TECHNICAL BULLETIN

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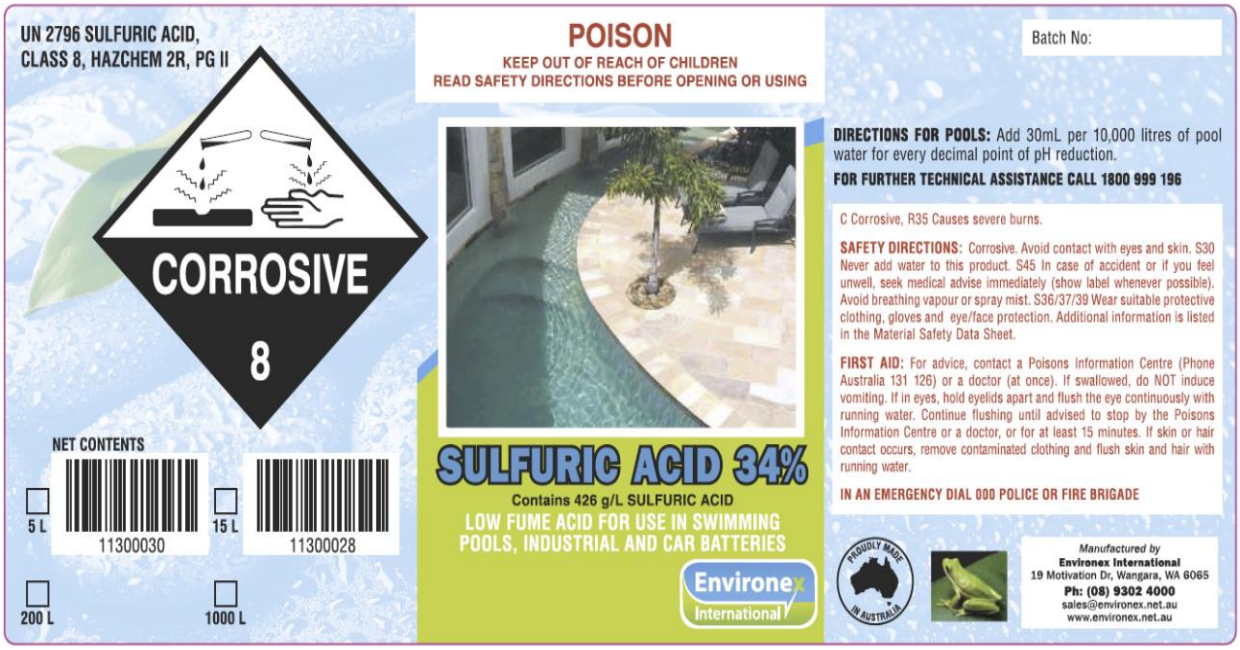
T +61 8 9302 4000 **| FREE** 1800 999 196 **| F** +61 8 9302 5000

SULFURIC ACID



MATERIAL & FUNCTION

General:

SULFURIC ACID (H_2SO_4) (also spelled **SULPHURIC ACID**) is a strong mineral acid used in many industrial processes as well as batteries. It is one of the largest inorganic industrial chemicals produced by tonnage. The quantity of **SULFURIC ACID** produced has been used as an indicator of a country's industrial status.

USES:

SULFURIC ACID is one of the most important industrial chemicals. More of it is made each year than is made of any other manufactured chemical. It has widely varied uses and plays some part in the production of nearly all manufactured goods. The major use of **SULFURIC ACID** is in the production of fertilizers, e.g., superphosphate of lime and ammonium sulfate. **SULFURIC ACID** is a strong acid used as an intermediate in the synthesis of linear alkylbenzene sulfonate surfactants used in dyes, in

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petroleum refining, for the nitration of explosives, in the manufacture of nitrocellulose, in caprolactam manufacturing, as the electrolyte in lead-acid batteries, and as a drying agent for chlorine and nitric acid

It is used in petroleum refining to wash impurities out of gasoline and other refinery products. **SULFURIC ACID** is used in processing metals, e.g., in pickling (cleaning) iron and steel before plating them with tin or zinc. Rayon is made with **SULFURIC ACID**. It serves as the electrolyte in the lead-acid storage battery commonly used in motor vehicles (acid for this use, containing about 33% H_2SO_4 and with specific gravity about 1.25, is often called battery acid).
Properties:
SULFURIC ACID is a clear liquid which weighs about 1.8 times as much as water. It reacts violently with water, bases and some organic materials but is normally stable. Its properties are strongly dependent on temperature and concentration.
At a common industrial strength of 95%, it freezes at 10ºC. It is soluble in water from 0% to over 100%.
Description: Colorless liquid
Molecular formula: H_2SO_4
Molecular weight: 98.1 g/mol
Density: 1.84 g/cm^3 at 15°C
Boiling point: 330 at 0.5°C (100%)
Melting point: 10.36°C (100%)
Vapour pressure: <0.001 torr at 25°C; 1 torr at 145.8°C
Solubility: Soluble in water

When heated, the pure 100% acid loses sulfur trioxide gas, SO_3, until a constant-boiling solution, or azeotrope, containing about 98.5% H_2SO_4 is formed at 337°C. Concentrated **SULFURIC ACID** is a weak acid and a poor electrolyte because relatively little of it is dissociated into ions at room temperature. When cold it does not react readily with such common metals as iron or copper. When hot it is an oxidizing agent, the sulfur in it being reduced; sulfur dioxide gas may be released. Hot concentrated **SULFURIC ACID** reacts with most metals and with several nonmetals, e.g. sulfur and carbon. Because the concentrated acid has a fairly high boiling point, it can be used to release more volatile acids from their salts, e.g. when sodium chloride (NaCl), or common salt, is heated with concentrated **SULFURIC ACID**, hydrogen chloride gas, HCl, is evolved.
Concentrated **SULFURIC ACID** has a very strong affinity for water. It is sometimes used as a drying agent and can be used to dehydrate (chemically remove water from) many compounds, e.g., carbohydrates. It reacts with the sugar sucrose, $C_{12}H_{22}O_{11}$, removing eleven molecules of water, H_2O, from each molecule of sucrose and leaving a brittle spongy black mass of carbon and diluted **SULFURIC ACID**. The acid reacts similarly with skin, cellulose, and other plant and animal matter. When the concentrated acid mixes with water, large amounts of heat are released; enough heat can

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be released at once to boil the water and spatter the acid. To dilute the acid, the acid should be added slowly to cold water with constant stirring to limit the buildup of heat. **SULFURIC ACID** reacts with water to form hydrates with distinct properties.
Dilute **SULFURIC ACID** is a strong acid and a good electrolyte; it is highly ionized, much of the heat released in dilution coming from hydration of the hydrogen ions. The dilute acid has most of the properties of common strong acids. It turns blue litmus red. It reacts with many metals (e.g. with zinc), releasing hydrogen gas, H_2, and forming the sulfate of the metal. It reacts with most hydroxides and oxides, with some carbonates and sulfides and with some salts. Since it is dibasic (i.e. it has two replaceable hydrogen atoms in each molecule), it forms both normal sulfates (with both hydrogens replaced, e.g., sodium sulfate, Na_2SO_4) and acid sulfates, also called bisulfates or hydrogen sulfates (with only one hydrogen replaced, e.g., sodium bisulfate, $NaHSO_4$).
Hazards
Concentrated **SULFURIC ACID** reacts strongly with water. Mixing water and acid will generate tremendous heat and can result in explosions if the water gets trapped. If water and acid are improperly mixed, then it can generate enough heat to melt plastics or shatter glass containers from thermal shock. The heat can cause the water to boil and generate high pressures. It will absorb water from air and organic materials. It can char wood, dry air to almost zero humidity and destroy flesh. Depending on concentration and temperature, it can be extremely corrosive to metals.
Environmental
SO_2, SO_3, and **SULFURIC ACID** are all harmful to the environment. While all occur naturally, particularly in volcanoes and geothermal vents, they harm plants and animals. Older plants were severe polluters but tightening environmental regulations and technological improvements now result in over 99.7% of the SO_2 produced being recovered as product (at least in developed countries). Newer technologies now appearing in the marketplace are resulting in even greater reductions. Users of **SULFURIC ACID** generally either neutralize it or return it for recycling. If disposed of untreated, it is a hazardous waste and requires special (and expensive) handling.

DIRECTION FOR USE

Never add water to SULFURIC ACID. Always add SULFURIC ACID to water.

CAUTION

Avoid contact with skin and eyes and avoid breathing vapour or spray mist.

Consult the msds specific for the grade of SULFURIC ACID you intend to use.

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PACKAGING

ENVIRONEX International routinely supply

98% Technical Grade **SULFURIC ACID**

78% AR Grade **SULFURIC ACID**

70% Technical Grade **SULFURIC ACID**

60% Technical Grade **SULFURIC ACID**

50% Technical Grade **SULFURIC ACID**

48% Technical Grade **SULFURIC ACID**

34% Technical Grade **SULFURIC ACID**

Other strengths and AR Grades may be supplied on request

5 Litre, 15 Litre, 200 Litre and 1000 Litre containers

IMPORTANT NOTICE TO CUSTOMER

Since the use of this product is beyond the control of either seller or manufacturer, their only obligation shall be to replace any quantity of product which is proven defective. They cannot assume any risk or liability in excess of the purchase price of the product itself, which does not include labour or any consequential damages resulting from the use of this product. Determining the suitability of this product for any intended use shall be solely the responsibility of the user. **ALWAYS TEST FIRST.**