

Material Safety Data Sheet

MSDS No.086C-250313

1. PRODUCT AND COMPANY IDENTIFICATION

Product identity	Sulfuric acid
Supplier	
Company name	GS Yuasa Battery Ltd.
Address	1-7-13, Shiba-Koen, Minato-ku, Tokyo, 105-0011, Japan
Responsible Department	Corporate Sales Division Sales Planning Department
Phone No.	+81-3-5402-5733
Fax No.	+81-3-5402-5743
Name of the contact person	Ikegami, Kiriyama

2. HAZARD IDENTIFICATION OVERVIEW

GHS CLASSIFICATION

PHYSICAL HAZARDS:	Not Classified.
HEALTH HAZARDS:	
Acute toxicity (oral route)	Category 5
Acute toxicity (inhalation: mist)	Category 2
Skin corrosion/irritation	Category 1A
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity (single exposure)	Category 1 (respiratory system)
Specific target organ toxicity (repeated exposure)	Category 1 (respiratory system)
ENVIRONMENTAL HAZARDS:	
Aquatic ecology acute toxicity:	Category 3

GHS LABEL ELEMENTS, INCLUDING PRECAUTIONARY STATEMENTS

PICTOGRAMS:



SIGNAL WORD: DANGER

HAZARD STATEMENTS:

- May be harmful if swallowed. (oral route)
- Cause respiratory irritation and harmful if inhaled.
- Causes severe skin burns.
- Causes severe eye irritation. Causes severe eye damage or blindness.
- Causes damage to respiratory organs.
- Cause damage to respiratory organs through prolonged or repeated exposure.
- Harmful to aquatic life.

PRECAUTIONARY STATEMENTS:

[Prevention/Safety]

- Use personal protective equipment as required.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Do not breathe dust/fume/gas/mist/vapors/spray.
- Use only outdoors or in a well ventilated area.
- Wash hands thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Avoid release to the environment.

[First aid]

If swallowed, drink plenty of water and rinse mouth.
Do not induce vomiting.
If on skin (or hair), remove/take off immediately all contaminated clothing.
Rinse skin with water/shower.
Wash contaminated clothing before reuse.
If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing.
If in eye, rinse cautiously with a lot of water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
If exposed on skin/in eyes/swallowed/inhaled, call a poison center or doctor/physician.
Get medical advice/attention if you feel unwell.

[Storage]

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

[Disposal]

Ask to a certificated waste trader or local offices, and dispose of contents/ container appropriately in accordance with related laws and standards.

This product is classified as hazardous according to Regulation (EC) No 1272/2008.

Classification: Category 1A

Label elements

Hazard pictograms:



Signal word:

DANGER

Hazard statements:

H314: Causes severe burns.

Precautionary statements:

P260: Do not breathe dust/fume/gas/mist/vapors/spray.
P264: Wash hands thoroughly after handling.
P280: Wear protective gloves/protective clothing/eye protection /face protection.
P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P363: Wash contaminated clothing before reuse.
P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P310: Immediately call a POISON CENTER or doctor/physician.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405: Store locked up.
P501: Dispose of contents container in accordance with local and regional regulations.

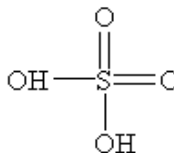
3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical name / Synonym: Sulfuric acid

Content: 36 - 45(%)

Chemical formula: H_2SO_4

Chemical property
(Chemical structure):



CAS No. : 7664-93-9

Reference No. in Japanese gazette: 1-430 (CSCL, ISHL)

EC No. : 231-639-5

COMPOSITION/INFORMATION ON INGREDIENTS

Chemical	CAS#	Hazard classification	Concentration %
Sulfuric acid	7664-93-9	Skin Corr. 1A	36~45
Water	7732-18-5	Not classified	Remainder

4. FIRST AID MEASURES

IF INHALED:

If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a poison center or doctor/physician.
Get medical advice/attention if you feel unwell.

IF ON SKIN:

Immediately remove/take off all contaminated clothing.
Call a poison center or doctor/physician.
Immediately flush the contaminated skin with water.
Continuing to wash the skin by running water or under a safety shower.
Get medical advice/attention if you feel unwell.
Wash contaminated clothing before reuse.

IF IN EYES:

Call a poison center or doctor/physician.
Immediately rinse with a lot of water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
Get medical advice/attention if you feel unwell.

IF SWALLOWED:

Call a poison center or doctor/physician.
Drink plenty of water and rinse mouth.
Do not induce vomiting.
Get medical advice/attention if you feel unwell.

MOST IMPORTANT SYMPTOMS / EFFECTS, ACUTE OR DELAYED:

Corrosiveness, Sensation of burning, Sore throat, Cough, Feeling of smothering, Breathlessness, Skin redness, Pain, Water blister, Severe skin burn, Severe burn, Abdominal pain, Sinking feeling or Shock

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND NOTES FOR PHYSICIAN:

In most cases, pneumonedema develops no symptoms until after 2-3hours.
If not keep quiet in bed, symptoms may worsen. Based on the individual reactions of the patient, the physician's judgment should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

This product itself is not flammable. Use extinguisher with suitable agent for surrounding fire.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL

Heating may cause explosions of containers.
May generate irritating, corrosive or poisonous gas in case of fire.

SPECIFIC EXTINGUISH METHOD OF THE CHEMICAL

If not dangerous, remove the container from the fire area.
If possible, use water spray extinguisher in case of fire.
Be careful of water pressure while discharging water.
Use water spray /fire foam/powder extinguisher.
Cool the fire-exposed container with plenty of water after fire extinction.
When the fire is spreading around, immediately keep away the containers as much as possible to the safety area.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS

Wear self-contained breathing apparatus and chemical-proof safety clothing while extinguishing fire.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

Immediately identify an area at an appropriate distance in all directions as the spilled area and cordon off the location.

Stretch the rope around the spilled area and off-limit except responsible persons.

Use suitable protective equipment. (See Section 8. "EXPOSURE CONTROLS/PERSONAL PROTECTION ") Avoid contact with skin, eyes or avoid inhalation.

Do not touch the broken container and spilled material, if you don't wear the appropriate protective clothing.

Have the wind at your back. Work with being up wind.

Keep on the windward side. Take action from windward and evacuate those who are under the wind.

Move away from the low-lying place.

ENVIRONMENTAL PRECAUTIONS

Attention not causing environmental pollution by emission into rivers.

Do not release to the environment.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

In case of small spills, absorb with dry earth, sand or other non-combustible material and collect spillage into an empty closed container. Afterward dispose it.

After neutralizing the residue with calcium hydroxide or sodium carbonate, wash away with plenty of water. In case of large spills, stop leakage to surroundings.

After neutralizing the residue with calcium hydroxide or sodium carbonate, wash away with plenty of water.

When gas is generating, spray water and absorb it.

SEALING OFF AND CLEAN UP METHODS

Stop or reduce any leaks if it is safe to do so.

PREVENTION OF SECONDARY ACCIDENTS

Keep away all ignition sources. (No smoking, no firework, or no flame near handling areas.)

7. HANDLING AND STORAGE

[HANDLING]

PRECAUTIONS FOR SAFE HANDLING

Take measures to the facilities described in Section 8 (EXPOSURE CONTROLS / PERSONAL PROTECTION) and wear the personal protective equipment .

This product is a subject substance regulated by Poisonous and Deleterious Substances Control Law (PDSCL). Handle with this product in accordance with the relevant law.

(Reference)

PDSCL; Article 7:

Any person in carrying on the business of poisonous or deleterious substances must staff a full-time responsible person handling poisonous or deleterious substances at every manufacturing facility, at every sales office or at every shop and make him or her to prevent the health harm caused by poisonous or deleterious substances.

Article 12:

Container and its package must be labeled "Not for medical use" and "Hazardous Substance (red characters on a white background)."

LOCAL VENTILATION AND WHOLE AIR VENTILATION

Make the measure to local exhaust ventilation and the whole ventilation in the way described in Section 8 "EXPOSURE CONTROLS/PERSONAL PROTECTION " .

PRECAUTION OF SAFETY HANDLING

Provide a local exhaust ventilation to control airborne level below the exposure limits.
Do not contact, inhale or ingest dust/fume/gas/mist/vapors/spray.
Wash hands thoroughly after handling.
Use only outdoors or in a well ventilated area.
Do not eat, drink or smoke when using this product.
Do not release to the environment.

AVOIDANCE OF CONTACT

Refer to section 10 "STABILITY AND REACTIVITY".

[STORAGE]

ENGINEERING MEASURES

Store in a well-lighted, lighting-well lit and well-ventilated place to handle the dangerous substances.

No special technical measure is required.

MIXED TOUCH DANGEROUS COMPOUNDS

Refer to section 10 "STABILITY AND REACTIVITY".

CONDITIONS FOR SAFE STORAGE

Store apart from the oxidizing agents.

Store locked up.

The storage place should be well-ventilated to avoid the accumulation of gases.

The container should be sturdy, corrosive-resistant and tightly sealed to prevent the product from leaking easily.

If stored in the tank, always check the remaining amount and prevent its overflow.

If stored in the small polypropylene bottle, store in cool and dark place avoiding direct sunlight.

Install water washing facility or drain in the storage place to prevent the leakage risk.

The floor of storage place should be undertaken with acid-resistant compounds to prevent the leaked acid from permeating into the ground..

Store apart from other chemicals (especially, oxidizing agents, cyanogen salts etc.).

CONTAINER/PACKAGE MATERIAL

Use the container defined by UN transportation law.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

[THRESHOLD VALUES

(OCCUPATIONAL EXPOSURE LIMITS OR BIOLOGICAL EXPOSURE INDEX)]

The Japanese Society for Hygiene (2005): 1 mg/m³ (Allowable upper limit)

ACGIH (2005): TLV –TWA 0.2 mg/m³ A2
(mist containing in a strong inorganic acid)

[FACILITY CONTROL]

An eyewash fountain and a safety shower are necessary.

Keep the process closed, equip with local exhaust ventilation, or take other engineering measurements to control airborne contamination level below a recommended specified or allowable limit.

If mist is generated when handling the material at high temperature, adequate ventilation must be provided to control airborne contamination level below a specified or allowable limit.

If gas is generated when handling the material at high temperature, adequate ventilation must be provided to control airborne contamination level below a specified or allowable limit.

[INDIVIDUAL PROTECTION MEASURES]

RESPIRATORY PROTECTION :

Wear appropriate respiratory protection.

If a possibility of exposure, wear an air-supplied respirator, a self-contained-compressed air breathing apparatus or a self-contained-compressed oxygen breathing apparatus .

HAND PROTECTION :

Wear protective gloves as appropriate.
Nitrile rubber or vinyl chloride is not suitable for protective materials.
Neoprene rubber is the most recommended.
If a possibility of airborne droplet exposure, wear protective full-body suit/clothing (an acid-resistant suit etc.).

EYE PROTECTION :

Wear protective glasses as appropriate.
Wear goggle for chemical droplet or face protection.
Wear protective safety eyeglasses.
If a possibility of exposure to eye or face by spatter or spray, wear full-length chemical splash goggles and face shield.

SKIN / BODY PROTECTION :

Wear protective clothing and face protection as appropriate.
Wear suitable eye/face protection, e.g. safety glasses or goggle.
Avoid skin and eye contact by wearing impermeable protective clothing (e.g. neoprene gloves, apron, safety boots and full-body suit).
If a possibility of splash exposure, a complete chemical-proof protective suit and boots combination is necessary.

SANITATION PRECAUTION :

Wash thoroughly after handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE (PHYSICAL STATE, COLOR etc.) :	Colorless liquid, hygroscopic
ODOR :	Odorless (Room temperature)
MELTING POINT/FREEZING POINT :	Below -40°C
INITIAL BOILING POINT AND BOILING RANGE :	About 112°C
SPECIFIC GRAVITY (DENSITY) :	1.280 ~ 1.360 (20°C)
SOLUBILITY :	Miscible in water. Soluble in alcohol.

10. STABILITY AND REACTIVITY**STABILITY:**

Sudden contact with water generates excessive heat and may result in scattering acid.
The sulfuric acid diluted by water is corrosive to most metals to produce hydrogen, which may be ignited and exploded with mixing air in depending on conditions.
If contact with basic salts, combustible materials, oxidizing materials, reducing materials or water, may cause fire or explosion.
Hygroscopic.

POSSIBLE HAZARDOUS REACTIONS:

May cause fire or explosion by many various reaction.
Sulfuric acid is a strong oxidizing material and reacts with various combustibility materials and reducing materials.
Sulfuric acid is a strong acid and corrosive to almost metals to generate flammable and explosive gas (hydrogen).
Sulfuric acid reacts with water and organic materials violently to generate excessive heat.

CONDITIONS TO AVOID:

Overheating causes irritating or poisonous fume and gas (sulfur oxide).

INCOMPATIBLE MATERIALS:

Avoid to contact with combustible materials, reducing materials, strong oxidizing materials, or strong basic salts.

HAZARDOUS DECOMPOSITION PRODUCTS:

Sulfur oxides may be released when burning this product.

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Acute toxicity: Category 5 based on the following data; Oral-rat: LD50: 2,140mg/kg¹⁾ and death case in human ingestion²⁾ (dose level not known).

Acute toxicity (dust-mist): Category 2 based on; Rat 4Hr-LC50: 0.375 mg/L¹⁾
: 1Hr-LC50 = 347 ppm (4Hr converted value 0.347 mg/L)¹⁾.

SKIN CORROSION / IRRITATION:

Category 1A-1C based on the following data; pH of concentrated sulfuric acid is ≤ 1 and is considered as corrosive according to the GHS classification criteria.

SERIOUS EYE DAMAGE / IRRITATION:

Category 1 based on the following data; Rabbit: Severe eye irritation 1380 μ g
In a human accidental case, serious eye damage associated with melting of anterior eye chamber was observed²⁾. 5% solution: moderate and 10% solution: severe irritation in rabbit eyes¹⁾. pH of the substance is ≤ 2 .

RESPIRATORY OR SKIN SENSITIZATION:

Not classified based on the following data; No data on skin sensitization is available. Sulfuric acid has been industrially used for several tens of years and is well known as skin trouble because of its skin irritation, however no case is reported as a sensitization. No allergic reaction occurs although there is a large amount of sulfuric ions in human body. In allergic tests of metal sulfates, positive result were caused due to a metal allergy but negative by sulfuric acid this is supported by the negative result of zinc sulfate. Based on the above results, it can be concluded that sulfuric acid does not have allergic potential³⁾.

GERM CELL MUTAGENICITY:

Classification not possible based on the following data. No in vivo data in germ cell or somatic cell is available. Only single positive result in a mutagenicity test (chromosome aberration test) is reported²⁾, however all in negative.

CARCINOGENICITY:

Classification not possible based on the following data. Regarding mists of inorganic strong acids including sulfuric acid, following classifications are reported, IARC Group 1⁴⁾, ACGIH A2⁵⁾ and NTP K⁶⁾. If classifications made by IARC and recent NTP are respected, category 1 can be chosen, however, sulfuric acid itself is classified as category 4 by DFGOT⁷⁾ and no classification has been made by other organization.

REPRODUCTIVE TOXICITY:

Not classified based on the following data. No toxicity to unborn child or teratogenic effects was reported at dose levels where no maternal toxicity were seen in inhalation test in rabbits and mice administered during fetal organ developmental stage¹⁾. 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 test¹⁾.

STOT-SINGLE EXPOSURE:

Category 1 (respiratory organs) based on the following data. In human cases, respiratory irritation such as cough and breath shortness were observed by inhalation exposure of low concentration levels⁷⁾. 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 reported²⁾. Bleeding or dysfunctions of lungs are observed in a guinea pig 8-h inhalation test²⁾.

STOT-REPEATED EXPOSURE:

Category 1 (respiratory organs) based on the following data. Cell proliferation of throat mucosa was observed at dose levels within the guidance value of category 1 in a rat 28-day inhalation test¹⁾. 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 vessel²⁾. 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 1²⁾ (0.048 mg/L, 23.5 Hr/Day).

ASPIRATION HAZARD:

Not classified. No information is available.

12. ECOLOGICAL INFORMATION

AQUATIC ECOLOGY ACUTE TOXICITY

Category 3 because LC₅₀ of Bluegill during 96hours is 16-28 mg/L⁸⁾.
Harmful to aquatic animals.

AQUATIC ECOLOGY CHRONIC TOXICITY

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

13. DISPOSAL CONSIDERATIONS

REMAINING PRODUCT

Before disposal, to the greatest possible extent, reduce to the lowest hazard category with treating by detoxification, stabilization and neutralization.
Because this product is a strong acid, handle after neutralizing with alkaline substance. Do not dispose if you can't satisfy the technical specification defined by the cabinet order. (Poisonous and Deleterious Substances Control Law; Article 15-2) Regulated by the related regulations and local government rules.
Hazardous waste must be delegated its handling to a industrial waste disposer licensed by prefecture governor or a industrial waste disposal authority.
When entrust the handling, you must completely notify the waste disposer of its dangerousness and harmful effect and entrust its handling

CONTAMINATED CONTAINERS AND PACKAGING

The container shall be cleaned up and recycled, or disposed according to related regulations or local government rules.
Contents should be removed completely when dispose of containers.
When dispose of the spray canes, regulated by the relevant government rules because different local governments have a different rules.

14. TRANSPORT INFORMATION

INTERNATIONAL TRANSPORT INFORMATION

Marine shipping information:	Regulated by IMO.
UN Number:	UN2796
Proper Shipping Name:	Sulfuric Acid
Transport Hazard Class:	8
Packing Group:	II
Marine Pollutant Substance:	Not applicable.
Air shipping information:	Regulated by ICAO/IATA.
UN Number:	UN2796
Proper Shipping Name:	Sulfuric Acid
Transport Hazard Class:	8
Packing Group:	II

DOMESTIC TRANSPORT INFORMATION (JAPAN)

Surface shipping information:	Regulated by PDSCL.
Marine shipping information:	Regulated by Ship Safety Act
UN Number:	UN2796
Proper Shipping Name:	Sulfuric Acid
Transport Hazard Class:	8
Packing Group:	II
Marine Pollutant Substance:	Not applicable.
Air shipping information:	Regulated by Aviation Law.
UN Number:	UN2796
Proper Shipping Name:	Sulfuric Acid
Transport Hazard Class:	8
Packing Group:	II

Specific measures for safe transport

Regulated by Road Trucking Vehicle Law.

When transporting, protect from direct sunlight and take on cargo without breakage of container, corrosion and leakage. Make sure to prevent collapse of cargo piles.

When transporting by the truck over 5 tons, the transport method must be satisfied with the following rules. (Enforcement ordinance for PDSCL, Article 40-5)

- 1) When transporting over the distance defined by the departmental regulation, another co-driver or assistant driver must be on every truck.
- 2) Trucks must be displayed with the signage of "Poison" which is black characters in white background on 0.3 square meter board.
- 3) The protection equipment (gas protection mask, protective gloves, protective long boots, protection suit, protection eyeglasses) must be equipped for over 2 persons on every truck.

Do not transport with foods and animal feeding stuffs.

Do not put on upper load of heavy goods.

While transporting, yellow card must be equipped.

Do not load on other dangerous substances or combustible materials.

Do not load near the other dangerous substance.

15. REGULATORY INFORMATION

Applicable rules or regulations (Japan domestic)

INDUSTRIAL SAFETY AND HEALTH LAW (ISHL)

Notifiable substance to be delivered MSDS.

(Article 57-2, Enforcement ordinance; Article 18-2; Appended table No.9)

(Decree number; No.613)

Corrosive liquid (Ordinance for Industrial Safety and Hygiene; Article 326)

Specified chemical substance Group-3 substance

(Ordinance for Prevention of Hazards Due to Specified Chemical Substances; Article 2-1-6)

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW (PDSCL)

Deleterious substance (Article 2, Appended table No.2)

SHIP SAFETY LAW

Corrosive substance

(Regulations for the Carriage and Storage of Dangerous Goods in Ships; Articles 2, 3

Dangerous substances bulletin annex table 1)

CIVIL AERONAUTICS LAW

Corrosive substance

(Enforcement ordinance; Article 194, Dangerous substances bulletin annex table 1)

AIR POLLUTION CONTROL LAW

Specified substance (Enforcement ordinance; Article 10)

16. OTHER INFORMATION

REFERENCES:

- 1) SIDS (2001)
- 2) ATSDR (1998)
- 3) SIDS (1998)
- 4) IARC (1992)
- 5) ACGIH (2004)
- 6) NTP (2005)
- 7) DFGOT (vol.15, 2001)
- 8) SIDS (2003)
- 9) Industrial Poisoning Handbook (Ishiyaku Shuppan)
- 10) Dangerous Hazardous Substances Handbook (Japan Industrial Safety and Health Association)
Under the editorship of Industrial Safety and Health Department
- 11) Japan Society of Occupational Health Occupational health

IMPORTANT NOTE:

Described contents in this document are based on the references, information and data currently available to us. You should note that these contents may be revised by the new knowledge. The described data and accounts are provided without any warranty. The information is believed to represent our best knowledge of the health and safety hazard on the workplace. However, user should make their own investigations to determine the suitability of the information for their particular purpose.