1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Trade name：	Sulfuric acid
Chemical family：	Acid
Use：	Battery Electrolyte
Company / identification：	Taiwan Yuasa Battery Co., Ltd.
Address：	No.11, Ln. 227, Fuying Rd., Xinzhuang District, New Taipei City, Taiwan
Emergency telephone：	886-2-29018261

2. COMPOSITION / INFORMATION ON INGREDIENTS

This product is considered to be hazardous and contains hazardous components.

Substance name	%	CAS number	EC number	CERTIFICATE
Sulfuric acid（H_2SO_4）	37~46	7664-93-9	231-639-5	C ; R35
Water（H_2O）	63~54	7732-18-5	231-791-2	Not classified

Other information : Full text of R-Phrases : see under section 16.

3. HAZARDS IDENTIFICATION

GHS Classification：

Hazard classification	Acute toxicity, oral （Category 5）
	Acute toxicity, inhalation（Category 2）
	Corrosive to metals（Category 1）
	Skin corrosion/irritation（Category 1）
	Serious eye damage/eye irritation（Category 1）
Pictogram	 
	Corrosion　Skull and crossbones
Signal word	Danger
Hazard statement(s)	Harmful if swallowed
	Fatal if inhaled
	Harmful if swallowed
H314	Causes severe skin burns and eye damage
	Causes serious eye damage
Precautionary statement(s)	P280
	Wear protective gloves/ protective clothing/ eye protection/ face protection
	P305 + P351 + P338
	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Classification of Product：	Corrosive.
Main hazards：	R35：Causes severe burns

4. FIRST AID MEASURES

Eye contact：
Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.

Skin contact：
Immediately flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport. While the patient is being transported to a medical facility, apply compresses of iced water.
If medical treatment must be delayed, immerse the affected area in iced water.
If immersion is not practical, compresses of iced water can be applied.
Avoid freezing tissues. Discard heavily contaminated clothing and shoes in a manner that limits further exposure. Otherwise, wash clothing separately before reuse.

Inhalation：
Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Do not use mouth-to-mouth method if victim ingested or inhaled the substance: induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Give Cardiopulmonary Resuscitation (CPR) if there is no pulse AND no breathing. Obtain medical attention IMMEDIATELY.

Ingestion：
DO NOT INDUCE VOMITING. If victim is alert and not convulsing, rinse mouth and give ½ to 1 glass of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY contact local poison control center. Vomiting may need to be induced but should be directed by a physician or a poison control center. IMMEDIATELY transport victim to an emergency facility.

Notes to physician：
This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed. Following exposure the patient should be kept under medical review for at least 48 hours as delayed pneumonitis may occur.

5. FIRE-FIGHTING MEASURES

Flammability of the product：	Non-flammable
Auto-ignition temperature：	Not applicable.
Flash points：	Not applicable.
Flammable limits：	Not applicable.
Products of combustion：	Not applicable.
Fire hazards in the presence of various substances：	Not flammable but highly reactive. Strong dehydrating agent, which may cause ignition of finely divided combustible materials on contact. Sulfuric acid is not compatible with steel.
Explosion hazards in the presence of various substances：	Reacts violently with water with the evolution of heat. It can react explosively with organic materials (See Section 10). Reacts with many metals to liberate hydrogen gas that can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage. Oxides of sulfur may be produced in fire.
Fire-fighting media and instructions：	Not applicable.
Protective clothing (fire)：	Not applicable.

6. ACCIDENTAL RELEASE MEASURES

General Information：	Use proper personal protective equipment as indicated in Section 8.
Small spill and leak：	Cover with DRY earth, sand or other non-combustible material. Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.
Large spill and leak：	Restrict access to area until completion of clean up. Ensure trained personnel conduct clean up. Remove all ignition sources (no smoking, flares, sparks or flames). All equipment should be grounded. Ventilate area. Use appropriate Personal Protection Equipment. Prevent liquid from entering sewers or waterways. Stop or reduce leak if safe to do so. Dike with inert material (sand, earth, etc.). Collect into plastic containers for disposal. Consider in situ neutralization and disposal. Ensure adequate decontamination of tools and equipment following clean up.

7. HANDLING AND STORAGE

Handling： Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes.

Storage： Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store near alkaline substances.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls： Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sulfuric acid	(1 mg/m3) TWA; (3 mg/m3) STEL	1 mg/m3 TWA 15 mg/m3 IDLH	1 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs： Sulfuric acid: 1 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes： Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin： Wear neoprene gloves, apron, and/or clothing. Wear appropriate protective gloves to prevent skin exposure.

Clothing： Wear neoprene gloves, apron, and/or clothing. Wear appropriate protective clothing to prevent skin exposure.

Respirators： A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Electrolyte：

Boiling Point：	203-204°F	Specific Gravity (H_2O = 1)：	1.215 to 1.350
Melting Point：	Not Applicable	Vapor Pressure（mm Hg）：	10
Solubility in Water：	100%	Vapor Density（AIR=1）：	Greater than 1
Evaporation Rate： (Butyl acetate = 1)	Less than 1	% Volatile by Weight：	Not Applicable
Appearance and Odor：	Electrolyte is a clear liquid with a sharp, penetrating, pungent odor.		

NFPA Hazard Rating：	Flammability (Red)	= 0
	Health (Blue)	= 3
	Reactivity (Yellow)	= 2

10. STABILITY AND REACTIVITY

Chemical Stability：	Stable under normal temperatures and pressures.
Conditions to Avoid：	Mechanical shock, incompatible materials, metals, excess heat, combustible materials, organic materials, oxidizers, amines, bases.
Incompatibilities with Other Materials：	Metals, strong oxidizing agents, strong reducing agents, bases, chlorates, finely powdered metals, iron, nitrates, nitrites, perchlorates, permanganates, phosphorus, potassium chlorates, steel, zinc, hydrogen peroxides, cesium acetylene carbide, cyanides (e.g. potassium cyanide, sodium cyanide), nitromethane, phosphorus trioxide, azides, iodides, benzene, carbides, fulminates, picrates, organic materials, mercuric nitride, strong dehydrating agents, alkali halides, cyclopentadiene, cyclpentanone oxime, nitroaryl amines, lithium silicides, trihydroxydiamino phosphate.
Hazardous Decomposition Products：	Carbon monoxide, oxides of sulfur, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization：	Has not been reported.

11. TOXICOLOGICAL INFORMATION

Toxicity information

Acute toxicity

Effects by ingestion：	Irritation of the linings of the mouth, throat, and gastrointestinal tract.
Effects on skin contact：	This material has been shown to be a severe skin irritant.
Effects on inhalation：	Irritating to respiratory system.
Effects on eye contact：	Severe eye irritant.

ON INGREDIENTS

Inhalation, rat：	LC50 = 510 mg/m3/2H
Oral, rat：	LD50 = 2140 mg/kg

12. ECOLOGICAL INFORMATION

Environmental：	Sulfuric acid reacts with calcium and magnesium in water to form sulfate salts. During transport through the soil, sulfuric acid can dissolve some of the soil material, in particular carbonate-based materials.
Products of degradation：	Decomposition products may include the following materials: sulfur oxides (SO2, SO3 etc.).
Toxicity of the products of biodegradation：	The products of biodegradation are more toxic than the original product.
Waste information：	Place neutralized slurry in sealed containers and dispose of as hazardous waste, as applicable. Large water-diluted spills, after neutralization and testing, should be managed in accordance with local, state and federal requirements. Consult state environmental agency and/or federal EPA.

13. DISPOSAL CONSIDERATIONS

Disposal：	Dispose in a safe manner in accordance with local/national regulations.
Treatment of dirty packing：	After last use, the packing should be totally empty and closed.

14. TRANSPORT INFORMATION

ADR / RID

UN Number：	UN2796
Class：	8
Proper Shipping Name：	Battery Fluid, Acid
Packing Group：	II
Label / Placard Required：	Corrosive

U.S. DOT

The transportation of electrolyte within the continental United States is regulated by the U.S. DOT through the Code of Federal Regulations, Title 49 (CFR 49). These regulations classify electrolyte as a hazardous material. Electrolyte must be packed according to 173.154, 173.202 or 173.242 depending upon the nature of the shipment. The shipping information for electrolyte is as follows：

UN Number：	UN2796
Class：	8
Proper Shipping Name：	Battery Fluid, Acid
Packing Group：	II
Label / Placard Required：	Corrosive

When battery fluid is shipped in a carton with a dry battery, CFR 49, 172.102 special provision N6 states that this combination packaging must conform either section 173.159 (g) or (h).

IATA

The international transportation of electrolyte is regulated by the International Air Transport Association (IATA). These regulations also classify electrolyte as a hazardous material. Electrolyte must be packed according to IATA Packing Instruction Y809. The shipping information is as follows：

UN Number：	UN2796
Class：	8
Proper Shipping Name：	Battery Fluid, Acid
Packing Group：	II
Label / Placard Required：	Corrosive

IMDG

The international transportation of electrolyte is regulated by the International Maritime Dangerous Goods code (IMDG).
These regulations also classify electrolyte as a hazardous material. Electrolyte must be packed according to IMDG code page 8230. The shipping information is as follows：

UN Number：	UN2796
Class：	8
Proper Shipping Name：	Battery Fluid, Acid
Packing Group：	II
Label / Placard Required：	Corrosive

15. REGULATORY INFORMATION

European Community Labeling：

Symbol(s)：  Corrosive.

Contains： Sulfuric acid

R Phrase(s)： R35：Causes severe burns.

S Phrase(s)： S26：In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36/37/39：Wear suitable protective clothing, gloves and eye/face protection.
S45：In case of accident or if you feel unwell, seek medical advice immediately (show the label when possible).

European Inventory of New and Existing Chemicals Substances (EINECS): All of the components in this product are listed on the EINECS inventory.

U.S. FEDERAL REGULATIONS：

CERCLA 103 Reportable Quantity：This product has a Reportable Quantity (RQ) of 5,000 lbs. based on the RQ for sulfuric acid of 1,000 lbs. Releases above the RQ must be reported to the National Response Center. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA TITLE III：Hazard Category For Section 311/312: Acute Health, Chronic Health

Section 313 Toxic Chemicals：This product contains the following chemicals subject to Annual Release Reporting Requirements Under SARA Title III, Section 313 (40 CFR 372).

Section 302 Extremely Hazardous Substances (TPQ)：None

EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.

U.S. FEDERAL REGULATIONS：

California Proposition 65: This products contain the following substances known to the State of California to cause cancer: Acetaldehyde <6.4ppm, 1,4 Dioxane <0.2 ppm.

Canadian Environmental Protection Act: All of the components in this product are listed on the Domestic Substances List (DSL).

Canadian WHMIS Classification: Class D-2-A, Class E.

Australian Inventory of Chemical Substances：All of the components in this product are listed on the AICS for Australia.

China Inventory of Existing Chemicals and Chemical Substances：All of the components in this product are listed on the IECSC for China.

Japanese Existing and New Chemical Substances：All of the components in this product are listed on the Japanese ENCS list.

16. OTHER INFORMATION

HMIS Hazard Rating： Health – 3 Fire Hazard – 0 Reactivity – 0

List of relevant R phrases： R35：Causes severe burns.

EU Classes and Risk Phrases for Reference (See Sections 2)

DISCLAIMER OF LIABILITY：

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