Safety Data Sheet

Reference No. 1510

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1. Chemical product and company identification

Product name DPR Reagent: Sulfate Model DPR-SO_4

Company name KYORITSU CHEMICAL-CHECK Lab., Corp.
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Recommended uses and restrictions Reagent for water quality measurement

2. Hazards identification

[GHS Classification**]**

Physical hazards: Classification not possible (no data for GHS classification available)

Health hazards:

Acute toxicity (oral):	Category 4 (applicable only R-2 reagent)
Skin corrosion/irritation:	Category 1 (applicable only R-1 reagent)
Serious eye damage/eye irritation:	Category 1 (applicable only R-1 reagent)
Respiratory or skin sensitization:	Category 1 (respiratory sensitization) (applicable only R-1 reagent)
Specific target organ toxicity (single exposure):	
	Category 2 (respiratory organs) (applicable only R-1 reagent)
	Category 1 (cardiovascular system, muscle) (applicable only R-2 reagent)
	Category 2 (nervous system) (applicable only R-2 reagent)
Specific target organ toxicity (repeated exposure):	
	Category 2 (teeth, respiratory organs) (applicable only R-1 reagent)

For those health hazards not listed above are not classified or classification not possible (no data for GHS classification available)

Environmental hazards:

Hazardous to the aquatic environment - Acute:	Category 2 (applicable only R-1 reagent)
Hazardous to the aquatic environment - Chronic:	Not classified
Harmful effects on the ozone layer:	Classification not possible

[GHS labeling elements**]**

[Signal word**]**

Danger

[Hazard statements**]**

Harmful if swallowed. (applicable only R-2 reagent)
Causes severe skin burns and eye damage. (applicable only R-1 reagent)
Causes serious eye damage. (applicable only R-1 reagent)
May cause allergy or asthma symptoms or breathing difficulties if inhaled. (applicable only R-1 reagent)
May cause damage to respiratory organs. (applicable only R-1 reagent)
Causes damage to cardiovascular system and muscle. (applicable only R-2 reagent)
May cause damage to nervous system. (applicable only R-2 reagent)
May cause damage to teeth and respiratory organs through prolonged or repeated exposure. (applicable only R-1 reagent)
Toxic to aquatic life. (applicable only R-1 reagent)

[Precautionary statements**]**

Keep out of reach of children and store in the cool, dry and dark place.
Carefully read instructions before use and do not use for other purposes.
Wear personal protective equipment if necessary.
Do not inhale reagents.
Wash contaminated clothing.
Wash hands thoroughly before and after handling.
Avoid release to the environment.

3. Composition/ information on ingredients

Discrimination of single substance or mixture: Mixture

Reagent name	R-A reagent		R-1 reagent			R-2 reagent	
Chemical name	Glycerin	Water	Hydrochloric acid	Other ingredient	Water	Barium chloride dihydrate	Water
Content	<15%	>85%	<3%	<1%	>96%	<20%	>80%
Chemical formula	$HOCH_2CHOHCH_2OH$	H_2O	HCl	—	H_2O	$BaCl_2 \cdot 2H_2O$	H_2O
METI No. (reference number under CSCL in Japan)	(2)-242	—	(1)-215	—	—	(1)-79	—
CAS No.	56-81-5	7732-18-5	7647-01-0	—	7732-18-5	10326-27-9	7732-18-5

4. First-aid measures

If reagents or developed sample;

Enter in eyes: Immediately rinse eyes with water for more than 15 minutes followed by the treatment by an ophthalmologist.
Contact with skin: Immediately wash out contaminated site with plenty of water.
Enter into mouth: Immediately rinse mouth with plenty of water.

If any symptoms appear after above measures, immediately get medical advice or treatment.
Especially in case ingested reagents or test solutions, drink plenty of water or milk and immediately get medical advice or treatment.

5. Fire-fighting measures

Extinguishing methods: Cut off ignition sources and extinct by a suitable media.
Suitable extinguishing media: Water (mist), powder, carbon dioxide, dry sand.

6. Accidental release measures

In case of outdoor use: Avoid spill of reagents and waste solutions.
In case of indoor use: If spilled on a table or floor, wipe off immediately spilled reagents and dispose of them.
Concentrated solutions should not be released into sewer or rivers.

7. Handling and storage

Handling: Avoid eyes contact, skin contact and ingestion of reagents. R-1 reagent and a sample with R-1 reagent are less than pH 2. Similar attention is necessary.
Especially for outdoor use, ensure to bring back reagents, liquid waste after the measurement and used containers.
Storage: Avoid direct sunlight and store in a cool and dark place.

8. Exposure controls and personal protection

Administrative control level
Working environment standard: Not established (Glycerin, Hydrochloric acid)

Occupational exposure limits
Japan Society for Occupational health: Not established (Glycerin)
5 ppm (7.5 mg/m^3) (Hydrochloric acid)
ACGIH (TLVs): TWA 10 mg/m^3 (Vapor) (Glycerin)
Cl 5 ppm (Hydrochloric acid)
TWA 0.5 mg(Ba)/m^3 (Barium chloride dihydrate)
OSHA (PEL): TWA 15 mg/m^3 (Glycerin)
air Cl 5 ppm (Hydrochloric acid)
8H TWA 0.5 mg (Ba)/m^3 (Barium chloride dihydrate)

Protective equipment: Recommend to wear protective glasses and gloves

9. Physical and chemical properties

Physical state:	R-A: liquid reagent	7 mL x 1 plastic bottle in plastic bag
	R-1: liquid reagent	7 mL x 1 plastic bottle in plastic bag
	R-2: liquid reagent	7 mL x 1 plastic bottle in plastic bag
Color:	R-A: colorless (liquid), R-1: colorless (liquid), R-2: colorless (liquid)	
Odor:	R-A: no odor, R-1: no odor, R-2: no odor	
pH:	R-A : pH 7, R-1: $\leq$ pH1, R-2: pH 7,developed sample: pH$\leq$ 2	

Melting point, boiling point, flash point, ignition point, lower explosion limit, vapor pressure, density, relative density, solubility, Pow, kinetic viscosity: not available as a mixture.

10. Stability and reactivity

Avoid leaving in a place where high temperature, humid or under direct sunlight. Stable under normal use conditions and no dangerous reactions under specific conditions are expected. No information on hazardous decomposition product is available.

11. Toxicological information

No data on mixture is available. Data on R-A, R-1, and R-2 reagents are shown below.

R-A reagent
Glycerin:
Acute toxicity
Oral: Human TDLo = 1,428 mg/kg, headache, nausea and vomiting (RTECS)
Rat LD_{50} = 12,600 mg/kg, anesthesia, weakened muscle (RTECS)
Rat LD_{50} = 27,200 mg/kg (SIDS)

Mouse LD_{50} = 4,090 mg/kg (RTECS)
Subcutaneous: Mouse LD_{50} = 91 mg/kg (RTECS)
Dermal: Rabbit LDo > 18,700 mg/kg (SIDS)
Inhalation: Rat LC_{50} > 570 mg/m^3/1H (RTECS)
Intraperitoneal: Mouse LD_{50} = 8,700 mg/kg, changed sleeping hours (RTECS)

Skin corrosion/ irritation:
Skin-rabbit 500 mg/24h mild. It is evaluated as “not irritating” in rabbits and Draize score ranges 0-0.4/30 (JETOC).

Serious eye damage/ eye irritation:
Eye-rabbits 126 mg/kg mild. Draize score in a rabbit test ranges 0-2/110 and it is evaluated as “not irritating” (JETOC).

Respiratory or skin sensitization:
Skin sensitization: Negative in a human patch test and negative in a guinea pig test without detailed information on test conditions. (JETOC).

Germ cell mutagenicity: No data

Carcinogenicity: Not reported in OSHA, IARC or NTP.

Reproductive toxicity:
No effects on sex function, reproductive potential, developmental indexes in newborn child were found in a rat two generation oral study. No teratogenicity was reported in rabbits or mice oral studies administered during periods including organ developmental stages in unborn child. (JETOC)

Specific target organ toxicity (repeated exposure):
NOAEL = 1,000 mg/kg in a rat two year oral study that means no adverse effects were seen at dose levels 10 times higher than the guidance value for the classification of category 2.
Due to a local irritation, a minor incidence of squamous metaplasia in airways (nasopharyngeal vault) was found at a dose level 0.0662 mg/L which exceeds the guidance value for the classification of category 2. No other serious toxicological findings are reported. (JETOC)

Other data: Not available

Water:
Acute toxicity:
Oral: Human-infant TDLo = 333 g/kg, cramping, attacks or fever.
Human-men TDLo = 42.86 g/kg, shaking, mussel pain.
Rat LD_{50} > 90 ml/kg
Intravenous: Mouse-LD_{50} = 25 g/kg
intraperitoneal : Mouse-LD_{50} = 190 mg/kg
Other data: Not available.

R-1 reagent:
Hydrochloric acid (gas) (no data on solution is available):
Acute toxicity:
Oral: Classified as Category 3 based on data; Rat: LD_{50} = 238 ~ 277, 700 mg/kg (SIDS (2002)).
Dermal: Not classified based on data; Rabbit $LD_{50} \geq$ 5,010 mg/kg (SIDS (2002)).
Inhalation (gas): Classified as Category 3 based on data; 1,411 ppm was obtained from statistical calculation of converted value of rats: LC_{50} = 4.2 mg/L, 4.7 mg/L, 283 mg/L/60 min (SIDS (2002)). Note that 4.2 mg/L (4-hr ppm = 1,411 ppm) was used because the calculated value was smaller than the lowest data.
Inhalation (dust, mist): Classified as Category 2 based on data; Rat LC_{50} (aerosol) = 1.68 mg/L/1hr (SIDS (2002)) which is equivalent to 0.42 mg/L/4hr.

Skin corrosion/ irritation: Classified as Category 1A – 1C based on data; Rabbit: Corrosive to the skin by 1 – 4 hour exposure depending on concentrations (SIDS (2002)). Mouse, rat: Skin irritation and inflammation associated with changes of color by 5 – 30 minutes exposure (SIDS (2002)). Human: Mild to severe irritation, ulcer and skin burns (SIDS (2002)).

Serious eye damage/ eye irritation: Classified as Category 1 based on data; Causes serious eye irritation, damage and corrosion in multiple animal tests including rabbits (SIDS (2002)). It also reported that may cause persistent eye damage and blindness in humans (SIDS (2002)).

Respiratory or skin sensitization
Respiratory sensitization: Classified as Category 1 based on data; Japanese Society of Occupational and Environmental Allergy lists as an occupational sensitizer. It is reported that caused bronchial spasm after the exposure of cleaning product containing hydrochloric acid furthermore caused asthma by a limited irritation after one year of the incident. (ACGIH (2003)).
Skin sensitization: Not classified based on data; Negatives in a guinea pig maximization test and a mouse ear swelling tests (SIDS (2002)) and no positive case was found among 15 people applied after10 – 14 days of induction.

Germ cell mutagenicity: Classification is not possible because; No in vivo test data is found except in a positive result of drosophlia sex-linked recessive lethal test. Some positive results are reported in vitro test

however it is not sufficient to conclude mutagenic to human germ cell.

Carcinogenicity: Not classified based on data; IARC Group 3 (1992), ACGIH A4 (2003). No evidence which indicates carcinogenicity was reported in rats and mice studies (SIDS (2002)). Epidemiological studies are of negative regarding relationships between carcinogenicity and exposure of hydrochloric acid (IARC 54 (1992), PATTY 5th (2001)).

Reproductive toxicity: Classification is not possible because of data luck based on available data; No developmental effect was observed in rats and mice administered during pregnancy period.
Effects on reproduction or fertility are not known if exposed before mating or during early developmental stage.

Specific target organ toxicity (single exposure): Classified as Category 1 (respiratory organs) based on animal and human data; Following effects in humans are reported by inhalation exposure; breathing difficulty, inflammation of pharynx, bronchitis, bronchoconstriction, pneumonia, effects on upper airways such as edema, inflammation and necrosis and lung edema (DFGOT vol.6 (1994), PATTY 5th (2001), IARC 54 (1992), ACGIH (2003)).
In animal test also reported that toxicological and morphological effects in lungs and bronchial tubes were observed e.g. bronchitis associated with necrosis of mucous membranes, lung edema, bleeding and thrombus (ACGIH (2003), SIDS (2002)).

Specific target organ toxicity (repeated exposure): Classified as Category 1 (teeth and respiratory organs) based on data; Damages of teeth by diabrosis in multiple cases are reported in human repeated exposure (SIDS (2002), EHC 21 (1982), DFGOT vol.6 (1994), PATTY 5th (2001),). It is also reported that increased incidence of chronic bronchitis (DFGOT vol.6 (1994)).

Other data: Not available

Water: Same as above.

R-2 reagent

Barium chloride dihydrate:

Acute toxicity:
Oral (data on anhydride): Classified as Category 3 based on data; LD_{50} (Oral-rat) = 118 mg/kg (EHC 107 (1990)), 132 mg/kg, 220 mg/kg (CERI hazard data collection 2001-56 (2002)) and calculated value of 118 mg/kg.

Skin corrosion/ irritation:
Classification is not possible because ISCS (2002) reports “redness” and is considered causing skin irritation however no detailed or supportive data is available.

Serious eye damage/ eye irritation:
Classification is not possible because ISCS (2002) reports “redness” and is considered causing eye irritation however no detailed or supportive data is available.

Germ cell mutagenicity:
Classification is not possible based on data sets reported in NTP DB (Access, May 2006) that no data in heritable mutagenicity test, in vivo germ cell/ somatic cell mutagenicity tests or in vivo germ cell/ somatic cell genotoxicity test. No (strong) positive data in multiple in vitro mutagenicity tests are available.

Carcinogenicity: Classification is not possible based on expert’s judgment. Some toxicological data are found in CICAD 33 (2001) however no existing classification is available and.

Specific target organ toxicity (single exposure):
In humans “gastroenteritis (vomiting, diarrhea, stomachache), hypokalemia, irregular heart beat or torpor of skeletal muscle were seen in human ingestion cases of barium compounds (accident or intended). (CICAD 33 (2001)).
ISCS (J) (1999) reported that “Irritating to eyes, skin and respiratory organs, may cause damage to nervous system, may cause hypokalemia. May cause disorder in heart or muscle. May result in death”.
Based on the above findings, it is considered causing respiratory irritation, and nervous system, cardiovascular system and muscle are the target organs. Because ISCS (J) 1999 is a Priority 2 document, classified as Category 1 (cardiovascular system and muscle), Category 2 (nervous system) and Category 3 (respiratory irritation).

Other data: Not available

Water: Same as above.

GHS classification results of R-A, R-1and R-2 reagents as mixtures are shown below.

[Acute toxicity (oral)]

R-A reagent: Not classified based on application of the additive equation of LD_{50} (rat) values of each ingredient.

R-1 reagent: Not classified based on application of the additive equation of LD_{50} (rat) values of each ingredient.

R-2 reagent: Classified as Category 4 (Warning, Harmful is swallowed.) based on application of the additive equation of LD_{50} (rat) values of each ingredient.

[Acute toxicity (dermal)]

R-1 reagent: Not classified based on application of the additive equation of LD_{50} (rabbit) values of each ingredient.

[Acute toxicity (inhalation-gas)]
R-1 reagent: Not applicable because it is a liquid.
[Acute toxicity (inhalation-mist)]
R-1 reagent: Not classified based on application of the additive equation of LC_{50} (rat) values of each ingredient.
[Skin corrosion/ irritation]
R-1 reagent: Classified as Category 1 (Danger, Causes severe skin burns and eye damage.) because pH of the mixture is lower than or equal to 2.
[Serious eye damage/ eye irritation]
R-1 reagent: Classified as Category 1 (Danger, Causes serious eye damage.) because pH of the mixture is lower than or equal to 2.
[Respiratory or skin sensitization]
R-1 reagent: Classified as Category 1 (Danger, May cause allergy or asthma symptoms or breathing difficulties if inhaled.) because it contains more than 1% of category 1 (respiratory sensitization).
[Specific target organ toxicity (single exposure)]
R-1 reagent: Classified as Category 2 (Warning, May cause damage to respiratory organs.) because it contained 1 to 10% of category 1 (respiratory organs).
R-2 reagent: Classified as Category 1 (Danger, Causes damage to cardiovascular system and muscle.)
Classified as Category 2 (Warning, May cause damage to nervous system)
Because it contains more than 10% of category 1 (cardiovascular system and muscle.) and category 2 (nervous system).
[Specific target organ toxicity (repeated exposure)]
R-1 reagent: Classified as Category 2 (Warning, May cause damage to teeth and respiratory system) because it contains 1 to 10% of category 1 (teeth, respiratory organs).

R-A, R-1 and R-2 reagents [Germ cell mutagenicity], [Carcinogenicity], [Reproductive toxicity], [Aspiration hazard],
R-A, R-2 Reagents [Skin corrosion/ irritation], [Serious eye damage/ eye irritation], [Respiratory or skin sensitization], [Specific target organ toxicity (repeated exposure)] and
R-A reagent [Specific target organ toxicity (single exposure)]
Classifications are not possible because of data lack.

12. Ecological information

No data on mixture is available. Data on R-A, R-1, and R-2 reagents are shown below.

R-A reagent
Glycerin:
Eco-toxicity
Toxicity in fish: Fish: 96-h LC_{50} = 184,000 mg/L (SIDS)
Golden fish: 24-h LC_{50} > 5,000 mg/L (SIDS)
Japanese dace: 48-h LC_0 > 250 mg/L (SIDS)
Acute toxicity: *Daphnia magna*: 24-h EC_{50} > 10,000 mg/L (SIDS)
Daphnids: 48-h EC_{50} = 153,000 mg/L (SIDS)
Green algae: 8-d EC_3 > 10,000 mg/L (SIDS)
Blue-green algae: 8-d EC_3 > 2,900 mg/L (SIDS)
Algae: 96-h EC_{50} = 77,712 mg/L (SIDS)
Mobility in soil: Taking into the physical-chemical properties, the substance is possible to be partitioned into water column or soil compartment.
Persistency/ degradability:readily biodegradable
Biodegradation rate: 63% by BOD, 94% by TOC, 100% by GC (METI, data on existing chemical substance)
Bioaccumulation potential: No data
Other data: Not available

R-1 reagent
Hydrochloric acid:
Hazardous to aquatic environment- Acute:
Classified as Category 1 based on data; Crustacea (*Daphnia magna*): 48-h EC_{50} = 0.492 mg/L (SIDS, 2005).
Hazardous to aquatic environment- Chronic:
Not classified because it is considered that toxicity is manifested by acidity of solution however it should be lowered in the environment because of buffering effects
Other data: Not available.

R-2 reagent
Barium chloride dihydrate:
Hazardous to aquatic environment- Acute (data on anhydride):
Classified as Category 3 based on data; Crustacea (*Daphnia magna*): 48-h EC_{50} = 14.5 mg/L (CERI hazard data collection 2002) (converted to barium chloride concentration: 22.0 mg/L)
Hazardous to aquatic environment- Chronic:
Classified as Category 3 based on data (data on anhydride); acute category 3, low bioaccumulation potential (BCF < 60; data on existing chemical substance) and unknown behavior in water because the substance is a metal compound.

GHS classification results of R-A, R-1and R-2 reagents as mixtures are shown below.
[Hazardous to aquatic environment- Acute]
R-A reagent: Not classified because all ingredients are not classified.
R-1 reagent: Classified as Category 2 (Toxic to aquatic life) based on the equation 1 (M=1) x 10 x less than 10% = 25 to 80%.
R-2 reagent: Not classified because category 3 is contained less than 25%.

[Hazardous to aquatic environment- Chronic]
R-A reagent: Not classified because all ingredients are not classified.
R-1 reagent: Not classified because all ingredients are not classified.
R-2 reagent: Not classified because category 3 is contained less than 25%.
[Harmful effects on the ozone layer]:
All reagents: Classification is not possible because each of the substances is not described in Annex to Montreal Protocol.

13. Disposal considerations

pHs of remaining R-1 reagent and liquid waste after the measurement are < 2.
Always dispose according to local regulations.

14. Transport information

In addition to precautionary measures regarding handling and storage, avoid rough handling so as not to break containers. It is recommended to ship by air because under high temperature for long period may lead to deterioration.

UN number	3316
Proper shipping name:	Chemical Kit
UN classification:	Class 9 (Miscellaneous Dangerous Goods)
Packing group:	II
Civil Aeronautics Act:	Same as above. Applicable to Limited Quantities of Dangerous Goods.
Poisonous and Deleterious Substances Control Act:	Not applicable (The product is a preparation and is not applicable as a deleterious substance under the Act)
Fire Service Act:	Not applicable
Total weight of the product:	ca. 80 g/kit

15. Regulatory information

PRTR Act: Not applicable
Industrial Safety and Health Act: Applicable
R-1 reagent contains more than 1% of Hydrochloric acid and Barium chloride.
: “Cabinet order, article 18, shall be notified the Name of the substances, #2”
: “Cabinet order, article 18-2, shall be indicated the Name of the substances, #2”
: “Group-3 specified chemical substances”.
R-2 reagent contains more than 1% of Barium chloride.
: “Cabinet order, article 18, shall be notified the Name of the substances, #2”
: “Cabinet order, article 18-2, shall be indicated the Name of the substances, #2”
Waste Disposal and Cleaning Act: Applicable
Applicable to the Special Controlled Industrial Waste of the Act because pHs of remaining R-1 reagent and liquid waste after measurement are less than 2.

16. Other information

Reference literature

15,911 no Kagaku Shouhin, The Chemical Diary Co., Ltd. (2011)
Material Safety Data Sheet No.JW070061, Wako Pure Chemical Industries, Ltd. (2008.10.30)
NITE, GHS Classification, ID567 Hydrochloric acid (2006.04.20, 2006.03.31)
Material Safety Data Sheet No.JW080343, Wako Pure Chemical Industries, Ltd. (2008.10.30)
NITE, GHS Classification, ID309 Barium chloride dihydrate (2006.04.20, 2006.03.31)
Material Safety Data Sheet No.JW020879, Wako Pure Chemical Industries, Ltd. (2007.04.03)
Material Safety Data Sheet No.JW041678, Wako Pure Chemical Industries, Ltd. (2007.09.18)
Material Safety Data Sheet No.051110033, TOSOH CORPORATION (2004.07.09)
Koukuu Kikenbutsu Yusou Houreisyu, Ed. MLIT, HOUBUN SHORIN CO., LTD. (2015)
JIS Z 7252:2014 Classification of chemicals based on “Globally Harmonized System of Classification and Labelling of Chemicals (GHS)” (Japanese Industrial Standards Committee)
JIS Z 7253:2012 Hazard communication of chemicals based on GHS-Labelling and Safety Data Sheet (SDS) (Japanese Industrial Standards Committee)
UN GHS (tentative translation, forth revised version), GHS Kankei Syocho Renraku Kaigi (2011)
Ministry of Economy, Trade and Industry, GHS Classification Guidance for Enterprises 2013 Revised Edition (2013)

NOTE) This information is not always exhaustive and use with care.
This data sheet only provides information but any description cannot be warranted.
Descriptions may possibly be changed because of new findings or modification of the current knowledge.
Precautions only cover normal handling.
This English SDS is prepared in the cooperation with the Chemicals Evaluation and Research Institute (CERI), Japan.