

Safety Data Sheet

Reference No. 1550

Issue: 1st December 2008
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1. Chemical product and company identification

Product name	DRP Reagent for Arsenic	Model	DPR-As
Company name	KYORITSU CHEMICAL-CHECK Lab., Corp.		
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Person in charge	Minoru UEDA		

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 Inhalation (Dusts/Mists):	Category 4 (applicable only R-1 reagent)
Skin corrosion/irritation:	Category 1 (applicable R-1 and R-4 reagents)
Serious eye damage/eye irritation:	Category 1 (applicable R-1 and R-4 reagents)
Specific target organ toxicity (single exposure):	Category 2 (respiratory organs) (applicable R-1 and R-4 reagents)
Specific target organ toxicity (repeated exposure):	Category 2 (respiratory organs) (applicable R-1 and R-4 reagents)

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:	Not classified
Hazardous to the aquatic environment	Chronic:	Not classified
Harmful effects on the ozone layer:		Not classified

[GHS labeling elements]



[Signal word]

Danger

[Hazard statements]

Toxic if inhaled.	(applicable R-1 reagent)
Causes severe skin burns and eye damage.	(applicable R-1 and R-4 reagents)
Causes serious eye damage.	(applicable R-1 and R-4 reagents)
May cause damage to respiratory organs.	(applicable R-1 and R-4 reagents)
May cause damage to respiratory organs through prolonged or repeated exposure.	(applicable R-1 and R-4 reagents)

[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 well before and after handling.
Avoid release to the environment.

3. Composition/ information on ingredients

Discrimination of single substance or mixture: Mixture

Reagent name	R-1 reagent		R-2 reagent			R-3 reagent	
Chemical name	Sulfuric acid	Water	Sodium thiosulfuric acid	Stabilizing agent	Water	Potassium permanganate	Water
Content	< 10%	> 90%	< 10%	< 0.5%	> 89.5%	< 0.1%	> 99.9%
Chemical formula	H ₂ SO ₄	H ₂ O	Na ₂ S ₂ O ₃	-	H ₂ O	KMnO ₄	H ₂ O
METI No. (reference number under CSCL in Japan)	(1)-430	-	(1)-503	-	-	(1)-446	-
CAS No.	7664-93-9	7732-18-5	7772-98-7	-	7732-18-5	7722-64-7	7732-18-5

Reagent name	R-4 reagent				Tube reagent		
Chemical name	Sulfuric acid	Ammonium heptamolybdate tetrahydrate	Buffering agent	Water	Tin (II) sulfate	Other ingredient	Extender
Content	< 10%	< 1%	< 10%	> 79%	< 1%	< 5%	> 94%
Chemical formula	H ₂ SO ₄	(NH ₄) ₆ Mo ₇ O ₂₄ ·4H ₂ O	-	H ₂ O	SnSO ₄	-	-
METI No. (reference number under CSCL in Japan)	(1)-430	(1)-389	-	-	(1)-538	-	-
CAS No.	7664-93-9	12027-67-7	-	7732-18-5	7488-55-3	-	-

4. First-aid measures

If reagents or test solutions;

Enter in eyes: Immediately rinse 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/ 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 waste solutions should not be released into sewer or rivers.

7. Handling and storage

Handling: Care should be made so that reagents will not contact with eyes or skin and to avoid ingestion. Special attention is required because pHs of R-1 and R-4 reagents are both ≤ 2 .
Especially for outdoor use, ensure to bring back reagents, waste solutions after the measurement and used containers.

Storage: Avoid direct sunlight and store in a well-ventilated, cool, dry, and dark place.

8. Exposure controls and personal protection

Administrative control level

Working environment standard: 0.2 mg (Mn)/m³ (only for Potassium permanganate)

Occupational exposure limits

Japan Society for Occupational health: 1 mg/ m³

ACGIH (TLVs): TWA 1 mg/ m³

OSHA (PEL): air TWA 1 mg/ m³ (only for 100% Sulfuric acid)

ACGIH (TLVs): TWA 5 mg(Mo)/m³

OSHA (PEL): air TWA 5 mg(Mo)/m³ (only for Ammonium heptamolybdate tetrahydrate)

ACGIH (TLVs): TWA 0.2 (Mn)/m³

OSHA (PEL): Ceiling, 5 mg (Mn)/m³ (only for Potassium permanganate)

ACGIH (TLVs): TWA 2 mg (Sn)/m³

OSHA (PEL): 8H TWA 2 mg (Sn)/m³ (only for Tin sulfate)

Protective equipment: Recommended to wear protective glasses and gloves.

9. Physical and chemical properties

Physical state: R-1: Liquid reagent 3 mL x 1 poly-bottle in a poly bag
R-2: Liquid reagent 2 mL x 1 poly-bottle in a poly bag
R-3: Liquid reagent 1 mL x 1 glass-bottle in a poly bag
R-4: Liquid reagent 10 mL x 1 poly-bottle in a poly bag
Tube reagent: Powder reagent
0.1g x 40 tubes/kit in poly-tube, aluminum laminate packaging each of 5 tubes.

Color: R-1: colorless (liquid), R-2: colorless (liquid), R-3: red-purple color (liquid), R-4: colorless (liquid),
Tube reagent: white (powder)

Odor: Characteristic odor (only for R-2 reagent)

pH: ≤ 2 (R-1 and R-4 reagents and final measurement solution)

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-1, R-2, R-3, R-4 and tube reagents are shown below.

R-1 reagent

Concentrated sulfuric acid:

Acute toxicity: Category 5 based on the following data; Oral-rat: LD₅₀: 2,140 mg/kg (SIDS, 2001) and death case in human ingestion (dose level not known).

Acute toxicity (dust-mist): Category 2 based on; Rat 4Hr-LC₅₀: 0.375 mg/L: 1Hr-LC₅₀: 347ppm (4Hr converted value 0.347mg/L) (SIDS, 2001)

Skin corrosion/ irritation: Category 1 based on the following data; pH of concentrated sulfuric acid is ≤ 1 and is

considered as corrosive according to the GHS classification criteria.

Serious eye damage/ eye irritation: Category 1 based on the following data;

Rabbit: Severe at 1380 µg

In a human accidental case, serious eye damage associated with melting of anterior eye chamber was observed (ATSDR, 1998). 5% solution: moderate and 10% solution: severe irritation in rabbit eyes (SIDS, 2001). pH of the substance is ≤ 2 .

Skin sensitization: Not classified based on the following data;

No data on skin sensitization is available. Sulfuric acid has been industrially used for several tens of years and is well known as skin trouble because of its skin irritation however no case is reported as a sensitization. No allergic reaction occurs although there is a large amount of sulfuric ions in human body. In allergic tests of metal sulfates, positive result were caused due to a metal allergy but negative by sulfuric acid this is supported by the negative result of zinc sulfate. Based on the above results, it can be concluded that sulfuric acid does not have allergic potential (SIDS, 1998).

Germ cell mutagenicity: Classification not possible based on the following data.

No in vivo data in germ cell or somatic cell is available. Only single positive result in a mutagenicity test (chromosome aberration test) is reported (ATSDR, 1998), however all in negative.

Carcinogenicity: Classification not possible based on the following data.

Regarding mists of inorganic strong acids including sulfuric acid, following classifications are reported, IARC (1992) Group 1, ACGIH (2004) A2 and NTP (2005) K. If classifications made by IARC and recent NTP are respected, category 1 can be chosen, however, sulfuric acid itself is classified as category 4 by DFGOT (vol.15, 2001) and no classification has been made by other organization.

Reproductive toxicity: Not classified based on the following data.

No toxicity to unborn child or teratogenic effects was reported at dose levels where no maternal toxicity were seen in inhalation test in rabbits and mice administered during fetal organ developmental stage (SIDS, 2001). It is reported that no reproductive toxicity is concerned because no effects on reproductive organs in both males and females were seen and dominant effects were due to primary irritation/corrosion in a combined chronic and carcinogenicity test (SIDS, 2001).

Specific target organ toxicity (single exposure): Category 1 (respiratory organs) based on the following data.

In human cases, respiratory irritation such as cough and breath shortness were observed by inhalation exposure of low concentration levels (DEGOT, 2001). At high concentration level, in addition to acute effects such as cough, breath shortness and blood in the sputum, prolonged effects such as dysfunction of lung, fibrosing disease and emphysema were reported (ATSDR, 1998). Bleeding or dysfunctions of lungs are observed in a guinea pig 8-h inhalation test (ATSDR, 1998).

Specific target organ toxicity (repeated exposure): Category 1 (respiratory organs) based on the following data.

Cell proliferation of throat mucosa was observed at dose levels within the guidance value of category 1 in a rat 28-day inhalation test (SIDS, 2001). A series of diseases in lungs and airways were reported in a guinea pig repeated (14-139-days) inhalation test at dose levels within the guidance value of category 1, such as edema of nasal septum, lung emphysema, atelectasis, hyperemia of bronchial tubes, edema, bleeding, blocked blood vessel. Furthermore, histo-pathological changes in lung bronchial tubes including hyperplasia and increased thickness were also observed in a 78-week monkey inhalation test at dose levels within the guidance value of category 1 (0.048mg/L, 23.5Hr/Day) (ATSDR, 1998).

Other data: Not available

Water:

Acute toxicity: Oral-rat LD₅₀ >90 mL/kg (used 90g/kg for the calculation of ATEmix below)

Other data: Not available

R-2 reagent

Sodium thiosulfuric acid (no data on preparation is available. Data on Sodium thiosulfuric acid are shown below):

Acute toxicity: Intravenous injection-rat LD > 2,500 mg/kg

Interperitoneal-mouse LD₅₀ = 5,200 mg/kg

Subcutaneous-rabbit LDLo = 4gm/kg

Low concentration solution is not irritating.

Harmful if swallowed and may cause nausea, vomiting, diarrhea or disorder of gastrointestinal.

Other data: Not available

Water: Same as above.

R-3 reagent

Potassium permanganate (no data on solution):

Acute toxicity: Category 4 based on the following data; Oral-rat: LD₅₀: 379 mg/kg (NITE, 2008), 750 mg/kg(NITE,2008 and EHC 17,1981).

Skin corrosion/ irritation: Category 1 based on the following data; there is no specific information, but the description that the substance is corrosive to the skin (HSDB (Access on December 2014)).

Serious eye damage/ eye irritation: Category 1 based on the above data, it is considered to be seriously corrosive to eyes.

Germ cell mutagenicity: Category 2 based on the absence of data on multi-generation mutagenicity tests, germ cell mutagenicity tests in vivo and germ cell genotoxicity tests in vivo, and positive data on somatic cell mutagenicity tests in vivo (micronucleus tests and chromosome aberration tests), described in CICAD 12 (1999).

Reproductive toxicity: Category 2 based on the evidence of adverse effects on sperm production and fetuses, described in EHC 17 (1981), though no data are available on parental toxicity.

Specific target organ toxicity (single exposure): Category 3 (Respiratory tract irritation) based on the following data.

“Acute inhalation exposure to high concentrations of manganese dusts (specifically MnO₂ and Mn₃O₄) can cause an inflammatory response in the lung, which, over time, can result in impaired lung function. Lung toxicity is manifested as an increased susceptibility to infections such as bronchitis and can result in manganic pneumonia” (CICAD 12 (1999)). However, this is merely a description of the state of the dust.

Specific target organ toxicity (repeated exposure): Category 1 (respiratory system, nervous system) based on the human evidence including “weakness and impaired mental capacity, a syndrome similar to Parkinson’s disease developed after 9 months” (CICAD 12 (1999)).

Other data: Not available

Water: Same as above

R-4 reagent

Ammonium heptamolybdate (unhydride) (no data on Ammonium heptamolybdate tetrahydrate):

Acute toxicity: Oral-rat: LD₅₀: 333 mg(Mo)/kg

Other data: Not available.

Sulfuric acid: Same as above.

Tube reagent:

Tin (II) sulfate:

Acute toxicity: Category 5 based on the following data; Oral-rat: LD₅₀: 2,207 mg/kg (RTECS, 1997).

Serious eye damage/ eye irritation: Category 2 based on the following data; From the description that eye irritation was indicated with inorganic tin compounds (ACGIH-TLV (2006)). In addition, detailed categorization is difficult.

Reproductive toxicity: Classification not possible based on the following data.

In the inhalation administration reproductive toxicity studies in pregnancy rat, although fetus fatality before and after implantation are observed (RTECA, 1997), details are unknown, data is insufficient.

Specific target organ toxicity (single exposure): Category 3 (Respiratory tract irritation) based on the following data.

“Although there was no data of this product, since it was supposed that an inorganic tin compound indicates respiratory irritant, it was considered as Category 3 (respiratory irritant) in ACGIH-TLV (2006).

Specific target organ toxicity (repeated exposure): Category 1 (lung) based on the following data.

It is supposed that it has a possibility of pneumoconiosis by as an inorganic tin compound (ACGIH-TLV (2006)). In addition, the statement “benign pneumoconiosis” is seen about the toxicity of the tin salts in a textbook.

Other data: Not available

GHS classifications as a mixture of each R-1, R-2, R-3, R-4 and tube reagents are shown below.

[Acute toxicity (oral)]

Tube reagent, R-1 and R-4 reagents: Not classified based on application of the additive equation.

[Acute toxicity (inhalation: dust, mist)]

R-1 reagent: Classified as Category 4 (Warning, harmful if inhaled.) based on application of the additive equation of LD₅₀ (rat) values of each ingredient.

R-4 reagent: Not classified based on application of the additive equation of LD₅₀ (rat) values of each ingredient.

[Skin corrosion/ irritation]

R-1 and R-4 reagents: Classified as Category 1 (Danger, Causes severe skin burns and eye damage.) because pHs of both reagents are lower than 2.

R-3 reagent contains less than 1% of category 1; Not classified.

[Serious eye damage/ eye irritation]

R-1 and R-4 reagents: Classified as Category 1 (Danger, Causes serious eye damage.) because pHs of both reagents are lower than 2.

R-3 reagent: Contains less than 1% of category 1; Not classified.

Tube reagent: Contains less than 1% of category 2A-2B; Not classified.

[Germ cell mutagenicity]

R-3 reagent: Contains less than 1% of category 2; Not classified.

[Reproductive toxicity]

R-3 reagent: Contains less than 3% of category 2; Not classified.

[Specific target organ toxicity (single exposure)]

R-1 and R-4 reagents: Classified as Category 2 (Warning, May cause damage to respiratory organs.) because there two reagents contain 1 to 10% of category 1 substance.

R-3 reagent: Contains less than 1% of category 3; Not classified.

Tube reagent: Contains less than 1% of category 3; Not classified.

[Specific target organ toxicity (repeated exposure)]

R-1 and R-4 reagents: Classified as Category 2 (Warning, May cause damage to respiratory organs through prolonged or repeated exposure.) because two reagents contain 1 to 10% of category 1 substance.

R-3 reagent: Contains less than 1% of category 1; Not classified.

Tube reagent: Contains less than 1% of category 1; Not classified.

Other reagents: Classifications are not possible due to not enough data available.

12. Ecological information

No data on mixture is available. Data on R-1, R-2, R-3, R-4 and tube reagents are shown below.

R-1 reagent

Concentrated sulfuric acid: No eco-toxicological information available. (No data on 10% solution is available)

R-2 reagent

Sodium thiosulfuric acid: No eco-toxicological information available.

R-3 reagent

Potassium permanganate:

Hazardous to the aquatic environment Acute

Category 1 based on the following data; Crustacea (*Diaptomidae*): 96-h LC₅₀ = 0.185 mg/L (Ministry of the environment, 2008)

Hazardous to the aquatic environment Chronic

Category 1: There is no evidential data, but "Hazardous to the aquatic environment Acute" is classified as Category 1.

Other data: Not available

R-4 reagent

Ammonium heptamolybdate tetrahydrate: No eco-toxicological information available.

Sulfuric acid: Same as above R-1 reagent.

Tube reagent

Tin (II) sulfate: No eco-toxicological information available.

GHS classifications as a mixture of each R-1, R-2, R-3, R-4 and tube reagents are shown below.

[Hazardous to the aquatic environment acute], [Hazardous to the aquatic environment chronic]

R-3 reagent: Not classified based on application of the additive equation.

Other reagents: Classifications are not possible due to not enough data available.

[Harmful effects on the ozone layer]:

Classification is not possible because each of the substances is not described in Annex to Montreal Protocol.

13. Disposal considerations

Always dispose of in accordance with local regulations.

pHs of R-1 and R-4 reagents and solution after addition of reagent is lower than or equal to 2, acidic.

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 (Chemical measurement kit)
UN classification:	Class 9 (miscellaneous dangerous substances and articles)
Packing group:	II

Civil Aeronautics Act: Same as above. Applicable to Limited Quantities of Dangerous Goods.
Poisonous and Deleterious Substances Control Act: Not applicable (This product contains lower than or equal to 10% of sulfuric acid and not applicable as a Deleterious Substance under the law).
Fire Service Act: Not applicable
Total weight of the product: ca.160 g/kit

15. Regulatory information

PRTR Act: Not applicable
(The product contains less than 1% of Ammonium molybdate tetrahydrate and not applicable as a class 1 designated substance)
Industrial Safety and Health Act: Applicable
R-1 reagent contains more than 1% of Sulfuric acid.
: "Designated substances class 3"
: "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"
R-4 reagent contains more than 1% of Sulfuric acid and more than 0.1% and less than 1% of Ammonium molybdate tetrahydrate.
: "Designated substances class 3"
: "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"
Tube reagent contains more than 0.1% and less than 1% of Tin (II) sulfate.
: "Cabinet order, article 18-2, shall be indicated the Name of the substances, #2"
Waste Disposal and Cleaning Act: Applicable
pHs of remaining solutions of R-1 and R-4 reagents and waste solutions after the measurement are less than or equal to 2 and is applicable as Industrial Waste Subject to Special Control under the Act.

16. Other information

Reference literature

15,911 no Kagaku Shouhin, The Chemical Diary Co., Ltd. (2011)
NITE, GHS Classification Result, ID626 Sulfuric acid (2006.06.20, 2006.03.31)
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Koukuu Kikenbutsu Yusou Houeisyu, 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-Labeling 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.