. S7 216 (1987)

REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008

OECD SIDS : (http://www.chem.unep.ch/irptc/sids/OECDSIDS/Naco.pdf)

Korea Occupational Health & Safety Agency

National chemicals information systems

U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB) : (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm)

Incorporated Administrative Agency National Institute of Technology and Evaluation : (http://www.safe.nite.go.jp/japan/sougou/data/pdf/hazard/hyokasyo/No-32.pdf)

b) Issuing date : 2010. 06. 18

c) Revision number and date :

Revision number : 4

Revision date : 2018. 04. 10

d) others :

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. It is intended for use only by persons having the necessary technical skills and at their own discretion and risk