Safety Data Sheet

Reference No. 1075

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1. Chemical product and company identification

Product name PACKTEST Sulfate (High Range) Model WAK-SO_4(C)

Company name KYORITSU CHEMICAL-CHECK Lab., Corp.
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Dept. in charge Sales Department

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 to only K-2 reagent)
Skin corrosion/irritation:	Category 1	(applicable to only K-2 reagent)
Serious eye damage/eye irritation:	Category 1	(applicable to only K-2 reagent)
Specific target organ toxicity (single exposure):	Category 1(cardiovascular system, muscle)	(applicable to only K-2 reagent)
	Category 2(nervous system)	(applicable to only K-2 reagent)

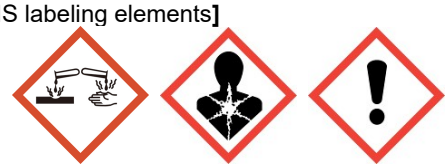
For those health hazards not listed above are not classified or classification not possible (no data for GHS classification available)

Environmental hazards:

Hazardous to the aquatic environment, short-term (acute):	Category 3	(applicable to only K-1 reagent)
Hazardous to the aquatic environment, long-term (chronic):	Category 3	(applicable to only K-1 reagent)

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

[GHS labeling elements**]**



[Signal word**]**

Danger

[Hazard statements**]**

Harmful if swallowed	(applicable to only K-2 reagent)
Causes severe skin burns and eye damage	(applicable to only K-2 reagent)
Causes serious eye damage	(applicable to only K-2 reagent)
Causes damage to cardiovascular system and muscle	(applicable to only K-2 reagent)
May cause damage to nervous system	(applicable to only K-2 reagent)
Harmful to aquatic life	(applicable to only K-1 reagent)
Harmful to aquatic life with long lasting effects	(applicable to only K-1 reagent)

[Precautionary statements**]**

Keep out of reach of children and store in the dry and dark place at room temperature.
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	K-1 reagent		K-2 reagent			
Chemical name	Potassium Permanganate	Water	Hydrogen Chloride (Hydrochloric Acid)	Barium Chloride Dihydrate	Others (not regulated)	Water
Content	0.5 – 0.9 %	99 – 99.9 %	0.1 – 0.5 %	10 – 19 %	10 – 19 %	70 – 79 %
Chemical formula	$KMnO_4$	H_2O	HCl	$BaCl_2 \cdot 2H_2O$	–	H_2O
METI No. (reference number under CSCL in Japan)	(1)-446	–	(1)-215	(1)-79	–	–
CAS No.	7722-64-7	7732-18-5	7647-01-0	10326-27-9	–	7732-18-5

Reagent name	K-3 reagent	
Chemical name	L(+)-Ascorbic Acid	Polyethylene
Content	1 – 4.9 %	90 – 99 %
Chemical formula	$C_6H_8O_6$	$(C_2H_4)_n$
METI No. (reference number under CSCL in Japan)	(5)-62	(6)-1
CAS No.	50-81-7	9002-88-4

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.

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 reagent or waste solution.
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 and skin.
Concentrated waste solution should not be released into sewer or rivers.

7. Handling and storage

Handling: Avoid contact of reagents with your skin or eyes, and inhalation of those especially powder in tube.
The pH of K-2 reagent is ≤ 2, and the pH of residue in the tube after the measurement is ≤ 3, acidic. Care should be made so as to avoid contact with eyes or skin.
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, dry and dark place at room temperature.

8. Exposure controls and personal protection

Administrative control level:		
Working environment standard	0.2 mg/m^3	(only Potassium Permanganate as Mn)
Occupational exposure limits:		
Japan Society for Occupational health	7.5 mg/m^3	(only Hydrogen Chloride)
	0.2 mg/m^3	(only Potassium Permanganate)
ACGIH	Ceiling 2 ppm	(only Hydrogen Chloride)
	TWA 0.02 mg/m^3	(only Potassium Permanganate as Mn)
	TWA 0.1 mg/m^3	(only Potassium Permanganate as Mn)
	TWA 0.5 mg/m^3	(only Barium Chloride Dihydrate as Ba)

Protective equipment: Recommend to wear protective glasses and gloves.

9. Physical and chemical properties

Physical state:	K-1 reagent:	Liquid reagent, 4 mL x 2 bottles/kit in glass-bottle and polyethylene-bag
	K-2 reagent:	Liquid reagent, 4 mL x 1 bottle/kit in polypropylene-bottle and polyethylene-bag
	K-3 reagent:	1.1 g x 40 tubes/kit (5 tubes per one aluminum laminated packaging)
Color:	K-1 reagent:	Dark reddish purple (liquid)
	K-2 reagent:	Colorless (liquid)
	K-3 reagent:	White (powder), semi-transparent (polyethylene-tube)
Odor:	No odor	
pH:	K-1 reagent:	7
	K-2 reagent:	≤ 2
	K-3 reagent and residue in the tube after the measurement:	2 - 3

Melting point, boiling point, flash point, ignition point, lower explosion limit, vapor pressure, density, relative density, solubility, P_{ow}, 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.

11. Toxicological information

No data on mixture is available. Data on each substance are shown.

K-1 reagent:
Potassium Permanganate:
- Acute toxicity (Oral): Category 4; Oral-rat LD_{50} = 379 mg/kg
- Acute toxicity (Inhalation: gas): Not applicable; solid under GHS definition
- Acute toxicity (Inhalation: vapor): Not applicable; solid under GHS definition
- Skin corrosion/ irritation: Category 1
- Serious eye damage/eye irritation: Category 1
- Germ cell mutagenicity: Category 2
- Reproductive toxicity: Category 2
- Specific target organ toxicity (single exposure): Category 3 (respiratory irritation)
- Specific target organ toxicity (repeated exposure): Category 1 (nervous, respiratory)
- Other data: Not available

Water:
- Acute toxicity: Oral-Rat LD_{50} > 90 mL/kg (used 90,000 mg/kg for the calculation of ATE_{mix} below)
- Other data: Not available

K-2 reagent:
Hydrogen Chloride (Gas) (no data on aqueous solution is available):
- Acute toxicity (Oral): Category 3

Based on LD_{50} values of 238 - 277 mg/kg and 700 mg/kg for rats (SIDS (2009)), the lower value was adopted and the substance was classified into Category 3.

Acute toxicity (Dermal): Not classified

Based on a LD_{50} value of > 5010 mg/kg for rabbits (SIDS (2009)), the substance was classified as "Not classified".

Acute toxicity (Inhalation: Gases): Category 3

Based on LC_{50} values of 4.2, 4.7 and 283 mg/L (4-hour equivalence: 1411, 1579 and 95,083 ppm, respectively) for rats (SIDS (2009)), the lowest value was adopted and the substance was classified into Category 3.

Acute toxicity (Inhalation: Dusts and mists): Category 2

Based on a LC50 value (aerosol) of 1.68 mg/L/1h (4-hour equivalence: 0.42 mg/L) for rats (SIDS (2009)), the substance was classified into Category 2.

Skin corrosion/irritation: Category 1

In a rabbit skin irritation test, application for 1 - 4-hour caused corrosion at higher concentrations (SIDS (2009)). Skin irritation and ulceration with fur discoloration occurred in mice and rats dermally exposed for 5 - 30 minutes (SIDS (2009)). In human experiments, there are reports that contact caused slight to strong irritation, or ulceration and severe burns to the skin (SIDS (2009)). Based on these data, the substance was considered to have corrosive properties, and was classified into Category 1.

Serious eye damage/eye irritation: Category 1

The substance was classified as a skin corrosive substance. In eye damage and irritation tests, solutions of the substance, hydrochloric acid, was used as a test substance. In animal tests including rabbit tests, high irritation, damage and corrosion to eyes have been reported (SIDS (2002)). For humans, the concentrated solution can cause permanent damage and loss of sight (SIDS (2002)). Based on these data, the substance was classified into Category 1. As relevant information, in EU classification, the substance is classified into C; R34.

Respiratory sensitization: Category 1

Since the substance is on the sensitizing chemical substance list by Japanese Society of Occupational and Environmental allergy, the substance was classified into Category 1. There is a report that after exposure to a cleaning product that contained hydrogen chloride, the subject developed bronchospasm and still had marked asthma symptoms 1 year after exposure that were triggered by exercise and inhalation of trivial concentrations of irritants (ACGIH (2003)).

Skin sensitization: Not classified

A guinea pig maximization test and a mouse ear swelling test demonstrated negative results (SIDS (2009)) for the substance. In a human test using fifty volunteers, none gave a positive reaction in a challenge application, 10 - 14 days after the final induction application (SIDS (2009)). The substance was classified as "Not classified".

Germ cell mutagenicity: Classification not possible

Classification is not possible due to lack of data from in vivo mutagenicity tests. From in vitro mutagenicity tests, there is a report of a negative Ames test and a positive result (which is considered to be an artifact due to the low pH) chromosome aberration test (SIDS (2009)).

Carcinogenicity: Not classified

Based on the classifications of "Group 3" in IARC (1992) and "A4" in ACGIH (2003), the substance was classified as "Not classified". As relevant information, no evidence of carcinogenicity was observed in rat and mouse carcinogenicity tests (SIDS (2009)). Epidemiologic tests did not suggest an association between exposure to hydrogen chloride and cancer development (IARC 54 (1992), PATTY (5th, 2001)).

Reproductive toxicity: Classification not possible

In rat and mice tests by exposure during gestation period, there were no adverse effects on fetal development, however, classification was not possible since there are no data for effects on sexual function and fertility by exposure before mating or gestation.

Specific target organ toxicity - Single exposure: Category 1 (respiratory system)

In humans, inhalation exposure caused symptoms such as dyspnea, laryngitis, bronchitis, bronchoconstriction, pneumonia and edema. Inflammation and necrosis of the upper respiratory tract and pulmonary edema have also been reported (DFGOT vol. 6 (1994), PATTY (5th, 2001), IARC 54 (1992), ACGIH (2003)). In animal tests, toxic effects with morphological change of the lung and bronchus such as bronchitis with mucosal necrosis, pulmonary edema, hemorrhage, and thrombus were observed at dose levels within the guidance value range for Category 1 (ACGIH (2003), SIDS (2009)). Based on the information for humans and animals, the substance was classified into Category 1 (respiratory system).

Specific target organ toxicity - Repeated exposure: Category 1 (tooth, respiratory system)

There are 2 or more reports for humans in which repeated exposure caused tooth damage by erosion (SIDS (2002), EHC 21 (1982), DFGOT vol. 6 (1994), PATTY (5th, 2001)). Additionally, an increase in the frequency of chronic bronchitis was reported (DFGOT vol. 6 (1994)). Based on the information, the substance was classified into Category 1 (tooth, respiratory system).

Other data: Not available

Barium Chloride Dihydrate:

Acute toxicity (Oral): Category 3

No date on dihydrate is available. Data on anhydride is as described below. The Date for LD_{50} of Oral-rat was reported: 118 mg/kg (CICAD 33 (2001), EHC 107 (1990)), 132 mg/kg (adult animal), 220 mg/kg

(postweaning), 269 mg/kg (ATSDR (2007)), 419 mg/kg (male), 408 mg/kg (female) (SIDS (2013)). The 4 of the 6 values is corresponding to Category 3, and the other 2 of them is corresponding to Category 4. Hence the substance is classified into Category 3 following the guidance for classification.

Acute toxicity (Dermal): Not classified

No date on dihydrate is available. Data on anhydride is as described below. The data for LD_{50} of Oral-rat was reported: > 2,000 mg/kg (male and female) (SIDS (2013)). Hence the substance is not classified based on the data.

Acute toxicity (Inhalation: Gases): Not applicable

Due to the fact that the substance is "solid" according to the GHS definition.

Skin corrosion/irritation: Classification not possible

ICSC (2002) presents evidence of "reddening," suggesting the skin irritation potential of the substance. However, classification is not possible due to lack of study detail.

Serious eye damage/eye irritation: Classification not possible

ICSC (2002) presents evidence of "reddening," suggesting the eye irritation potential of the substance. However, classification is not possible due to lack of study detail.

Germ cell mutagenicity: Classification not possible

Based on the absence of data on multi-generation mutagenicity tests, germ/somatic cell mutagenicity tests in vivo and germ/somatic cell genotoxicity tests in vivo, and no positive data on mutagenicity tests in vitro (several indices), described in NTP DB (Access on May 2006).

Carcinogenicity: Classification not possible

Classification not possible based on expert judgment in the absence of existing classification, though CICAD 33 (2001) provides some data on toxicity studies.

Specific target organ toxicity - Single exposure: Category 1 (cardiovascular system, muscle)
Category 2 (nervous system)
Category 3 (respiratory tract irritation)

Based on the human evidence: "Intentional or accidental ingestion of barium compounds causes gastroenteritis (vomiting, diarrhea, abdominal pain), hypokalemia, cardiac arrhythmias and skeletal muscle paralysis" (CICAD 33 (2001)), "irritates the eye, skin, respiratory tract; may adversely affect nervous system; may cause hypokalemia; may cause heart/muscle disorder; may lead to death" (ICSC (J) (1999)). Since the priority rating of ICSC (J) (1999) is 2, the effects are classified into Category 1 (cardiovascular system, muscle), Category 2 (nervous system) and Category 3 (respiratory tract irritation).

Other data: Not available

Water: Same as the K-1 discussed above.

K-3 reagent:

L(+)-Ascorbic acid:

Acute toxicity (Oral): Rat LD_{50} = 11,900 mg/kg.

Other data: Not available

Polyethylene:

Acute toxicity (Oral): Rat LD_{50} > 7,950 mg/kg (used 7,950 mg/kg for the calculation of ATEmix below)

Carcinogenicity: IARC Group 3 (not classifiable as to carcinogenicity to humans).

Other data: Not available

GHS classifications as a mixture are shown below.

[Acute toxicity (Oral)]:

K-2 reagent: Classified as Category 4 (Warning, Harmful if swallowed) based on ATE_{mix} value.

Other reagents: Not classified based on ATE_{mix} value.

[Skin corrosion/ irritation]:

K-1 reagent: Not Classified; The content of Category 1 substance is < 1%.

K-2 reagent: Classified as Category 1 (Danger, Causes severe skin burns and eye damage.) because pH of the mixture is ≤ 2.

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

[Serious eye damage/ eye irritation]:

K-1 reagent: Not Classified; The content of Category 1 substance is < 1%.

K-2 reagent: Classified as Category 1 (Danger, Causes serious eye damage.) because pH of the mixture is ≤ 2.

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

[Specific target organ toxicity (single exposure)]:

K-1 reagent: Not Classified; The content of Category 3 (respiratory irritation) substance is < 20%.

K-2 reagent: Classified as Category 1 (Danger, Causes damage to cardiovascular system and muscle), Category 2 (Warning, May cause damage to nervous system); The content of Category 1 (respiratory irritation) substance is < 1%, those of Category 1 (cardiovascular system, muscle) is ≥ 10%, those of Category 2 (nervous system) is ≥10%, and those of Category 3 (respiratory tract irritation) is < 20%.

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

[Specific target organ toxicity (repeated exposure)]:
K-1 reagent: Not Classified; The content of Category 1 (nervous system, respiratory system) substance is < 1%.
K-2 reagent: Not Classified; The content of Category 1 (tooth, respiratory system) substance is < 1%.
K-3 reagent: Classification is not possible because of data lack.

[Acute toxicity (Inhalation: Gases)], [Acute toxicity (Inhalation: Dusts and mists)],
[Acute toxicity (dermal)], [Acute toxicity (Inhalation: Gases)], [Respiratory or skin sensitization],
[Germ cell mutagenicity], [Reproductive toxicity], [Carcinogenicity], [Aspiration hazard]:
Not classified or classifications are not possible because of data lack.

12. Ecological information

No data on mixture is available. Data on each substance are shown.

K-1 reagent:
Potassium Permanganate:
Hazardous to the aquatic environment, short-term (acute): Category 1; LC_{50}-96hr (Daphnia) =0.185 mg/L,
Hazardous to the aquatic environment, long-term (chronic): Category 1
Harmful effects on the ozone layer: Classification is not possible
The substance is not described in Annex to Montreal Protocol.

K-2 reagent:
Hydrogen Chloride (Gas):
Hazardous to the aquatic environment, short-term (acute): Category 1
Classified into Category 1 from its 48h-EC50 = 0.492 mg/L for Crustacea (Daphnia magna) (SIDS, 2005), etc.
Hazardous to the aquatic environment, long-term (chronic): Not classified
Classified into Not classified since the toxicity is mitigated in environmental water by buffer action though it is considered to be a factor of toxicity that water solution becomes strongly acidic.
Harmful effects on the ozone layer: Classification is not possible
The substance is not described in Annex to Montreal Protocol.

Barium Chloride Dihydrate:
Hazardous to the aquatic environment, short-term (acute): Category 3
No date on dihydrate is available. Data on anhydride is as described below. It was classified into Category 3 from 48 hours EC_{50}=14.5 mg/L (Barium Chloride Equivalent: 22.0 mg/L) of the crustacea (Daphnia magna) (SIDS, 2008).
Hazardous to the aquatic environment, long-term (chronic): Category 3
No date on dihydrate is available. Data on anhydride is as described below. No reliable data for chronic toxicity is available. It was classified into Category 3 from unclear degradability and 48 hours EC_{50}=14.5 mg/L (Barium Chloride Equivalent: 22.0 mg/L) of the crustacea (Daphnia magna) (SIDS, 2008).
Harmful effects on the ozone layer: Classification is not possible
The substance is not described in Annex to Montreal Protocol.

K-3 reagent:
L(+)-Ascorbic acid: No eco-toxicological information available.

GHS classifications as a mixture are shown below.
[Hazardous to the aquatic environment, short-term(acute)]:
K-1 reagent: Classified as Category 3 (Harmful to aquatic life.) based on the classification of the mixture.
K-2 reagent: Not classified; It contains Hydrogen Chloride of Category 1, so corresponding to Category 3 based on the application of additivity formula. But its toxicity may be caused by acidification in aqueous solution, and relieved in environmental water by its buffering effect. Additionally, Barium Chloride Dihydrate of Category 3 is not classified as mixture based on the classification of the mixture.
K-3 reagent: Classification is not possible because of data lack.
[Hazardous to the aquatic environment, long-term(chronic)]:
K-1 reagent: Classified as Category 3 (Harmful to aquatic life with long lasting effects.) based on the classification of the mixture.
K-2 reagent: Not classified based on the classification of the mixture.
K-3 reagent: Classification is not possible because of data lack.
[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

The pH of K-2 reagent is ≤ 2, and the pH of residue in the tube after the measurement is ≤ 3, acidic.
Always dispose of remaining waste and used containers 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. Air transportation is recommended for long-distance haul, 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 Goods)
Packing group:	II
Civil Aeronautics Act:	Same as above. Applicable to Limited Quantities of Dangerous Goods.
Fire Service Act:	Not applicable
Total weight of the product:	ca. 180 g/kit

15. Regulatory information

Poisonous and Deleterious Substances Control Act: Not applicable
PRTR Act: Not applicable
Industrial Safety and Health Act: Applicable
K-1 reagent contains ≥ 0.1% and < 1% of Potassium Permanganate.
: “Cabinet order, article 18-2, shall be indicatd the Name of the substance, #2”
K-2 reagent contains ≥ 0.2% of Hydrogen Chloride and ≥ 1% of Barium Chloride Dihydrate.
: “Cabinet order, article 18, shall be notified the Name of the substances, #2”
: “Cabinet order, article 18-2, shall be indicatd the Name of the substance, #2”
Waste Disposal and Cleaning Act: Applicable
Applicable as the Special Controlled Industrial Waste under the Act, because the pH of residual K-2 reagent is ≤ 2, acidic.
Water Pollution Control Act: Applicable
The pH of K-2 reagent is ≤ 2, and the pH of residue in the tube after the measurement is ≤ 3; Applicable to “Cabinet Order set forth in Item (1) of Article 3”.
Sewerage Act: Applicable
The pH of K-2 reagent is ≤ 2, and the pH of residue in the tube after the measurement is ≤ 3; Applicable to “Cabinet Order set forth in Item (2) of Article 9”.

16. Other information

Reference literature

15,911 no Kagaku Shouhin, The Chemical Diary Co., Ltd. (2011)
NITE, GHS Classification, ID H26-B-148/R-133 Potassium Permanganate (2014)
NITE, GHS Classification, ID H21B3004 Hydrogen Chloride (2009)
NITE, GHS Classification, ID 309 Barium Chloride Dihydrate (2006)
NITE, GHS Classification, ID H26-B-078/R-032 Barium Chloride (2014)
Safety Data Sheet, No.W01W0108-0111 JGHEJP, Wako Pure Chemical Industries, Ltd. (2016.06.13)
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Safety Data Sheet, No.W01W0101-0480 JGHEJP, Wako Pure Chemical Industries, Ltd. (2013.12.12)
Material Safety Data Sheet, No.051110033, TOSOH CORPORATION (2004.07.09)
Koukuu Kikenbutsu Yusou Houreisyu, Ed. MLIT, HOUBUN SHORIN CO., LTD. (2019)
JIS Z 7252:2019 Classification of chemicals based on “Globally Harmonized System of Classification and Labelling of Chemicals (GHS)” (Japanese Industrial Standards Committee)
JIS Z 7253:2019 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.