SAFETY DATA SHEET

1. Chemical Product and Company Identification

Product name	: Dilute sulfuric acid (Electrolyte for lead acid battery)
Information on company	
Company name	: GS Yuasa Battery Ltd.
Relevant dept.	: Sales Planning Group, Sales Planning Division
Address	: 1-7-13, Shiba-Koen, Minato-ku, Tokyo, 105-0011, Japan
Phone number	: +81-3-5402-5733
Fax number	: +81-3-5402-5743
Emergency contact	: GS Yuasa International Ltd.
Recommended use of the chemical and restrictions on use	: This product is the electrolyte of lead acid battery. Please do not use for except to be filled in lead acid battery.

2. Hazards Identification

GHS classification

Physical and chemical hazards

Flammable liquids	: Not classified
Pyrophoric liquids	: Not classified
Oxidizing liquids	: Not classified

Health hazards

Acute toxicity (Oral)	: Category 5
Acute toxicity (Inhalation:mists)	: Category 2
Skin corrosion/ irritation	: Category 1A
Serious eye damage/ eye irritation	: Category 1
Skin sensitization	: Not classified
Reproductive toxicity	: Not classified
Specific target organ toxicity (Single exposure)	: Category 1 (respiratory organs)
Specific target organ toxicity (Repeated exposure)	: Category 1 (respiratory organs)

Environmental hazards

Hazardous to the aquatic environment (Acute)	: Category 3
Hazardous to the aquatic environment (Chronic)	: Not classified

※Regard to physical and chemical hazards, health hazards, environmental hazards, the classification not mentioned above is 'Not applicable' or 'Classification not possible' currently.

GHS label elements:

Pictogram

Signal words : Danger

Hazard statements : Causes severe skin burns and eye damage.
Fatal if inhaled.
Causes damage to organs (respiratory organ)
May cause damage to organs through prolonged or repeated exposure (respiratory organ system).
Harmful to aquatic life.

Precautionary statements

Prevention : Do not breathe mist/ vapours /spray.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
In case of inadequate ventilation, wear respiratory protection.

Response : Wash contaminated clothing before reuse.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF exposed or concerned: Call a doctor.
IF exposed or concerned: Get medical advice/attention if you feel unwell.
IF SWALLOWED: Rinse mouth. Do not induce vomiting.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If swallowed, if on skin (or hair), if inhaled, if in eyes, immediately call a doctor.

Storage : Store locked up.
Store in a well-ventilated place.
Keep container tightly closed.

Disposal : Entrust disposal of contents/container to the professional disposal contractor who has received the permission of the prefectural governor.

Other risks/hazards : No information.

3. Composition/Information on Ingredients

Single chemical substance/mixture	: Chemical substance
Chemical name or common name	: Sulfuric acid
Synonym	: Dilute sulfuric acid
Molecular formula	: H_2SO_4
CAS No.	: 7664-93-9
Concentration or concentration range	: 14-51% ※The remaining composition is water (CAS No.7732-18-5, 49-86%)
Serial no. of government gazette (CSCL/ISHA)	: (1)-430
Impurities and stabilizing additives which contribute to the classification	: No information.

CSCL: Chemical Substance Control Law
ISHA: Industrial Safety and Health Act

4. First-aid Measures

If inhaled	: Remove person to fresh air, keep comfortable for breathing. Get medical advice/attention.
If on skin	: Take off or remove immediately all contaminated clothing. Rinse skin with water/ shower. If skin irritation or skin burns occurs, get medical advice/attention.
If in eyes	: Open the eyelids with your fingers, and wash with running water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention.
If swallowed	: Immediately call a doctor. Rinse mouth. Give plenty of water. Do not induce vomiting. Get medical advice/attention.
Most important symptoms/effects, acute and delayed	: Corrosive, burning sensation, sore throat, cough, breathlessness, shortness of breath, redness, pain, blisters, severe skin burns, severe burns, abdominal pain, shock or collapse.
Protection for first-aiders	: Rescuers wear suitable protective equipment such as rubber gloves and tight-fitting safety goggles.
Special note to physician	: Symptoms of lung edema often do not show until a few hours have passed, and it might aggravate if it does not take a rest. Therefore, it is necessary to take a rest and medical observation.

5. Fire Fighting Measures

Suitable extinguishing media	: Electrolyte itself does not have flammability and also not combustion supporting property. In lead acid battery and electrolyte handling place and the like, extinguish fire using dry chemical, foam extinguish agent, extinguisher of non-flammable gas when fire occurs.
Unsuitable extinguishing media	: No information.
Specific risk/hazard	: In case of fire, there is a possibility that irritative, corrosive or toxicity gases or fumes are generated.
Specific fire fighting method	: Move the container from the fire area if it is not dangerous. After extinguishing the fire, continue to cool the container thoroughly with plenty of water. Immediate move the movable container to safe place when fire occurs in surrounding.
Protection for fire-fighters	: Extinguish fire from upwind. Wear appropriate respiratory protection or protective clothes for chemical when firefighting.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency measures	: Wear suitable protective equipment (gloves, protective glasses, protective clothing and the like), when processing the leakage. Do not touch or walk through the leakage. Do not breathe mist, vapour and spray.
Precautions for the environment	: Be careful to not discharge the product into the rivers, sewer, and soil.
Method for containment and clean-up	: If dilute sulfuric acid is leaked, stopping the flow with sand and earth, absorbing mat and the like, remove by absorbing with them. And then, neutralized with sodium bicarbonate or slaked lime, and wash off with plenty of water. Absorb by sprinkling misty water when the gas is generated.
Prevention of secondary hazards	: Immediately remove all ignition sources in the vicinity. Prepare fire extinguishing equipment just in case it is ignited.

7. Handling and Storage

Handling

Technical measures	: Take measure described in ‘8: Exposure Controls and Personal Protective Equipment’, and wear appropriate protective equipment.
Local exhaust/general ventilation	: Work in a well-ventilated place and provide local exhaust or general ventilation as necessary.
Cautions for Safety Handling	: Wash hands, face and the like thoroughly and gargle after handling. Do not eat, drink or smoke when using this product.

Do not breathe mist/ vapours /spray.
Avoid contact with eyes and skin.

Storage

Storage condition : Provide a ventilation and lighting required for storing and handling hazardous materials in the storage location.
: Store locked up.
Keep container tightly closed and store in a well ventilated and cool-dark place.
Do not use fire in storage place.
Keep away from oxidizing agents.
: See '10. Stability and Reactivity'.

Packaging material : Use the container regulated in the UN transport regulation.

8. Exposure Controls and Personal Protective Equipment

Controlled exposure level : Not established.

Permissible exposure level

Japan Society for Occupational Health (2014) : 1mg/m^3 (Maximum permissible exposure limit)

ACGIH (2014) : TLV-TWA = 0.2mg/m^3

Engineering controls : Provide eyes wash facilities and safety shower in the handling and storage place.
Provide local exhaust device, prevent discharge this product from the facilities or general ventilation to keep concentration levels in the air below the recommended control concentration/permissible concentration.
When the mist is generated in the high heat process, provide local exhaust device to keep concentration levels in the air below the recommended control concentration/permissible concentration.
When the gas is generated in the high heat process, provide local exhaust device to keep concentration levels in the air below the recommended control concentration/permissible concentration.

Personal protective equipment

Respiratory protection : Wear gas mask (for acidic gases) as necessary.

Hand protection : Wear acid resistant (neoprene, etc.) gloves.

Eye protection : Wear safety glasses, goggle type safety glasses, face protection and the like.

Skin and body protection : Wear impermeable protective clothing, protective apron and the like.

Hygiene measures : Do not eat, drink or smoke when handling.
Wash hands thoroughly after handling.
Protective equipment shall be inspected regularly according to the protective equipment checklist.

9. Physical and Chemical properties

Physical state	Liquid
Colour,	Colourless
Odour	Odourless (normal temperature)
Melting point, freezing point	－40 －56.4℃（34%）
Boiling point, initial boiling point and boiling range	No information
Flammability(solid, gas)	Not applicable
Lower and upper explosion limit / flammability limit	No information
Flash point	Non flammable
Auto-ignition temperature	Non flammable
Decomposition temperature	No information
pH	≦1
Kinematic viscosity	No information.
Solubility	Miscible in water. Soluble in alcohol.
Partition coefficient ;n-octanol/water(log value)	No information
Vapour pressure	No information
Density and/or relative density	Approx. 1.1～1.4 (20°C)
Relative vapour density	No information
Particle characteristics	Not applicable
Other Information	No information.

10. Stability and Reactivity

Stability : At first, vapor is generated by heating, and generate sulfuric acid vapors if continue to heat.
Rapid contact with water might be generate a large amount of heat, and sometimes the acid is scattered.
Dilute sulfuric acid which is generated by diluting with water, generates hydrogen gas by the corrosion of various metals and may cause flash explosion by mixing with air.
There is hygroscopic.

Hazardous reactivity : It may cause fire or explosion by many reactions.
It is strong oxidant and reacts with combustible and reducing materials.
It is strong acid and reacts violently with bases and is corrosive to most common metals forming a flammable/explosive gas (hydrogen).
React with water and organic materials violently and release heat.

Conditions to avoid : Generate irritating or toxic fumes or gases (sulfur oxides)

when heating.

Incompatible materials : Combustible materials, reducing materials, strong oxidizing agents, strong bases.

Hazardous decomposition products : In case of fire, there is a possibility that irritative or toxic gases (CO, CO2, SOx and the like) are generated.

11. Toxicological Information

Acute toxicity (Oral) : Based on the Rat LD_{50} value: 2140mg/kg and the description of the death case report by the oral ingestion in humans (amount of intake is unknown), it was classified as Category 5 (“Not classified” by JIS classification).

Acute toxicity (Dermal) : No data.

Acute toxicity (Inhalation: Gases) : Classification not applicable because it is a liquid in the definition of GHS.

Acute toxicity (Inhalation: Vapours) : No data.

Acute toxicity (Inhalation: Dust and Mists) : Based on rat LC_{50} value: 0.375mg/L (4 hour exposure) and 347ppm (1-hour exposure) (4 hour equivalent value: 0.347mg/L), it was classified as Category 2.

Skin corrosion/irritation : Since pH of sulfuric acid was 1 or less, it was judged to be corrosive substance in accordance with the GHS classification standards, and classified as Category 1A.

Serious eye damage/eye irritation : There is the description that the critical damage to the eye accompanied by lysis of anterior chamber of eye was observed in accident case of human. And also from the description that the moderate irritation with 5% solution and the severe irritation with 10% solution were observed to the eye of rabbit, therefore, it was classified as "Category 1".

Respiratory or skin sensitization : Respiratory sensitization: No data.

Skin sensitization:

There is no test data on skin sensitizing of sulfuric acids. Although sulfuric acid has been industrially used for several decades, there is no case report of skin sensitization while skin injuries by skin irritation are well known.

Although an extensive amount of sulfate ion exists internally (the sulfate ion in serum ~33 mmol/L, and 50 times more in cells), allergic reactions do not occur.

In allergic test of sulfuric acid salt of metal, even if allergic positive with metal may occur, sulfuric ion is presumed to result in allergic negative as is suggested by the negative results in sulfate of zinc. Based on the description that conclusion is obtained from the results mentioned above that sulfate does not cause allergy to human, it was classified as "Not classified".

Germ cell mutagenicity : For in vivo, there is not any test data which the reproductive

cells and the somatic cells were used. For in vitro mutagenicity tests, there is the positive result only in the test system with the single indicator (chromosomal aberration test). However, there are negative results in other indices. Therefore, it was classified as "Classification not possible".

Carcinogenicity : Occupational exposure of the mist of the inorganic strong acid including sulfuric acids is classified as group 1 according to IARC, as A2 according to ACGIH, and as K according to NTP.
Respect the evaluation of IARC and the latest NTP, it was classified as category 1. However, sulfuric acids itself was classified as the category 4 according to DFGOT. And, since none of those institutions have carried out the carcinogenic classification, it was classified as "Classification not possible".

Reproductive toxicity : In inhalation exposure test using rabbit and mouse in fetal organogenesis period, it is not observed of fetotoxicity and teratogenicity at the dose causing no maternal toxicity in both species. And also, the effect on the reproductive organ of both sexes is not observed in chronic toxicity test and carcinogenicity test. Since the direct effect by irritation/corrosive is the main toxicity, it is judged that there is no concern that indicates the reproductive toxicity, therefore, it was classified as "Not classified".

Specific target organ toxicity (single exposure) : There is the descriptions that in the inhalation exposure of low concentration in humans, airway irritation symptoms such as cough and breath shortness are observed and at high concentration exposure, addition to acute effects such as cough, breathe shortness and hemoptysis shedding etc., permanent effects such as functional depression of lungs, fibrosis and emphysema are observed. Additionally, there is the description that hemorrhage and dysfunction in lungs were observed in 8-hour inhalation exposure using guinea pigs. Based on these descriptions, it was classified as "Category 1 (respiratory systems)".

Specific target organ toxicity (repeated exposure) : In the 28-day inhalation exposure test using rat, cell proliferation in laryngeal mucosa is observed in guidance value range of Category 1. In the 14 to 139-day repeated inhalation exposure test using the guinea pigs, respiratory and lung disorder, such as nasal-septum dropsy, pulmonary emphysema, atelectasis, hyperemia, dropsy, bleeding and thrombosis of bronchioles are observed at the concentration range of guidance value of Category 1. Furthermore, in the 78-week inhalation exposure test using a cynomolgus, histological change as hyperplasia of a cell, the wall thickening, etc. in bronchioles of lungs were observed at the

dosage (0.048 mg/L, 23.5 Hr/Day) of the guidance value range of Category 1. From the above, it was classified as Category 1 (respiratory systems).

Aspiration hazard : No data.

Others : No information.

12. Ecological Information

Ecotoxicity : Fishes: bluegill, 96hr-LC_{50} = 16-28mg/L
Toxicity factor is considered to be aqueous solution which becomes strong acid, but toxic effect is eased by the buffer action in the environmental water. Therefore, chronic hazardous to the aquatic environment is classified as “Not classified”.

Persistence/degradability : No data.

Bioaccumulation : No data.

Mobility in soil : No data.

Hazardous to the ozone layer : Not contain ingredients listed in the Annex of the Montreal Protocol.

Other hazard : No information.

13. Precautions for Disposal

Residual wastes : Before disposal, to be the low level hazard state, perform the process of detoxification, stabilization and neutralization and the like as much as possible.
Because it is a strong acid, dispose after neutralizing with an alkali.
In the disposal, follow the relevant laws and regulations and the standards of the local government.
Entrust disposal to industrial waste disposal contractor who has received the permission of prefectural governor, or if the local government is performing waste disposal, entrust them disposal.

Contaminated container and packages : Recycle containers after cleaning up or dispose of properly in accordance with relevant laws and local regulations.
If dispose the empty container, dispose after removing contents completely.

14. Transport Information

International regulations

Inland transport : Follow the regulation under ADR/RID.

Sea transport : Follow the regulation under IMO.

Air transport : Follow the regulation under ICAO/IATA.

UN number : 2796

UN class : Corrosive substance /Class 8

Proper shipping name	: SULPHURIC ACID with not more than 51% acid or BATTERY FLUID, ACID
Packing group	: II
Marine pollutant	: Not applicable

Japan domestic regulations

Inland transport	: Follow the regulation of Poisonous and Deleterious Substances Control Law.
Sea transport	: Follow the regulation of Ship Safety Law and Act on Port Regulation.
Air transport	: Follow the regulation of Civil Aeronautics Act.
Special safety measures and condition for transport	: For transport, confirm that the containers have no damage, corrosion and leak. Load to not overturning, falling and damage, and take prevention of cargo collapse securely. Avoid transport under the direct sunlight and high temperature. Avoid mixed loading with other substances as much as possible. Transport in accordance with the standards of other related laws and regulations.
Emergency response guideline number(North America)	: 137

15. Regulatory Information

Chemical Substances Control Law	: General chemical substances
Industrial Safety and Health Act	: Dangerous and Harmful Substances Subjects to Notify Their Names (Article 57-2 of the Act) : Corrosive liquid (Article 326 of the regulation) Specified Chemical Substances : Category 3 substance (Article 2 of the Ordinance, paragraph 1, no.6 on Prevention of Dangers Due to Specified Chemical Substances)
Poisonous and Deleterious Substances Control Act	: Deleterious Substances (Article 2 of the designated ordinance)
Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof	: Not applicable
Fire Service Act	: Not applicable
Marine Pollution Prevention Law	: Noxious liquid substances: Category Y
Civil Aeronautics Act	: Corrosive substance (Article 194 of Enforcement Regulations, Appended Table 1 of the Notification for

	Establishing Standards for the Carriage of Dangerous Goods in Ships)
Ship Safety Act	: Corrosive substance (Article 2,3 of the Dangerous Goods Regulations, Appended Table 1 of the Notification for Establishing Standards for the Carriage of Dangerous Goods in Ships)
Act on Port Regulation	: Corrosive substance (Article 12 of Enforcement Regulation, Appended Table 1 of the Notification for Establishing Standards for the Carriage of Dangerous Goods in Ships)

16. Other Information

Reference:

Globally Harmonized System of classification and labelling of chemicals, (6th ed., 2015), UN
JIS Z 7253:2019

1) NITE GHS classification data.
2) SIDS
3) NITE CHRIP (http://www.safe.nite.go.jp/japan/sougou/view/SystemTop_jp.faces)

Notice:

The contents described in this SDS are prepared based on the data and information currently available to us. However, it does not intend to be any guarantees in regard to content, physical and chemical properties, hazards, etc.

Please handle this product in the responsibility of the user after referring to this SDS.

In addition, the precautions are intended for normal handling. Please use under implementing safety measures that are suitable for application/usage if you want to special handling.