

## Safety Data Sheet

Reference No. 1102

Issue: 9<sup>th</sup> January 2001  
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### 1. Chemical product and company identification

Product name	Pretreatment Reagent for Total Chromium	Model	Cr-RA
Company name	KYORITSU CHEMICAL-CHECK Lab., Corp.		
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Person in charge	Rika SATO		

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: dust, mist):	Category 4 (applicable only R-1 reagent)
Skin corrosion/irritation:	Category 1 (applicable only R-1 reagent)
Serious eye damage/eye irritation:	Category 1 (applicable only R-1 reagent)
Specific target organ toxicity (single exposure):	Category 2 (respiratory organs) (applicable only R-1 reagent)
Specific target organ toxicity (repeated exposure):	Category 2 (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 3 (applicable R-2 and R-3 reagents)
Hazardous to the aquatic environment - Chronic:	Category 3 (applicable R-2 and R-3 reagents)
Harmful effects on the ozone layer:	Classification not possible

#### [GHS labeling elements]



#### [Signal word]

Danger

#### [Hazard statements]

Harmful if inhaled.	(applicable only R-1 reagent)
Causes severe skin burns and eye damage.	(applicable only R-1 reagent)
Causes serious eye damage.	(applicable only R-1 reagent)
Causes damage to respiratory organs.	(applicable only R-1 reagent)
Causes damage to respiratory organs through prolonged or repeated exposure.	(applicable only R-1 reagent)
Harmful to aquatic life.	(applicable R-2 and R-3 reagents)
Harmful to aquatic life with long lasting effects.	(applicable R-2 and R-3 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	Potassium permanganate	Water	Sodium nitrite	Water
Content	<10%	> 90%	< 1%	> 99%	< 1%	> 99%
Chemical formula	H <sub>2</sub> SO <sub>4</sub>	H <sub>2</sub> O	KMnO <sub>4</sub>	H <sub>2</sub> O	NaNO <sub>2</sub>	H <sub>2</sub> O
METI No. (reference number under CSCL in Japan)	(1)-430	-	(1)-446	-	(1)-483	-
CAS No.	7664-93-9	7732-18-5	7722-64-7	7732-18-5	7632-00-0	7732-18-5

**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 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. Do not contact with eyes or skin.

Concentrated waste solutions should not be released into sewer or rivers.

**7. Handling and storage**

Handling: Avoid contact of the reagents with eyes and skin. Do not ingest or inhale the reagents. It needs special attention because pHs of R-1 reagent and a sample solution after addition of R-1 reagent are lower than or equal to 2, acidic.  
 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)/m<sup>3</sup> (only Potassium permanganate)

### Occupational exposure limits

Japan Society for Occupational health: 1 mg/ m<sup>3</sup> (only for 100% Sulfuric acid)

0.2 mg (Mn)/ m<sup>3</sup> (only Potassium permanganate)

ACGIH (TLVs): TWA 0.2 mg/ m<sup>3</sup> (only for 100% Sulfuric acid)

TWA 0.2 mg (Mn)/m<sup>3</sup> (only Potassium permanganate)

OSHA (PEL): air TWA 1 mg/ m<sup>3</sup> (only for 100% Sulfuric acid)

Ceiling, 5 mg (Mn)/m<sup>3</sup> (only Potassium permanganate)

Protective equipment: Recommended to wear protective glasses and gloves

## 9. Physical and chemical properties

Physical state: R-1: liquid reagent 30 mL x 1 poly-bottle in a poly bag

R-2: liquid reagent 20 mL x 1 poly-bottle in a poly bag

R-3: liquid reagent 20 mL x 1 poly-bottle in a poly bag

Color: R-1: colorless(liquid), R-2: red-purple(liquid), R-3: colorless(liquid)

Odor: No odor

pH:  $\leq 2$  (R-1 reagent, sample solution after addition of R-1 reagent),  
7 (R-2 and R-3 reagents)

Melting point, boiling point, flash point, ignition point, lower explosion limit, vapor pressure, density, specific gravity, 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 each ingredient in R-1, R-2 and R-3 reagents is shown below.

### R-1 reagent

Concentrated sulfuric acid (no data on <10% solution is available):

#### Acute toxicity:

Oral-rat: LD<sub>50</sub> = 2,140 mg/kg (SIDS, 2001) and death case in human ingestion (dose level not known).

Inhalation(dust-mist)-rat: 4Hr-LC<sub>50</sub> = 0.375 mg/L, 1Hr-LC<sub>50</sub> = 347 ppm (4Hr converted value 0.347 mg/L) (SIDS, 2001)

#### Skin corrosion/ irritation:

pH of concentrated sulfuric acid is  $\leq 1$  and is considered as corrosive according to the GHS classification criteria.

#### Serious eye damage/ eye irritation:

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  $\leq 2$ .

#### Skin sensitization:

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).

**Reproductive toxicity:**

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):**

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):**

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 (0.048 mg/L, 23.5 Hr/Day) (ATSDR, 1998).

Other data: Not available.

Water: Acute toxicity: Oral-rat: LD<sub>50</sub> > 90 mL/kg

Other data: Not available

**R-2 reagent**

Potassium permanganate (no data on solution is available)

Acute toxicity: Oral-rat: LD<sub>50</sub> = 750 mg/kg (EHC, 17(1981))

**Skin corrosion/ irritation:**

In a human case "Corrosion of mouth cavity, esophagus and stomach were seen in a child accidental ingestion case of 174 mg." (CICAD 12(1999)) "Redness, skin burns, pain" (ICSC (2003)). It is considered to be corrosive to skin.

**Serious eye damage/irritation:**

In a human case "Highly corrosive" (IUCLID, 2000), "Redness, pain, severe deep burns" (ICSC (2003)). It is considered to be irritating to eyes.

**Germ cell mutagenicity:**

DNA damage test: E-coli 200 µmol/L

No data on heritable mutagenicity test or in vivo germ cell mutagenicity test. Positive in vivo somatic cell mutagenicity test (micronucleus test and chromosome aberration test). No data in vitro germ cell genotoxicity test. (CICAD 12 (1999)).

**Reproductive toxicity:**

Although no information regarding maternal toxicity is reported, effects on spermatogenesis and unborn child were observed (EHC 17(1981))

**Specific target organ toxicity (single exposure)**

It is reported "Acute exposure of manganese dust caused lung inflammation which resulted in dysfunction of lungs along with time passage. In addition, incidence of bronchitis and manganese pneumonia was increased." (CICAD 12(1999))

**Specific target organ toxicity (repeated exposure)**

In human cases "increased incidence of pneumonia" (EHC 17(1981)), "weakness, decreased mental activity, causes Parkinson's disease-like symptoms after 9 months" (CICAD 12(1999)). "Changed conditioned reflex in test animals" (EHC 17(1981))

Other data: Not available

Water: Same as above.

**R-3 reagent**

Sodium nitrite (no data on solution is available)

**Acute toxicity:**

Oral-mouse: LD<sub>50</sub> = 175 mg/kg, Inhalation-rat: LC<sub>50</sub> = 5.5 mg/m<sup>3</sup>/4Hr

Oral-rabbit: LD<sub>50</sub> = 186 mg/kg, Oral-rat: LD<sub>50</sub> = 180 mg/kg (RTECS)

Oral-rat: LD<sub>50</sub> = 85,200 mg/kg (IUCLID, 2000)

**Serious eye damage/irritation:**

Rabbit 500 mg/24Hr Mild (RTECS)

## Specific target organ toxicity (single exposure):

Effects on human vascular system (decreased blood pressure, etc) and blood system (methemoglobinemia) are reported in Priority 2 documents of ICSC (J) (2000), HSFS (1999), HSDB (2003) and RTECS (2004).

## Specific target organ toxicity (repeated exposure):

Two methemoglobinemia cases in rat repeated dose studies are reported in Priority 2 document of RTECS (2004).

Other data: Not available

Water: Same as above.

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

## [Acute toxicity (oral)]

All reagents are not classified based on application of the additivity formula.

## [Acute toxicity (inhalation: dust, mist)]

R-1 reagent: Classified as Category 4 (Warning, Harmful if inhaled.) based on application of the additivity formula.

Other reagents: Classifications are not possible because of data lack.

## [Skin corrosion/ irritation]

R-1 reagent: Classified as Category 1 (Danger, Causes severe skin burns and eye damage.) because pH is  $\leq 2$ .

R-2 reagent: Not classified because concentration of potassium permanganate in R-2 reagent is less than 1%.

R-3 reagent: Classification is not possible because of data lack.

## [Serious eye damage/ eye irritation]

R-1 reagent: Classified as Category 1 (Danger, Causes serious eye damage.) because pH is  $\leq 2$ .

R-2 reagent: Not classified because concentration of potassium permanganate in R-2 reagent is less than 1%.

R-3 reagent: Not classified because concentration of sodium nitrite in R-3 reagent is less than 1%.

## [Germ cell mutagenicity], [Reproductive toxicity]

R-2 reagent: Not classified because concentration of potassium permanganate in R-2 reagent is less than 1%.

Other reagents: Classification is not possible because of data lack.

## [Specific target organ toxicity (single exposure)]

R-1 reagent: Classified as Category 2 (Warning, Causes damage to respiratory organs.) because concentration of sulfuric acid in R-1 reagent is between 1 to 10%.

R-2 and R-3 reagents: Not classified because concentrations of potassium permanganate in R-2 reagent and sodium nitrite in R-3 reagent are both less than 1%.

## [Specific target organ toxicity (repeated exposure)]

R-1 reagent: Classified as Category 2 (Warning, Causes damage to respiratory organs through prolonged or repeated exposure.) because concentration of sulfuric acid in R-1 reagent is between 1 to 10%.

R-2 and R-3 reagents: Not classified because concentrations of potassium permanganate in R-2 reagent and sodium nitrite in R-3 reagent are both less than 1%.

## [Respiratory or skin sensitization], [Carcinogenicity], [Aspiration hazard]:

Classifications are not possible because of data lack.

## 12. Ecological information

No data on mixture is available. Data on each ingredient in R-1, R-2 and R-3 reagents is shown below.

## R-1 reagent

## Concentrated sulfuric acid:

Hazardous to the aquatic environment Acute: Fish (Bluegill): 96-h  $LC_{50}$  = 16-28 mg/L (SIDS, 2003)

Hazardous to the aquatic environment Chronic:

Toxicity may be caused because solutions become strong acid however it should be lowered in the environment due to buffering effects; Not classified.

## R-2 reagent

## Potassium permanganate:

Hazardous to the aquatic environment Acute

Crustacea (*Daphnia magna*): 48-h  $EC_{50}$  = 0.242 mg/L (CERI, Collection of hazard data, 2002)

Hazardous to the aquatic environment Chronic

BCF < 81 (Data on examination of existing chemicals). The substance is a metal compound and shows unknown behavior in water.

**R-3 reagent****Sodium nitrite:**

Hazardous to the aquatic environment Acute:

Fish (rainbow trout): 96-h LC<sub>50</sub> = 0.36 mg/L (ECETOC TR91, 2003)

Other data: Not available.

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

**[Hazardous to the aquatic environment acute]**

R-1 reagent: Not classified based on application of the additivity formula.

R-2 and R-3 reagents: Classified as Category 3 (no hazard statement, harmful to aquatic life.) based on application of the additivity formula.

**[Hazardous to the aquatic environment chronic]**

R-1 reagent: Not classified based on application of the additivity formula.

R-2 and R-3 reagents: Classified as Category 3 (no hazard statement, harmful to aquatic life with long lasting effects.) based on application of the additivity formula.

**[Harmful effects on the ozone layer]**

Every reagent: 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 a sample solution after addition of R-1 solution is  $\leq 2$ , acidic.

Waste solution contains ca 20 mg of nitrite nitrogen per 1 poly-bottle.

Always dispose of in accordance with 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	2796
Proper shipping name:	SULPHURIC ACID with 51% or less acid (applicable only R-1 reagent)
UN classification:	Class 8 (corrosive substances)
Packing group:	II
Civil Aeronautics Act:	Same as above. Applicable as as Excepted Quantities of Dangerous Goods.
Poisonous and Deleterious Substances Control Act:	Not applicable (The product contains less than 10% of sulfuric acid and not applicable as a deleterious substance)
Fire Service Act:	Not applicable
Total weight of the product:	ca. 200g/kit

**15. Regulatory information**PRTR Act: Not applicable  
(The product contains less than 1% of Potassium permanganate and not applicable as a class 1 designated Chemical substance)**Industrial Safety and Health Act:**

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-2 reagent contains 0.1% or more and less than 1% of Potassium permanganate.

: "Cabinet order, article 18-2, shall be indicated the Name of the substances, #2"

**Water Pollution Control Act:**

R-3 reagent contains sodium nitrite.

: "Cabinet Order set forth in Item (26) of Article 2"

**Sewerage Act:**

R-3 reagent contains sodium nitrite.

: "Cabinet Order set forth in Item (1) of Article 9-5"

**Waste Disposal and Cleaning Act:**

pH of waste solution after the measurement is less than or equal to 2 and is applicable as Special Controlled Industrial Waste under the Act.

## 16. Other information

### Reference literature

15,911 no Kagaku Shouhin, The Chemical Diary Co., Ltd. (2011)  
NITE, GHS Classification, ID626 Sulfuric acid (2006.06.20, 2006.03.31)  
NITE, GHS Classification, ID497 Potassium permanganate (2006.07.24, 2006.03.31)  
NITE, GHS Classification, ID1110 Sodium nitrite (2007.03.15, 2006.03.31)  
Material Safety Data Sheet No.JW191170, Wako Pure Chemical Industries, Ltd. (2009.08.04)  
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Material Safety Data Sheet No.JW160888, Wako Pure Chemical Industries, Ltd. (2010.10.22)  
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Koukoku 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-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.