

Preventional wordings

Prevention

P260: Do not breathe (dust/fume/gas/mist/vapours/spray).
P261: Avoid breathing (dust/fume/gas/mist/vapours/spray).
P264: Wash the area of contact thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear (protective gloves/protective clothing/eye

protection/face protection).

Response

P301 + P312: IF SWALLOWED: Call a medical institute (doctor) if you feel unwell.

P303+P361+P331: If swallowed, wash the mouth. Do not induce vomiting.

P303+P361+P353: IF ON SKIN (or hair): 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 present and easy to do. Continue rinsing.

P310: Immediately call a medical institute (doctor).

P312: Call a medical institute (doctor) if you feel unwell.

P321: perform emergency treatment

P330: Rinse mouth.

P363: Wash contaminated clothing before reuse.

P403+P233: Store in a well-ventilated place and keep

Storage

container tightly closed.

Disposal

P501: Dispose of contents/container to (as stated in the concerned law)

C. Other hazards and maleficence not included in the standards of the category of hazards and maleficence (NFPA)

Sanitation	3
Fire	0
Reactivity	0

3. Title and content of the component

Name of the component	Phosphoric acid	Water
Nickname (Trivial name)	White Phosphoric Acid	DIHYDROGEN OXIDE
CAS no	7664-38-2	7732-18-5
Content (%)	85%	15%

4. Emergency measures.

A. If in eyes

Wash the skin and eye in contact with the material immediately with running water for more than 20 minutes.

Remove the lens first if used.

Consult with a doctor immediately.

B. If on skin

Remove and eliminate the clothes and shoes contaminated by the chemical material.

Wash the skin and eye in contact with the material immediately with running water for more than 20 minutes.

C. If inhaled

Consult with a doctor in case of irritation or abnormal symptoms.

Move it to the area with fresh air.

D. If swallowed.

Drink a lot of water and do not induce vomiting.

To remove the possibility of inhalation while natural vomiting, keep the posture where the head is lower than the bottom.

In case of drinking or swallowing a chemical material, consult and be treated by the doctor.

E. Major Symptoms/effects of the acute and delay.

Inhalation by the respiratory system: Temporary effect - may irritate the respiratory system and cause lung disease.

Skin contact: Temporary effect- the risk of serious skin burn and necrosis.

Eye contact: Temporary effect-causes serious damage to the eye and risk of burn and conjunctivitis and corneal opacity.

F. Other cautions to doctor

Move the patient to the non-contaminated area with fresh air and provide oxygen if breathing is difficult, and provide artificial breathing if there is no breathing.

Keep the patient warm and at ease.

The symptoms due to exposure (inhalation, swallowing, contact on the skin) may form delayed.

If required, be treated by a doctor.

Inform the concerned personnel of the medicine so that they could perform appropriate protection measures.

Contact 119 or another emergency medical institute.

Minimize the contact on the skin with the material of leakage.

Mouth-to-mouth methods are prohibited for the person that has inhaled, swallowed the material of leakage, and artificial breathing should be done using the emergency kits as breathing apparatus such as pocket mask, etc.

5. Measures in case of explosion, fire.

A. Recommended (inappropriate) extinguisher.

Appropriate extinguisher: dry chemical powder, CO₂, Aqueous Film Forming Foam (AFFF)

Inappropriate extinguisher: Do not spray a large amount of water directly.

In case of a huge fire: dry chemical powder, CO₂, Aqueous Film Forming Foam (AFFF)

The firefighter captures them in a bank or ditch and does not let them disperse.

If it is not in danger, remove the container away from the fire danger area.

Tank/trailer/train cargo fire: fight fire at the furthest area, or use hose stand or unmanned extinguisher.

Freeze enough amount of water until the fire is completely set off.

Do not access the tank when in flame.

Make sure that water does not enter the container.

Tank, tank truck, cargo train prohibits the access within 800 m when related with fire.

(Initial evacuation by the 800m outskirt is considered)

B. Specific hazard from the chemical component

Product by thermal decomposition:

Thermal decomposition could release toxic fume of the sulfur.

A large amount of heat is occurred by releasing the corrosive/toxic gas reacting to water.

Be careful as hydrogen gas is formed when in contact with metal.

Fire and explosion threats:

As it is a non-flammable material, it does not burn itself, but could release corrosive or toxic vapor by thermal decomposition by heat.

The container may explode by the heat.

C. Protective equipment when fire-fighting and preventional measures.

Wear the chemical protections that are related to the Respiratory system (SCBA)

Chemical protection clothes may not have a heat-resistant effect or at all.

The fire resistant protections have a limited protection effect at the fire, and it is inappropriate for the spillage situation.

Use the extinguishers applied to the neighboring fire.

Cool down the container with water spray for a certain period of time even after the extinguishment.

Move the container from the area of fire if it could be done safely.

6. Measures in case spillage

A. Required measures and protections to protect the body.

Do not touch or contact the spillage.

Ventilate the confined area.

Locate it at wind and frost and avoid the lower area.

Separate it from the point of spillage or leakage for more than 25~50 m of radius, and control the access by unconcerned personnel.

Check the guideline of the transported material and document etc., and check the detailed material information from the related organization and concerned company.

B. Environmental measures.

Land: The spilled material should be disposed of considering it as potentially dangerous waste.

Biological exposure standards Not applicable.

B. Appropriate engineering maintenance. Install the sealed facility or local ventilation system. Check if the working environment meets the standard of approval and exposure of the ministry of labor. In case this material may be exposed to the eye and skin of the worker, a washing facility or cleaning facility must be installed in the place nearest to the work for an emergency.

C. Personal protection

Respiratory protection

Use the respiratory protection have at has completed the inspection by the Korea Occupational Safety and Health Agency that meets the physicochemical characteristics of the gas, liquid exposed.

In case the exposure concentration is lower than 2 mg/m³, wear a half respiratory mask with an appropriate filter or cartridge.

In case the exposure concentration is lower than 5 mg/m³, wear a hood/helmet automatic respiratory protections with an appropriate filter or loose fitting type with the cartridge.

In case the exposure concentration is lower than 200 mg/m³, wear the full-face type with an appropriate filter or cartridge or automatic half face or dust respirator of continuous flow/pressure required.

In case the exposure concentration is lower than 2,000 mg/m³ wear Self Contained Breathing Apparatus (SCBA) or a pressure required Self Contained Breathing Apparatus (SCBA) with appropriate filter or cartridge.

Eye protection

Install the quick showering facility (shower room) and washing facility so that the workers could easily use it.

Wear safety glass and clothes to protect the eye and face (front of the face, forehead, chin, front of the neck, nose, mouth) from different arsenic acid and harmful liquids that occurs in processing.

Skin protection

Wear a chemical-resistant glove to avoid direct contact of the chemical material to hands.

Body protection

Wear chemical-resistant cloth to avoid the exposure to skin.

9. Physicochemical characteristic.

A. External

Shape

Liquid

Color

No color

B. Odor

Odorless, Sour taste.

C. Odor threshold	No data available.
D. pH	No data available.
E. Melting point/ freezing point	42.4 C
F. Initial boiling point and boiling point range	135 to 158 C (257 to 316F) at 760 mmHg
G. Ignition point	No data available.
H. Vaporization speed	No data available.
I. Inflammability (solid, vapor)	Non-flammable.
J. Upper limit or lower limit of the range of ignition or explosion	No data available.
K. Steam pressure	5.65 to 2.16 mmHg at 20 C (68F)
L. Solubility	Soluble to water and soluble to methanol organic solvent.
M. Vapor density	3.38 (Air =1)
N. Specific gravity	1.58 to 1.69 g/ml at 25 C (77F)
O. n-octanol-water partition coefficient	-0.77
P. Auto-ignition temperature	No data available.
Q. Decomposition temperature	No data available.
R. Viscosity	No data available.
S. Molecular weight	No data available.

10. Stability and reactivity

A. Chemical stability and hazardous reactivity

It could corrode a metal.

Be careful as corrosive/toxic gas is released on contact to water.

Toxic gas could be formed by decomposition at high temperatures.

B. Conditions to avoid

Moisture, heat, flame, spark and other sources of ignition.

C. Materials to avoid

Metal, water

D. Harmful decomposed product

Very irritating, and toxic gas may release while burning by thermal decomposition or combustion.

11. Toxicological information.

A. Information on routes of exposure of high possibility.

Acute inhalation toxicity: It causes serious irritation to the mucous membrane of the respiratory system and it could be fatal if the area of exposure is large.

Acute oral toxicity: when swallowed, it may cause nausea with a burn on the oral cavity, neck, throat, vomiting, and it could be fatal.

Skin contact: It may cause a burn on skin serious dehydration.

Eye contact: May cause pierced wound and burn on the eye, loss of sight, bleeding in the conjunctiva.

B. Health hazards information.

Acute toxicity Statements of all the routes of possible exposure.

Oral LD50=2,140 mg/kg (Rabbit)

Skin	No data available.
Inhalation	LC50=0.094 mg/14 hr
Skin corrosion or irritation	When tested on human skin, serious corrosion was observed and corrosion and necrosis were observed from the skin of pig and rabbit each.
Serious eye damage or irritation	As the result of the eye irritation test to human, severe and serious damage to the eye and to the rabbit, corrosion and conjunctivitis and necrosis was observed, and it is categorized as skin corrosive.
Respiratory sensitization	No data available.
Skin sensitizations	Sulfuric acid does not show allergic to human.
Carcinogenicity	Not categorised
Occupation safety and health act	No Data Available.
Notice of Ministry of Employment and Labor	1A (limited to strong acid mist)
IARC	Group 1 (limited to a strong acid mist)
OSHA	No Data Available.
ACGIH	A2 (carcinogenicity when exposed to strong acid mist including the sulfuric acid)
NTP	K(Carcinogenicity when exposed to strong acid mist including the sulfuric acid)
EU CLP	No data available.
Germ-cell mutagenicity	No data available.
Reproductive toxicity	Does not show effects on the reproductive organ of the females of rabbits and rats.
Specific target organ systemic toxicity (Single exposure)	Acute effects such as cough, gasping, blood phlegm, etc, and permanent effects such as reduction of the lung function and fibrosis, emphysema could be observed.
Specific target organ systemic toxicity (Repeated exposure)	Upon inhalation test of white rat for 28 days, cell proliferation at tunica mucosa laryngis was observed. In the repeated inhalation exposure test on a guinea pig, the disorder in airway and lung such as the septum edema, pulmonary emphysema, detelectasis, bleeding in bronchiole, edema, bleeding, etc. is observed.
Aspirations respiratory tract hazards	No data available.
Other Hazards	No data available.

12. Effects on the environment.

A. Ecotoxicity

Fish	96hr-LC50 (Oncorhynchus mykiss) = 16mg/l
Crustacean	48hr-EC50 (Daphnia Magna) = 200mg/l
Algae	No data available.

B. Persistent and biodegradable.

Persistent As logK_{ow} is lower than 4, persistence is expected to be low.
Degradability No data available.

C. Bio-accumulative potential

Condensability bioaccumulation is low as bioaccumulation factor (BCF) = 250 (estimation).
Biodegradability Bisectary (Estimation)

D. Mobility in soil No data available

E. Other adverse effects No data available

13. Disposal considerations.

A. Methods of waste disposal

It must be disposed of by cohesion, precipitation, filter, dehydration method after treated by the reaction of the neutralization, oxidation, reduction.

It must be disposed of by evaporation, concentration method.

It must be purified by separation, vaporization, extraction, other methods.

In case of danger to the health hygiene or environment conservation, take measures for the prevention by the competent health center, police station, fire station, etc.

B. Cautious measures when disposal.

Do not put anything in the container that had the sulfuric acid, dispose it of by the approved agent or send it back to the manufacturer of the product or the merchant company after storing separately at a place with a warning sign. Handle carefully as a small drop may splash when dilution with water or neutralization by alkali, and be cautious to prevent the contact to eye or water.

14. Information required for transport.

A. UN No. UN1805
B. Proper shipping name Phosphoric Acid with more than 50% acid
C. Transportation hazard classification Class 8
D. If applied, the packing group III
E. Marine pollution (Marine pollutant material) Not applicable.
F. Special transport measures to the transport or the transportation and precautionary conditions that the user should know.

Emergency measures in case of fire F-A

Emergency measures in case of spillage S-B

15. Legal regulatory status.

A. Regulations by occupation safety and health acts working environment (frequency of measurement: 6 months)	Object of measurement of the Controlled harmful substances The object of standards of exposure.
B. Regulations by Chemicals control Act	Not Applicable.
C. Regulations by Safety Control of Dangerous Substances	Not Applicable.
D. Regulations by waste control act	Specified waste.
E. Regulations by domestic and foreign law. Other domestic regulations.	
Persistent organic pollutants control act	Not Applicable.
Foreign regulations	
The USA knowledge management (OSHA Regulations)	Not Applicable.
The USA knowledge management (CERCLA Regulations)	2267.995kg 5000lb
The USA knowledge management (EPCRA 302 Regulations)	Not Applicable.
The USA knowledge management (EPCRA 304 Regulations)	Not Applicable.
The USA knowledge management (EPCRA 313 Regulations)	Not Applicable.
The USA knowledge management (EPCRA 302 Regulations)	Not Applicable.
The USA knowledge management (Materials of Rotterdam agreement)	Not Applicable.
The USA knowledge management (Materials of Stockholm agreement)	Not Applicable.
The USA knowledge management (Materials of Montreal protocol)	Not Applicable.
EU Classification(result of definite classification)	C; R34
EU Classification (Hazard text)	R34
EU Classification (Safety text)	S1/2,S26,S45

16. Other information.

A. Source of reference.

International Chemical Safety Cards (ICSC)
Hazardous Substances Data Bank (HSDB)
SDIS
KISCO-NET Material Safety Data Sheet
Material Safety Data Sheet of KOSHANET (Korea Occupational Safety and Health Agency)
(04.04.2013)
Material Safety Data Sheet issued by Japan Legacy Association (01.09.1995)
Chemical material data processing system (<http://ncis.nier.go.kr>)
Chemical material safety maintenance data system (<http://kischem.nier.go.kr>)

B. Initial date of preparation 20th December 2016

C. Number of revision and first date of issue

Number of revision 4

Last date of revision 10th October 2018.

D. Miscellaneous

The issued Material safety data sheet (MSDS) is document edited and partly amended by referencing the MSDS provided by Korea Occupational Safety and Health Agency

The material safety data sheet was revised based on the revised terms of the classification of the chemical material and contents of the announcements on the composition of the material safety data sheet.