

M.S.D.S

(Material Safety Data Sheet)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

- A. PRODUCT NAME : VRLA(Valve Regulated Lead Acid) Battery
- B. RECOMMENDED USE OF THE CHEMICAL AND RESTRICTIONS ON USE
: Vehicle Electrical System
- C. MANUFACTURER/SUPPLIER/DISTRIBUTOR INFORMATION
- MANUFACTURER'S NAME: Clarios Delkor Corporation
- ADDRESS: 13, Okgye2gongdan-ro, Gumi-si, Gyeongsangbuk-do, Korea
- INFORMATION: 82-2-529-8975

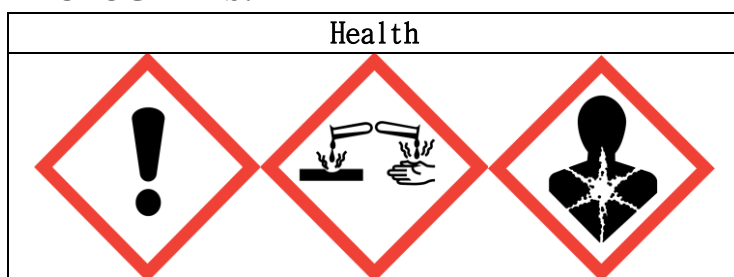
2. HAZARDS IDENTIFICATION

A. HAZARD CLASSIFICATION

- : Acute toxicity Category 4 (inhalation)
- : Skin corrosion/irritation Category 1
- : Serious eye damage/eye irritation Category 1
- : Carcinogenicity Category 1B
- : Germ cell mutagenicity Category 2
- : Specific target organ toxicity – single exposure Category 1
- : Specific target organ toxicity – repeated exposure Category 1

B.GHS LABEL ELEMENTS, INCLUDING PRECAUTIONARY STATEMENTS

PICTOGRAMS:



SIGNAL WORD : DANGER

HAZARD STATEMENTS

- H314 Causes severe skin burns and eye damage
- H318 Causes serious eye damage
- H332 Harmful if inhaled

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H341 Suspected of causing genetic defects

H350 May cause cancer

H370 Causes damage to organs

H372 Causes damage to organs through prolonged or repeated exposure

PRECAUTIONARY STATEMENTS

PREVENTION

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P250 Do not subject to grinding/shock friction.

P260 Do not breathe dust/fume/gas/mist/vapours/spray

P261 Avoid breathing dust/fume/gas/mist/vapours/spray

P264 Wash ... thoroughly after handling

P270 Do not eat, drink or smoke when using this product

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P281 Use personal protective equipment as required.

RESPONSE

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

P307+P311 IF exposed: Call a POISON CENTER or doctor/physician.

P308+P313 IF exposed or concerned: Get medical advice/attention.

P310 Immediately call a POISON CENTER or doctor/physician.

P312 Call a POISON CENTER or doctor/physician if you feel unwell.

P314 Get medical advice/attention if you feel unwell.

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P321 Specific treatment (see ... on this label).

P363 Wash contaminated clothing before reuse.

P391 Collect spillage.

STORAGE

P405 Store locked up.

DISPOSAL

P501 Dispose of contents/container in accordance with local / regional/national regulations

C.OTHER HAZARDS WHICH DO NOT RESULT IN CLASSIFICATION

(e.g. Dust explosion hazards)

: NFPA/HMIS Rating

Health=3, Flammability=0, Instability=1

(0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme)

3. COMPOSITION & INFORMATION ON INGREDIENTS

CAS #	COMMON NAME	% by Wt	TLV mg/m ³ ACGIH	PEL mg/m ³ OSHA	OTHER in mg/m ³
7439-92-1	Lead	69	0.05	0.05	MSHA - air 0.15 TWA
7664-93-9	About 40% dilute sulfuric acid(H ₂ SO ₄)	21.5	1	1	ACGIH STEL 3
9003-07-0	Polypropylene	7.5	Not Est.	Not Est.	Not Est.
65997-17-3	Separator (Glass Fiber)	2	-	-	-

4. FIRST-AID MEASURES

A. EYE CONTACT : Force eyes open and rinse with clean, cool, running water for 15 minutes. Do not use eye drops or other medication unless advised to do so by a doctor. Seek medical attention immediately after rinsing.

B. SKIN CONTACT : Flush the exposed skin with large amounts of water for 15 minutes.
Remove contaminated clothing. Seek medical attention.

C. INHALATION : Remove from exposure. Seek medical attention.

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D. INGESTION : Give large quantities of water; Do NOT induce vomiting or aspiration into the lungs may occur and can cause permanent injury or death; consult physician.

5. FIRE-FIGHTING MEASURES

A. SUITABLE (AND UNSUITABLE) EXTINGUISHING MEDIA

: Class ABC extinguisher, carbon dioxide, foam, halon, water spray.

B. SPECIFIC HAZARDS ARISING FROM THE CHEMICAL

: Acid mists and vapors, toxic fumes from burning plastic.

Highly flammable hydrogen gas is generated during charging and operation of batteries. If ignited by burning cigarette, naked flame or spark, may cause battery explosion with dispersion of casing fragments and corrosive liquid electrolyte.

C. SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE FIGHTERS

Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing.

Special Fire Fighting Procedures: Cool exterior of battery if exposed to fire to prevent rupture.

Acid mists and vapors in a fire are corrosive. Wear protective clothing and use self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards:

- Hydrogen and oxygen gases are produced during normal battery operation and charging. These gases escape through the battery vents and may form an explosive atmosphere around the battery if

6. ACCIDENTAL RELEASE OF MATERIAL

A. NECESSARY MEASURES AND PROTECTIVE GEAR TO PROTECT HUMANS :

Do not breathe dust/fume/gas/mist/vapours/spray

Wash ... 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.

B. NECESSARY MEASURES TO PROTECT ENVIRONMENT :

Avoid release to the environment

Do not release unneutralized acid.

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C. METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

Small spill: Neutralize the spill with baking soda, household ammonia and/or water. Rinse clean.

Large spill: Remove combustible materials and all sources of ignition. Contain spill by dinking with soda ash (sodium carbonate) or quicklime (calcium oxide). Cover spill with neutralizing agent such as soda ash or quicklime. Mix well. When mixture is neutral collect the residue in a suitable container and dispose of per local, state and federal waste regulations. Wear acid resistant boots, face shield, chemical splash goggles, and acid resistant gloves. Do not release unneutralized acid.

Heated. Combustion can produce carbon dioxide and carbon monoxide. Will release an explosive hydrogen/oxygen gas mixture. Oxides of lead, lead and/or lead compounds may be released. Sulfuric acid may release sulfur dioxide and/or sulfur trioxide.

7. HANDLING AND STORAGE

A. PRECAUTIONS FOR SAFE HANDLING :

Use a battery carrier to lift battery or place hands at opposite corners to avoid spilling acid through the vents. Avoid contact with internal components of batteries. Do not tilt batteries to an angle greater than 45 degrees. Do not smoke when working near a battery.

B. CONDITIONS FOR SAFE STORAGE (INCLUDING ANY INCOMPATIBILITIES)

Avoid direct conductive connection across positive and negative terminals to prevent short circuit. Batteries must be kept in an upright position away from ignition sources. Stack batteries so as to prevent accidental contact between terminal and/or other damage to terminals or containers. Whenever feasible, store on shipping pallet or rack. Do not stack loaded pallets or racks on top of other batteries. Store batteries in cool, well-ventilated location. Keep a supply of neutralizing agent in or near the storage area for emergency use. Avoid storage in areas exposed to heat or solar buildup. When batteries are completely discharged, the electrolyte will freeze when stored below 20°F. Fully charged batteries may be stored at temperatures as low as - 20°F.

8. EXPOSURE CONTROLS

A. OCCUPATIONAL EXPOSURE LIMIT(S), BIOLOGICAL EXPOSURE STANDARD :

Korea Standard - LEAD (TWA 0.05 mg/m³), Sulfuric Acid (TWA 0.2 mg/m³, STEL 0.6 mg/m³)

ACGIH - LEAD (TWA 0.05 mg/m³), Sulfuric Acid (TWA 0.2 mg/m³)

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B. APPROPRIATE ENGINEERING CONTROLS :

Store and handle in well-ventilated area. If mechanical ventilation is used, components must be acid-resistant. Handle batteries cautiously, do not tip to avoid spills. Make certain vent caps are on securely. If battery case is damaged, avoid bodily contact with internal components. Wear protective clothing, eye and face protection, when filling, charging, or handling batteries. Do not allow metallic materials to simultaneously contact both the positive and negative terminals of the batteries. Charge batteries in areas with adequate ventilation. General dilution ventilation is acceptable.

C. INDIVIDUAL PROTECTION MEASURES

Respiratory Protection: Use NIOSH approved respiratory protection when concentrations exceed exposure guidelines.

Eye Protection : Chemical splash goggles or a full-face shield with safety glasses.

Hand protection : If battery case is damaged, use rubber or plastic acid-resistant gloves with elbow-length gauntlet, acid-resistant apron, clothing and boots.

Body protection : Lab apron, acid resistant steel-toed boots and protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

A. APPEARANCE (PHYSICAL STATE, COLOUR etc.) : A manufactured article cased in plastic with a sealed case, terminals and flame arrestor vent caps. Case color varies.

B. ODOR : Product is essentially odorless.

C. ODOR THRESHOLD: Not available.

D. pH : pH < 1 (Sulfuric acid)

E. MELTING POINT/FREEZING POINT : Not available.

F. INITIAL BOILING POINT AND BOILING RANGE : Battery Electrolyte (Acid) - 230 - 233.6 °F (110 - 112 °C), Lead - 3191 °F (1755 °C)

G. FLASH POINT: Non-flammable.

H. EVAPORATION RATE: Not available.

I. FLAMMABILITY (SOLID, GAS):Not applicable.

J. UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS:

Hydrogen Flammability Limit Lower- 4.1 % Flammability Limit Upper – 74.2 %

K. VAPOR PRESSURE : Not available.

L. SOLUBILITY : Soluble in water.

M. VAPOR DENSITY : Not available.

N. SPECIFIC GRAVITY: 1.2~1.35

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O. PARTITION COEFFICIENT OF n-OCTANOL/WATER: Not available.

P. AUTO-IGNITION TEMPERATURE: Not applicable.

Q. DECOMPOSITION TEMPERATURE: Not available.

R. VISCOSITY: Not available.

S. MOLECULAR WEIGHT: Mixture.

10. STABILITY AND REACTIVITY

A. CHEMICAL STABILITY & POSSIBILITY OF HAZARDOUS REACTIONS

: The sealed battery is considered stable at normal temperatures . Hazardous polymerization will not occur.

B. CONDITIONS TO AVOID (STATIC DISCHARGE, SHOCK, VIBRATION etc.):

: Conditions to Avoid: Use only approved charging methods. Avoid overcharging. Avoid short-circuiting. Avoid sparks and other ignition sources. Keep away from oxidizing and reducing materials. Do not open, break or melt the casing.

C. SUBSTANCES TO AVOID : Heat, open flames, sparks, strong oxidizing or reducing agents.

D. HAZARDOUS DECOMPOSITION PRODUCTS

: Can emit highly toxic fumes when heated. Combustion can produce carbon dioxide and carbon monoxide. Will release an explosive hydrogen/oxygen gas mixture. Oxides of lead, lead and/or lead compounds may be released. Sulfuric acid may release sulfur dioxide and/or sulfur trioxide.

11. TOXICOLOGY INFORMATION

A. Information on the likely routes of exposure

Toxicology Data: Wet storage batteries are sealed articles. Exposure to lead, acid and lead contaminated acid is not anticipated during normal storage, handling and intended use or maintenance of the battery. Battery recycling personnel should carefully follow established employer protocols when processing batteries and battery components.

Eye Effects : Sulfuric Acid - Severe eye irritant

Skin Effects : Sulfuric Acid - Extremely irritating, corrosive, and toxic to tissue, resulting in rapid destruction of tissue, causing severe burns. If much skin is involved, exposure is accompanied by shock, collapse and symptoms similar to those seen in severe burns. Repeated contact with dilute solutions can cause dermatitis.

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Ingestion Effects:

Lead - Poison by ingestion in large dosages and with prolonged exposure leading to the same effects as seen in exposure by inhalation. Adults absorb 5-15% of ingested lead and retain less than 5%. Children absorb about 50% and retain about 30%.

Sulfuric Acid - Moderately toxic by ingestion.

Inhalation Effects:

Lead - For industry, inhalation is much more important than is ingestion. Systemic effects include loss of appetite, anemia, malaise, insomnia, headache, irritability, muscle and joint pains, tremors, flaccid paralysis without anesthesia, hallucinations and distorted perceptions, muscle weakness, gastritis and liver changes. Major organ systems affected are the nervous system, blood system and kidneys. Experimental evidence suggests that blood levels of lead below 10 µg/dL can lower the IQ scores of children. Low levels of lead impair neurotransmission and immune system function and may increase systolic blood pressure. Reversible kidney damage can occur from acute exposure. Chronic exposure can lead to irreversible vascular sclerosis, tubular cell atrophy, interstitial fibrosis, and glomerular sclerosis. Very heavy intoxication can sometimes be detected by formation of a dark line on the gum margins.

Sulfuric Acid - Experimental poison by inhalation. Repeated or prolonged inhalation of sulfuric acid mist can cause inflammation of the upper respiratory tract, leading to chronic bronchitis. Severe exposure may cause chemical pneumonitis. Erosion of tooth enamel due to strong acid fume exposure has been observed in industry. Workers exposed to low concentrations of the vapors gradually lose their sensitivity to its irritating action.

Carcinogenicity:

CAS #	Name	OSHA Listed	NTP Listed	IARC
7439-92-1	Lead	Yes	No	2B, Human Limited Evidence
7664-93-9	Sulfuric acid*	Yes	No	1, Human Sufficient Evidence

* Occupational exposures to strong-acid mists containing sulfuric acid have been associated with several respiratory tract cancers. However, there is no animal data supporting the carcinogenicity of sulfuric acid.

Sulfuric acid has been found to be non-mutagenic, and in two studies of workers employed in lead acid battery manufacture, no association between sulfuric acid mist exposure and respiratory tract cancers was observed.

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Mutagenicity:

Lead - Human mutation data reported.

Reproductive Effects:

Lead - Severe toxicity can cause sterility, abortion, and neonatal mortality and morbidity. Experimental teratogen. Experimental reproductive effects. Pathological lesions have been found on male gonads.

Sulfuric Acid - Experimental teratogen.

B. Health Hazard Information

Acute toxicity (possible route of exposure)

Oral : 2140 mg/kg (Sulfuric acid)

Skin : Not available.

Inhalation : 0.347 mg/L(4hr)(rat)

Skin corrosion/irritation : pH < 1 (Sulfuric acid)

Serious eye damage/irritation : Sulfuric Acid(Severe irritation, burns, cornea damage, and blindness).

Sulfuric Acid: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mist containing sulfuric acid" as a Category I carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may result in the generation of sulfuric acid mist.

Lead Compounds: Lead is listed as a Group 2A- carcinogen, likely in animals at extreme doses. Per the guidance found in OSHA 29 CFR 1910.1200 Appendix F, this is approximately equivalent to GHS Category 1A. Proof of carcinogenicity in humans is lacking at present.

IARC Monographs. Overall Evaluation of Carcinogenicity

Lead (CAS 7439-92-1) : 2A Probably carcinogenic to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050) : Not listed.

Reproductive toxicity : May damage fertility or the unborn child.

Specific target organ toxicity - single exposure :No data available.

Specific target organ toxicity -repeated exposure

Lead: May cause damage to organs (blood, central nervous system) through prolonged or repeated exposure.

Aspiration hazard : Not classified.

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12. ECOLOGICAL INFORMATION

A. Aquatic/terrestrial ecology toxicity

Fish : Lead(LC50 2.2 mg/l 96 hr, Sulfuric Acid LC50 16 mg/l 96 hr)

Daphnia : Lead(LC50 2.2 mg/l 96 hr, Sulfuric Acid LC50 200 mg/l 48 hr)

Algae : Not available.

B. Persistence and degradability

Persistence: Lead(Log Kow 2.98, Sulfuric Acid Log Kow 1.43)

Degradability: Not available.

C. Bioaccumulative potential: Not available.

D. Mobility in soil: Not available.

E. Other hazardous effects : Not available.

13. DISPOSAL CONSIDERATIONS

A. DISPOSAL METHODS : Wet storage batteries are recyclable and should be turned over to a licensed battery recycler. Do not incinerate.

B. PRECAUTIONS (INCLUDING DISPOSAL OF CONTAMINATED CONTAINER OR PACKAGE)

Sulfuric acid: Neutralize as for a spill; collect residue and place in suitable container; dispose as hazardous waste in accordance with local, state and federal regulations. Do not flush lead contaminated acid into the sewer.

14. TRANSPORT INFORMATION

A.UN NUMBER : UN 2800

B.UN PROPER SHIPPING NAME : Batteries, Wet, Non-spillable electric storage

C.TRANSPORT HAZARD CLASS(ES): 8

D.PACKING GROUP (IF APPLICABLE):None.

E.MARINE POLLUTANT SUBSTANCES (APPLICABLE/NOT APPLICABLE): Not Applicable.

F.SPECIAL PRECAUTIONS FOR USER:Not available.

AGM batteries are non-spillable batteries (special provision 238)and are exempted from all ADR/RID provisions if they are protected from short circuit

AGM batteries are non-spillable batteries (special provision A67)and are exempted from all IATA DGR Code if they are protected from short circuit

AGM batteries are non-spillable batteries (special provision 238)and are exempted from all IMDG Code if they are protected from short circuit

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Notice:

Special provision 238 ADR/RID/IMDG Code:

a.) Batteries can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential test given below, without leakage of battery fluid

Vibration test: The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0.8 mm (1.6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz and 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

Pressure differential test: Following the vibration test, the battery is stored for six hours at $24^{\circ}\text{C} \pm 4^{\circ}\text{C}$ while subjected to a pressure differential of at least 88 kPa. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

NOTE: Non-spillable type batteries which are an integral part of and necessary for the operation of mechanical or electronic equipment, shall be securely fastened in the battery holder on the equipment and protected in such a manner as to prevent damage and short circuits.

b.) Non-spillable batteries are not subject to the requirements of ADR if, at a temperature of 55°C , the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow and if, as packaged for carriage, the terminals are protected from short circuit.

A67 IATA DGR:

A67 Non-spillable batteries meeting the requirements of Packing instruction 872 are not subject to these Regulations if, at a temperature of 55°C (131°F), the electrolyte will not flow from a ruptured or cracked case. The battery must not contain any free or unabsorbed liquid. Any electrical battery or battery powered device, equipment or vehicle having the potential of dangerous evolution of heat must be prepared for transport so as to prevent:

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a) A short circuit (e.g. in the case of batteries, by the effective insulation of exposed terminals; or in the case of equipment, by disconnection of the battery and protection of exposed terminals); and

b) Unintentional activation

The words “Not Restricted” and the Special Provision number must be included in the description

15. REGULATORY INFORMATION

TSCA Inventory Status: All ingredients are listed on the EPA TSCA Inventory

EPA Hazard Categories:

Immediate (acute) health hazard: Yes

Delayed (chronic) health hazard: Yes

Fire hazard: No

Sudden release of pressure hazard: No

Reactive hazard: No

SARA 311/312: Extremely Hazardous Substances

CAS #	Name	RQ	TPQ
7664-93-9	Sulfuric acid	1000 lbs	1000 lbs

CERCLA Section 103: Hazardous Substances List

CAS #	Name	Percent	RQ
7439-92-1	Lead	50~60%	10 lbs
7664-93-9	Sulfuric acid	12~18%	1000 lbs

Great Lakes Persistent Toxics - Metals:

CAS #	Name	Percent
7439-92-1	Lead	50~60%

Volatile Organic Compound (VOC): Not applicable

WHMIS: Controlled as a manufactured article

Canadian Environmental Protection Act (CEPA):

CAS #	Name	Schedule
7439-92-1	Lead	I and III part II

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California Proposition 65 - Reproductive Toxicants

CAS #	Name	Percent
7439-92-1	Lead	50~60%

Proposition 65 Warning:

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

New Jersey Right-to-Know Hazardous Substances

CAS #	Name	Percent
7439-92-1	Lead	50~60%
7664-93-9	Sulfuric acid	12~18%

Massachusetts Substance List

CAS #	Name	Percent
7439-92-1	Lead	50~60%
7664-93-9	Sulfuric acid	12~18%

Pennsylvania Hazardous Substances

CAS #	Name	Percent
7439-92-1	Lead	50~60%
7664-93-9	Sulfuric acid	12~18%

Ontario Designated Substance

CAS #	Name	Percent
7439-92-1	Lead	50~60%

EINECS/EU: Listed (EINECS No. 231-100-4(LEAD),231-639-5(Sulfuric ACID))

ENCS/JAPAN: Listed

AICS/AUSTRALIA: Listed

DSL/CANADA: Listed

IECSC/CHINA: Listed

PICCS/PHILIPPINES: Listed

KECI/S.KOREA: Listed (KE-21887(LEAD) , KE-32570(Sulfuric acid))

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16. OTHER INFORMATION

Label Information:

DANGER! Explosive Gases: Always shield eyes and face from battery. Cigarettes, flames, sparks could cause battery to explode. Do not charge or use booster cables or adjust post connections without proper instruction and training.

POISON! Causes severe burns: Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately. Do not tip. Keep out of reach of children.

SOURCE OF DATA :

Guideline for Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

EC-ECB, International uniform Chemical information Database (IUCLID)

NITE Chemical Risk Information Platform (CHRIP)

Hazardous Substance Data Bank (HSDB)

International Chemical Safety Cards (ICSC)

Chemical Hazards Response Information System (CHRIS)

Chemical Information Supporting System

Registry of Toxic Effects of Chemical Substances (RTECS)

NFPA 704 Standard System for the identification of the hazards of materials for Emergency Response

THE DATE OF PREPARATION OF THE MSDS : 28 June 2002

THE NUMBER OF TIMES REVISED : 11

THE DATE OF PREPARATION OF THE LATEST REVISION : 01 October 2025

End of MSDS