

# Prepared on: April 15, 2011 Revised on: September 22, 2014

# Safety Data Sheet

## **1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product name	Pure Etch F200
Product code	P1-04
Reference No.	P1-04-5
Company	HAYASHI PURE CHEMICAL IND., LTD.
Address	3-2-12 Uchihiranomachi, Chuo-ku, Osaka, Japan
<b>Responsible department</b>	Environment and Quality Assurance Department
Telephone No.	06-6910-7305
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2. HAZARDS IDENTIFICATION	

#### **GHS** classification

Physical and chemical hazards	Flammable liquids : Category 4
	Corrosive to metals: Category 1
Health hazards	Acute toxicity (dermal): Category 4
	Acute toxicity (inhalation: steam): Category 3
	Acute toxicity (inhalation: mist): Category 2
	Skin corrosion and skin irritation: Category 1A
	Serious eye damage or eye irritation: Category 1
	Skin sensitization: Category 1
	Germ cell mutagenicity: Category 2
	Specific target organ toxicity (single exposure) : Category 1 (blood, respiratory system)
	Specific target organ toxicity (single exposure): Category 2 (respiratory organ, pancreas)
	Specific target organ toxicity (repeated exposure): Category 2 (hypophysis, liver, bronchial tubes, respiratory system, thyroid gland, bone, teeth, nervous system, kidney, testis)
<b>Environmental Hazards</b>	Hazards to the aquatic environment (acute): Category 3
	Dangers and hazards which are not stipulated above are not listed or unable to be classified.
GHS label element	

Pictogram



Signal words Hazard statement

Danger H227 Combustible liquid H290 May be corrosive to metals H312 Harmful in contact with skin H314 Causes severe skin burns and eye damage

	H317 May cause an allergic skin reaction
	H330 Fatal if inhaled
	H341 Suspected of causing genetic defects
	H370 Causes damage to blood, respiratory system
	H371 May cause damage to respiratory organ, pancreas
	H373 May cause damage to organs hypophysis, liver, bronchial tubes, respiratory system, thyroid gland, bone, teeth, nervous system, kidney, testis through prolonged or repeated exposure H402 Harmful to aquatic life.
Precautionary statement	
Safety measures	Keep away from heat/sparks/open flames/hot surfaces. No smoking. (P210)
	Keep only in original container. (P234)
	Do not breathe mist/vapors/spray. (P260)
	Wash hands thoroughly after handling. (P264)
	Do not eat, drink or smoke when using this product. (P270)
	Use only outdoors or in a well-ventilated area. (P271)
	Contaminated work clothing should not be allowed out of the workplace.(P272)
	Avoid release to the environment. (P273)
	Wear protective gloves/protective clothing/eye protection/face protection.(P280)
	Wear respiratory protection. (P284)
First aid measures	IF SWALLOWD: Rinse mouth, Do NOT induce vomiting. (P301+P330+P331)
	IF ON SKIN(or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. (P303+P361+P353)
	IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing. (P304+P340)
	IF IN EYES, Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. (P305+P351+P338) IF exposed or concerned: Get medical advice/attention. (P308+P313)
	Immediately call a POISON CENTER or doctor/physician. (P310)
	Get medical advice/attention if you feel unwell. (P314)
	If skin irritation or rash occurs: Get medical advice/attention. (P333+P313)
	Take off contaminated clothing and wash before reuse. (P362+P364)
	Absorb spillage to prevent material damage. (P390)
Storage	Store it in an airtight container in a well-ventilated place. (P403+P233)
	Store locked up. (P405)
	Store in corrosive resistant container with a resistant inner liner. (P406)
Disposal	Dispose of contents/container by outsourcing the disposal to professional waste disposer licensed by prefectural governor. (P501)

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Classification of the chemical substance or mixture

Chemical Name or General Name	Concentration or concentration range		Reference numbers gazetted		
		Chemical formula	Japanese Chemical Substances Control Law	Industrial Safety and Health Law	CAS No.
Hydrogen fluoride	5.0 - 9.5%	HF	1-306	Published	7664-39-3
Nitric acid	1.0 - 5.0%	HNO3	1-394	Published	7697-37-2
Acetic acid	65.0 - 82.0%	СН3СООН	2-688	Published	64-19-7
AdditiveA	Nondisclosure	Nondisclosure	Nondisclosu	Nondisclosure	Nondisclosure

Impurities and stabilizing additives which contribute No information available to the classification of the substance **Industrial Safety and Health Act** Dangerous and Toxic Substances Fluorine and its water-soluble inorganic Subject to Notify Their Names, compounds etc. (Article 57-2 of the Law, (Number specified by law:487) Article 18-2 Appendix 9 of the Nitric acid (Number specified by law:307) Enforcement Order) Acetic acid (Number specified by law:176) **Poisonous and Deleterious** Poisonous substance (Article 1 of Preparation containing hydrogen fluoride **Substances Control Law** Cabinet Order for the Designation of the Poisonous and Deleterious Substances) **Pollutant Release and Transfer** Class I designated chemical Hydrogen fluoride and its water-soluble substance (Clause 2, Article 2 of Register salt(As fluorine) (Number specified by (PRTR Act) the Law, Appended Table 1, law:374) (4.8~9.0%) Article 1 of the Enforcement Order) 4. FIRST AID MEASURES Remove to fresh air, keep at rest in a position comfortable for breathing, and Inhalation loosen tight clothing. Get medical advice/attention. Remove and keep away from contaminated clothing, shoes and socks. Wash a Skin contact contacted area of the body with water and soap. Get medical advice/attention. Eve contact Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention. Ingestion Immediately allow the victim to drink plenty of water. Rinse mouth. Do not induce vomiting. Get medical advice/attention. **5. FIRE FIGHTING MEASURES** Extinguishing media to use Water spray, Dry Chemical, Carbon Dioxide, Alcohol-resistant foam, Dry Unsuitable extinguishing media to High-pressure straight stream of water. use Specific hazards during fire Container might explode due to contamination of water or heating. When burnt, product may produce irritative or toxic fumes/gases. Specific fire fighting procedures In the case of peripheral fire, quickly transfer movable containers to a safe place. If they are unable to be moved, spray water to cool containers and surrounding equipment etc.

When ignited, for initial firefighting, cut out fire sources (combustion sources), and use appropriate fire-fighting media, to extinguish a fire at a stroke.

**Fire fighting personnel protection** Wear appropriate fire-resistant clothing (heat-resistant) including selfcontained-compressed air breathing apparatus.

# 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency	Immediately evacuate the leakage area, with taking proper distances for all directions.
procedures	Do not let unauthorized persons come close to the area.
	Before entering, ventilate the closed place.
	Wear appropriate personal protective devices with care to prevent inhalation and contact with eye, skin, and clothing and never attempt to work on the lee.
<b>Environmental precautions</b>	Do not release into the environment.
	This product is a water-pollutant. Therefore, prevent soil pollution anddischarge into drainage ditch, drainage system and large quantity of water.
Methods and materials for containment and cleaning up	Scatter sand or inert adsorbent and sweep up as much as possible. Collect product in an empty sealable container and move it to a secured place.
	Wash out the spilled area with large amounts of water.
7. HANDLING AND STORAGE	
Handling	
Engineering measures	Work with appropriate personal protective equipment worn with care to prevent inhalation or contact to eyes, skin, and clothing.
	Avoid prolonged or repeated exposure.
	Handle with care to prevent leakage, overflowing, or scattering, minimize generation of mist or vapor, and thoroughly ventilate.
	After handling, stopper tightly, and thoroughly gargle and wash hands.
	Handle within local ventilation or at a place provided with general ventilation.
Precautions for safe handling	Only be used outdoors or in a well-ventilated area.
	Thoroughly wash hand and gargle after handling.
	Do not inhale mist, vapor and spray.
	Avoid eye, skin and clothing contact.
Storage	
Secure storage conditions	Store in a appropriate corrosive-resistant container with a resistant inner liner.
	Lock the container before storing it.
	Store in a well-ventilated, cool and dark place, away from direct sunlight. Keep container tightly closed and keep away from fire and heat sources.
Secure container materials	Light-resistant airtight container

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

	Control concentration	Permissible concentration (Japan Society for Occupational Health)	Permissible concentration (ACGIH)
Hydrogen fluoride	0.5ppm	3ppm(2.5mg/m <sup>3</sup> )(Maximu m allowable concentration)	TWA 0.5 ppm, STEL C 2 ppm (as F) (Skin)
Nitric acid	No regulated	$2ppm(5.2mg/m^3)$	TWA 2 ppm, STEL 4 ppm
Acetic acid	No regulated	10 ppm $(25$ mg/m <sup>3</sup> $)$	TWA 10 ppm, STEL 15 ppm
AdditiveA	No regulated		

Engineering measures	Cover up tightly the generation source at the handling place or install local exhaust equipment or overall ventilation equipment. Install safety showers and eye-fountains near a handling place. Clearly indicate the location.
Protective devices	
<b>Respiratory protection</b>	Gas mask for acid gases,, self-contained breathing apparatus(at fire)
Hand protection	Impervious protective gloves.
Eye protection	Protective glasses (of ordinary eyeglasses type with or without side shields, or of goggles type)
Skin and body protection	Impermeable apron, impermeable working clothes, protective boots.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

As a product	
Appearance	
Physical condition	Liquid
Form	Liquid
Color	Clear and colorless
Odor	Peculiar odor
Odor threshold	No data available
рН	lor less(25°C)
Boiling point, initial boiling point, and boiling range	No information available
Flashing point	66°C (Cleveland open cup )
Evaporation rate	No information available
Combustion or explosive range	No data available
Vapor pressure	No information available
Specific gravity (density)	$1.09 \text{ g/cm}^{3}(20^{\circ}\text{C})$
Solubility	Readily soluble in water.
Kinematic viscosity	No data available
As hydrogen fluoride	
рН	1
Melting/coagulation point	-83°C
Boiling point, initial boiling point,	20°C
and boiling range	
Vapor pressure	122 kPa(25°C)
Vapor density	(Air=1): 0.7
Specific gravity (density)	(Water=1): 1.0 (liquid, 4°C)
Solubility	Water solubility: extremely soluble.
As nitric acid	
рН	1
Melting/coagulation point	-41.6°C
Boiling point, initial boiling point, and boiling range	121°C
Vapor pressure	6.4 kPa(25°C)
Vapor density	2.2(air=1)
Specific gravity (density)	1.4(Water=1)
Solubility	Readily soluble in water. Soluble in ether, alcohol.
n-Octanol-water partition	-0.21
As acetic acid	
рН	1.2
Melting/coagulation point	16.7°C

Boiling point, initial boiling point, and boiling range	118°C
Flashing point	39°C
Combustion or explosive range	4.0vol%(air) - 19.9vol/%(air)
Vapor pressure	1.5 kPa(20°C)
Vapor density	2.1(air=1)
Specific gravity (density)	1.05(Water=1)
Solubility	Soluble in water. Soluble in ethanol, diethyl ether.
n-Octanol-water partition	-0.31
Spontaneous ignition temperature	427°C
10. STABILITY AND REACTIVITY	
Reactivity	No information available
Chemical stability	Substances with this type of structure are stable in normal conditions. Degrade when exposure to sunlight or by heating and generates corrosive and toxic nitrogen oxide.
Possibility of hazardous reactions	Acts on various metals; generates nitrogen oxide gas or, in some cases, ignitable hydrogen gas, which mixes with air to catch fire leading to explosion. May evolve heat, catch fire, or explode when mixed or comes into contact with a combustible substance. Violently reacts with a strong base, oxidant, and reducing substance. Acts on glasses, certain plastics, rubber, and coating. Generates corrosive and toxic hydrogen fluoride gas at room temperature.
Conditions to avoid	Sunlight, humidity, high-temperature matter. Avoid contact with ignition sources such as open flame, spark, and static electricity, strong bases, oxidants, organic peroxides, reducing substances, combustible substances, and metals.
Materials to avoid	Strong bases, oxidants, organic peroxides, reducing substances, combustible substances, and metals.

Hazardous decomposition products Fluorine, hydrogen fluoride, fluorine compounds, and nitrogen oxide.

# 11. TOXICOLOGICAL INFORMATION

As a product	
Acute toxicity	No data available
As hydrogen fluoride	
Acute toxicity (inhalation: gas)	Due to the fact that the substance is "liquid" according to the GHS definition and inhalation of its gas is not expected.
Acute toxicity: inhalation (air)	Based on the LC <sub>50</sub> value (4 hours) of 650ppm, calculated from the testing data of rat LC <sub>50</sub> (1 hour inhalation of vapour) of 0.79mg/L (CERI Hazard Data 2001-46 (2002)), 1.915mg/L (CERI Hazard Data 2001-46 (2002)), 1.828mg/L (EU-RAR No.8 (2001)), 1.909mg/L (EU-RAR No.8 (2001)), 1.069mg/L (EU-RAR No.8 (2001)), 0.792mg/L (EU-RAR No.8 (2001)), 1.136mg/L (EU-RAR No.8 (2001)), 1.317mg/L (ATSDR (2003)), 1.069mg/L (PATTY (4th, 2000)) and 1.14mg/L (PATTY (4th, 2000)), was lower than 90% of the saturated vapor concentration (1,210,000 ppm) under a saturated vapour pressure of 122kPa (25degC) (Hydrogen Fluoride) (ICSC (2004)), the substance was considered as "vapour containing substantially no mist" and was classified based on standard values expressed in ppm.
Skin corrosion and skin irritation	Based on the testing data of animal eye irritation tests (CERI Hazard Data 2001-46 (2002), EURAR No.8 (2001), ATSDR (2003) and PATTY 4th
	(2000)) and data on human health effects: Corrosive to the skin. The results of rabbit skin irritation tests suggest the formation of eschar (14 days after the 4-hour application of 5% aqueous solution), although the substance should be placed in Category 1A from the viewpoint of safety.

Serious eye damage or eye irritation	Based on the testing data of animal eye irritation tests (CERI Hazard Data 2001-46 (2002), EURAR No.8 (2001) and ATSDR (2003)) and high-concentration inhalation exposure tests (ATSDR (2003)): Irreversible effects and corrosivity are observed.
Germ cell mutagenicity	Based on the absence of data on multi-generation mutagenicity tests and germ cell mutagenicity tests in vivo, positive data on somatic cell mutagenicity tests in vivo (chromosome aberration tests) and the absence of data on germ cell genotoxicity tests in vivo, described in EU-RAR No.8 (2001).
Carcinogenicity	Classification not possible, due to lack of data (No classification is available, though there are some data on the carcinogenicity; no evidence is observed of an increase in the incidence of osteosarcoma.) Refer to sodium fluoride (CAS No.7681-49-4) for health hazards.
Specific target organ toxicity(single exposure)	Based on the human evidence including "damage to the respiratory tract and lung, irritation to the nasal mucosa, conjunctiva and respiratory tract" (EU- RAR No.8 (2001)), "pulmonary hemorrhagic edema, bronchitis, pancreatic hemorrhage and necrosis" (CERI Hazard Data2001-46 (2002)) and the evidence from animal studies including "inflammation of the respiratory organs, pulmonary congestion, alveolar edema, damage to the nasal mucosa (necrosis, inflammation, cellular infiltration, effusion and hemorrhage in the epithelium and submucosal tissues)" (CERI Hazard Data 2001-46 (2002)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
Specific target organ toxicity (repeated exposure)	Based on human evidence including "fluorosis of the bone (an increase in bone density, osseous deformity, exostosis, mottled enamel, loss of memory, pituitary/thyroid dysfunction" (CERI Hazard Data2001-46 (2002)), and the evidence from animal studies including "degeneration and necrosis of renal tubules, cerebrospinal dysfunction (a disturbance of conditioned reflex, prolongation of the latent time before the reflex occurs following stimulation), degeneration of nerve cell synapses, diffuse focal necrosis of hepatocytes, fatty degeneration of the hepatic parenchyma, periportal fibrosis, inflammation of the eyithelium of the scrotum, ulcer on the scrotum, degenerative changes in the testes" (CERI Hazard Data2001-46 (2002)), "atrophy and edema in the bronchial mucosa, peribronchial hyperplasia" (EU-RAR No.8 (2001)). The effects on experimental animals were observed at dosing levels within the guidance value ranges for Category 1.
As nitric acid	
Acute toxicity: oral	Although there is a lethal (IUCLID (2000)) statement of 430 mg/kg in humans, there is no other data and it cannot be classified.
Acute toxicity :inhalation (gas)	Liquid (GHS definition)
Acute toxicity: inhalation (dust, mist)	Nitric acid did not exist as steam and gas, and it considered that all the data of $LC_{50}$ was mist. Since all of five data were within the range of 0.05 - 0.5mg/L, it was set as Category 2.
Skin corrosion and skin irritation	There is a description of corrosivity on humans (ICSC(1994))and (HSDB(2005)),and its UN classification is class 8I, it was classified as Category 1A.
Serious eye damage or eye irritation	There is a statement that if exposed to the human eye, severe burns will take place, and muddiness of a cornea and visual impairment result in vision loss (ACGIH (2001)). And it was set as Category 1 since skin corrosivity / irritation was categoried into Category 1A.
Germ cell mutagenicity	Although there is a report of negative results from the in vitro Ames test (DFGOTvol.3 (1991)), the substance cannot be classified because there are no reports about in vivo tests.

Carcinogenicity	There is a result in the inhalation exposure test report of two cases using rats that shows no carcinogenicity (DFGOTvol.3 (1991), (IUCLID (2000)). But there is no report of evaluation organizations, such as IARC, therefore it cannot be classified.
Toxic to reproduction	Although there is the description that teratogenicity and ferotoxity does not occur and there is only a slight ossification inhibition of cranial bone in embryo in the drinking water administration test to pregnancy rat (IUCLID (2000)), but it is considered as insufficient data for classification, and it is considered as it cannot be classified.
Specific target organ toxicity(single exposure)	According to the statements that when humans inhale the steam generated from nitrate, irritation of the upper airway, coughing, breathing difficulty, pain of the breast or pulmonary are caused depending on the exposure concentration and exposure time (ACGIH (2001), DFGOTvol.3 (1991), ICSC(J), (1994), and HSDB (2005)). So it was classified into Category 1. (respiratory systems).
Specific target organ toxicity (repeated exposure)	According to the statement of the chronic bronchitis by occupation exposure of the steam generated from mist or nitric acid (ACGIH (2001)) and erosion of tooth (ACGIH (2001), (DFGOTvol.3 (1994)), it was classified to as Category 1 (tooth, respiratory system).
As acetic acid	
Acute toxicity: oral	Classified as Category 5 based on the lower, $LD_{50}=3310 \text{ mg/kg}$ (PATTY (5th, 2001)), of the two $LD_{50}$ values (3310 and 3530 mg/kg) for rat.
Acute toxicity: dermal	Classified as Category 4 based on the $LD_{50}$ value =1060 mg/kg (PATTY(5th, 2001)) for rabbit.
Acute toxicity: Inhalation (gas)	Liquid according to the definitions by GHS
Acute toxicity: Inhalation (vapor)	Cannot be classified because LCLo=16000 ppm (PATTY (5th, 2001) for rat
Skin corrosion and skin irritation	corresponds to Category 4 or is out of the specified categories. This is lower than the saturated vapor pressure concentration of 90% (20394.7 ppmV * 0.90 = 18355 ppmV); therefore, the reference values for gases were applied to the classification. In the test using rabbits or guinea pigs (PATTY (5th, 2001), ACGIH (2004)), the degree of irritancy depends on the concentration and time of exposure. Especially, severe burns and eschar formation were observed at a concentration of 50% to 80% or more. Classified as Category 1 because it is classified into C and R35 in the EU classification in addition to the above. pH is 1.0 M=2.4 (Merck (14th, 2006)).
Serious eye damage or eye irritation	Classified as Category 1 based on the reports that a destructive damage was caused to the eyes of a rabbit immediately after glacial acetic acid was applied to the eyes (ACGIH (2004)) and excessive irritancy accompanied by persistent corneal damage was shown at a concentration of 10% or more in another test (IUCLID (2000)) and the case reports that accidental contact with human eyes caused cornea opacity or iris inflammation even if they were immediately washed and it took many months for the epithelium to be reproduced (especially the cornea opacity was persistent) (PATTY (5th, 2001)).
Respiratory sensitization	People with bronchial asthma who showed positive reactions to trigger with acetic acid and people who showed reactions similar to those of the type I hypersensitivity after exposure to alcohol or acetic acid were reported (PATTY (5th, 2001)). It was also reported that a person showed anaphylactic reaction to ethanol and another person showed immediate-type allergy to acetic acid (HSDB (2005)). However, the above reports are extremely rare cases and there are no other reports on human or test reports on animals; and thus, the substance cannot be classified for lack of data. Because association of the relevant substance with an asthmatic attack cannot be denied, sufficient caution is required for handling the substance.

Germ cell mutagenicity	Cannot be classified because there have been no in vivo test results. For the in vitro mutagenicity tests, negative results (PATTY (5th, 2001)) were reported in both of the Ames test and chromosomal aberration test using CHO cells.
Carcinogenicity	A large-scale epidemiological study (PATTY (5th, 2001)) was conducted in a production plant for acetic acid and acetic acid anhydride to evaluate death from cancers for the cohort of 1359 workers. The result shows reduction in deaths from all cancers other than prostate cancer, from which deaths have been increased (6 cases). It has been concluded that deaths from prostate cancer is difficult to interpret (PATTY (5th, 2001)). In any event, the substance cannot be classified for lack of data.
Reproduction toxicity	In the results of the test that rats were exposed to the substance for the period from the birth to the age of 18 days (PATTY (5th, 2001)) and the test of oral administration of the substance to mice during the period of organogenesis (HSDB (2005)), no influence on lactation or adverse effect on production of offsprings was reported. Effects of exposure to the substance before mating on the sexual function and reproductive capability of parent animals cannot be classified because of no data available.
Specific target organ toxicity (single exposure)	Classified as Category 1 (blood) based on more than one case report that ingestion of glacial acetic acid or a large amount of acetic acid by human caused disseminated intravascular coagulopathy (DIC), severe hemolysis, or ischemic renal failure (PATTY (5th, 2001), ACGIH (2004)). Classified as Category 1 (respiratory system) because there is a description about irritation to nose, upper respiratory tract, and lung caused by inhalation exposure of humans (PATTY (5th, 2001)), a report that "inhalation of vapor by humans may corrode the respiratory tracts or cause lung edema" (ICSC (J) (1997)), and a report that exposure due to an accident at a petrochemical plant resulted in development of airway obstruction and interstitial lung disease (ACGIH (2004)).
Specific target organ toxicity (repeated exposure)	In the test that the 3% test article was administered into the stomachs of rats for 6 months, chronic inflammation of the esophageal mucous membranes was observed (PATTY (5th, 2001)). There are a report that workers complained of digestive symptoms such as heartburn and constipation due to occupational exposure (PATTY (5th, 2001)) as well as a report that, in the cross-sectional study of 117 female workers, prevalence rates of chronic coughing, feeling of chest tightness, nasal catarrh, and sinusitis were significantly higher in the workers exposed to the substance than in control subjects (ACGIH (2004)). However, classification is impossible for lack of data in each of the cases.
ECOLOGICAL INFORMATION	

#### 12.

As a product	
Ecotoxicity	No information available
Hazards to the ozone layer	No data available
As hydrogen fluoride	
Hazardous to the aquatic environment (acute)	It was classified into Category 3 from 96 hours $EC_{50}=10.5$ mg/L of the crustacea (Mysid Shrimp)) (EU-RAR (2002) and others.).
Hazardous to the aquatic environment (chronic)	Although the acute toxicity was Category 3, judging from the NOEC=14.1mg/L during 21 days of the crustacea (Daphnia magna) (EU-RAR, 2002), it was classified into Not classified.
As acetic acid	
Hazardous to the aquatic environment (acute)	Classified as Category 3 based on the data: 48-h EC <sub>50</sub> of the substance to crustacea (daphnia magna) = 65000 $\mu$ g/L (AQUIRE, 2010).

Hazardous to the aquatic environment (chronic)	Determined to be out of the specified categories because the substance is estimated to be rapidly degradable (degradation by BOD: 74% (existing chemicals survey, 1993)) and have a low bioaccumulation potential (log Kow=-0.17 (PHYSPROP Database, 2009)).
Persistence and degradability	(Degradability) Substance deemed to be highly degradable by microorganisms, etc. Degradation: 74% (BOD)
13. DISPOSAL CONSIDERATIONS	
Residual wastes	Dispose of contents/container in accordance with related laws and regulations
Contaminated containers and packaging	With the details of the waste disclosed, subcontract its disposal to a waste disposer authorized by a Prefectural Governor. Containers should be recycled after being cleaned or properly dispose of it while abiding by the relevant laws/regulations and standards of local governments
	When empty containers are disposed of, completely remove the content.
14. TRANSPORT INFORMATION	
International regulations	
Maritime transport regulatory	Comply with the provisions of IMO
information UN No.	2927
Proper Shipping Name.	TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S.
Class	6.1
Sub Risk	8
Packing Group	II
Marine Pollutant	Not applicable
Transport in bulk according to MARPOL 73/78, Annex II, and the IBC code	applicable
Air transport regulatory	Comply with the provisions of ICAO/IATA
information UN No	2027
On No. Proper Shinning Name	TOXIC LIQUID CORROSIVE ORGANIC NOS
Class	61
Sub Risk	8
Packing Group	II
Domestic regulations	
Land transport regulatory information	Not applicable
Maritime transport regulatory	Comply with the provisions of Ship Safety Law
information UN No.	2927
<b>Proper Shipping Name</b>	Poison other (organic matter) (Liquid) (corrosive)
UN Class	6.1
Sub Risk	8
Packing Group	II
Marine pollutant	Not applicable
Liquid substance transported in bulk according to MARPOL 73/78, Annex II, and the IBC Code	Not applicable
Air transport regulatory information	Comply with provisions of Aviation Law

UN No.	2927
Proper Shipping Name	Poison other (organic matter) (Liquid) (corrosive)
UN Class	6.1
Sub Risk	8
Group	II
Special precautions for user	In transportation, take necessary measures to prevent overturn, damage, fall, collapse, etc. of containers, and make sure containers are free of any leakage.
Emergency response guide number	154
<b>15. REGULATORY INFORMATION</b>	
Industrial Safety and Health Law	Hazardous substance: oxidizers (Enforcement Ordinance, Attached Table 1, Item 3)
	Class III specified chemical substance (Item 6, Clause 1, Article 2 of Ordinance on the Prevention of the Hazard due to Specified Chemical Substances) Working environment assessment standard (Clause 1, Article 65-2 of Industrial Safety and Health Act)
	Dangerous and Toxic Substances Subject to Indicate Their Names, etc. (Article 57-1 of the Law, Article 18 of the Enforcement Order)
	Dangerous and Toxic Substances Subject to Notify Their Names, etc. (Article 57-2 of the Law, Article 18-2 Appendix 9 of the Enforcement Order)
	Corrosive liquid (Article 326 of Ordinance on Industrial Safety and Hygiene)
Poisonous and Deleterious Substances Control Law	Poisonous substance (Article 1 of Cabinet Order for the Designation of the Poisonous and Deleterious Substances)
Water Pollution Control Law	Toxic substances (Article 2, Article 2 of Order of Enforcement, Article 1 of Ministerial Ordinance to Provide Effluent Standards)
Fire Service Law	Class 4 Petroleum No. 2 (water-soluble)
Air Pollution Control Act	Substance whose storage, etc. is required to be notified (Article 9-3 of the Law, Appended Table 1-8 Item 5, Article 1-10 of Hazardous Materials Control Order, Article 1 of Home Affairs Ministry Ordinance No. 2, 1989) Substance whose emission is regulated (hazardous substance) (3, Clause 1, Article 2 of the Law and Article 1 of the Cabinet Order)
	Specified substance (Clause 1, Article 17 of the Law and Article 10 of the Cabinet Order)
	Hazardous air pollutants (the 9th report by Central Environmental Council)
Act for the Prevention of Marine Pollution and Maritime Disasters	Noxious liquid substance (Category Z) (Appended table 1 of Enforcement Order)
Foreign Exchange and Foreign Trade Act	Appended Table 1, Clause 16 (2) of Export Trade Control Order
Ship Safety Act	Toxic substances and poisons (Dangerous Goods Notification Appended Table 1, Articles 2 and 3 of Regulations for the Carriage and Storage of Dangerous Goods in Ships)
<b>Civil Aeronautics Act</b>	Toxic substances and poisons (Dangerous Goods Notification Appended table 1, Article 194, Ordinance for Enforcement)
Act on Port Regulations	Dangerous goods and toxic substances (Article 21-2 of the Law, Article 12 of the Ordinance of Enforcement and Appended Table 2 of Notice No. 547, 1979)
Road Act	Restriction of vehicle traffic (Article 19-13 of the Order for Enforcement and Appended Table 2 in the Notification No. 7 of the Japan Expressway Holding and Debt Repayment Agency)
Wastes Disposal and Public Cleansing Act	Specially controlled industrial wastes (Clause 5, Article 2 of the Law and Article 2-4 of the Enforcement Order)

Law for the Control of Export Import and Others of Specified Hazardous Wastes and Other Wasted	Hazardous components of wastes and substances specified in Item 1 (a), Clause 1, Article 2 of the Law (Notice No. 1 of the three Ministries, 1998)
Reference data (Japan Society for Occupational Health, permissible concentration)	Substance for which recommended allowable concentration is specified
Waterworks Act	Hazardous Substance (Paragraph 2 of Article 4); Water Quality Standards (Ministerial Order 101, 2003)
Sewerage Service Act	Substance subject to the water quality standards (Clause 2, Article 12-2 of Sewerage Service Act and Article 9-4 of the Enforcement Order)
Pollutant Release and Transfer Register	Class I designated chemical substance (Clause 2, Article 2 of the Law, Appended Table 1, Article 1 of the Enforcement Order)
(PRIRACT) Reference data (metal conversion factor)	[Data on metal conversion factor] hydrofluoric acid (hydrogen fluoride): 0.950
Labor Standards Act	Chemical substance causing specific diseases (Clause 2, Article 75 of the Act and Item 4.1, Appended table 1-2, Article 35 of the Ordinance for
Soil Contamination Countermeasures Act	Specified hazardous substance (Clause 1, Article 2 of the Law and Article 1 of the Enforcement Order)
16. OTHER INFORMATION	
References	International Chemical Safety Cards (ICSC) Handbook of 16514 Chemical Products, The Chemical Daily Co., Ltd. National Institute of Technology and Evaluation
Miscellaneous	The Registry of Toxic Effects of Chemical Substances NIOSH This Safety Data Sheet is intended to be provided for business operators who handle chemical substance products of the relevant product and is not intended to assure safety in any way. The Safety Data Sheet does not verify all the information on the applicable chemical substance in the present time. With the recognition in that unknown danger constantly exists in the relevant
	chemical substance, the product shall be used in the principle of self- responsibility of the user with the highest priority to safety from transport and unpacking to disposal. When the relevant chemical substance is used, the user him/herself shall collect safety information and shall investigate laws and regulations at the place, organizations, countries, etc. where the substance is actually used and
	give the highest priority to them. The Company shall take no responsibility for investigating state and local regulations and the user shall handle this problem on his/her own The SDS is copyrighted material of Hayashi Pure Chemical Ind., Ltd.
	In the event that SDS in Japanese and SDS translated into other languages exist, the document described in Japanese is prior to all other documents whether or not there is any difference in contents, and documents in other languages shall be references.