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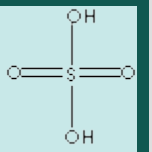
SULFURIC ACID

PRODUCT IDENTIFICATION	
CAS NO.	7664-93-9
EINECS NO.	231-639-5
FORMULA	H_2SO_4
MOL WT.	98.08
H.S. CODE	2807.00
TOXICITY	Oral rat LD50: 2140 mg/kg
SYNONYMS	Oil Of Vitriol; Babcock Acid; Sulphuric Acid; Battery Acid



Acide Sulfurique (French); Acido Solforico (Italian); Acido Sulfurico (Spanish); Dihydrogen Sulfate; Dipping Acid; Electrolyte Acid; Hydrogen Sulfate; Mattling Acid; Schwefelsaeureloesungen; Spirit Of Sulfur; Zwavelzuuroplossingen

RAW MATERIALS CLASSIFICATION	

PHYSICAL AND CHEMICAL PROPERTIES	
PHYSICAL STATE	Colorless (pure) to dark brown, oily, dense liquid with acrid odor.
MELTING POINT	3 C (100%), -32 C (93%), -38 C (78%), -64 C (65%)
BOILING POINT	ca. 290C (decomposes at 340 C)
SPECIFIC GRAVITY	1.84
SOLUBILITY IN WATER	Miscible, liberates much heat
pH	1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1
VAPOR DENSITY	3.4
REFRACTIVE INDEX	
NFPA RATINGS	Health: 3 Flammability: 0 Reactivity: 2 Other: Water reactive
AUTOIGNITION	
FLASH POINT	
STABILITY	Stable under ordinary conditions

APPLICATIONS

It is used in fertilizers, chemicals, dyes, petroleum refining, etching and in making iron, steel and industrial explosives.

SALES SPECIFICATION

70% , 93%, 96%, 98% SULFURIC ACID	
H2SO4	70.0±1 % or 93.0 % min or 96.0±1 % or 98.0% min
FREE SO2	0.01% max
Fe	0.01% max
OLEUM	
FREE SO3	25%
ASH	0.05% max
Fe	0.03% max
LIQUID SO3	
SO3 (DRY BASIS)	99.9% min
MOISTURE	0.01% max
ASH	0.05% max
Fe	0.03% max
SULFURIC ACID MONOHYDRATE	
CONTENT	99-101 wt.%
TRANSPORTATION	
PACKING	
HAZARD CLASS	8
UN NO.	1830, UN 1831 (fuming), UN 1832 (spent)

GENERAL DESCRIPTION OF SULFURIC ACID & ITS SALTS

Sulfuric acid , also spelled Sulphuric acid, sometimes called Oil Of Vitriol, or Hydrogen Sulfate battery acid, is a dense, colourless, oily, corrosive liquid; more sulfuric acid is produced than any other chemical. It has widely varied uses and plays some part in the production of nearly all manufactured goods.

Pure sulfuric acid with a specific gravity of 1.85. freezes at 10.37° C , boils at 340° C and is soluble in all proportions in water. When heated, the pure acid partially decomposes into water and sulfur trioxide. Sulfuric acid is a very strong acid in aqueous solution; it is largely changed to hydrogen ions (H^+) and sulfate ions (SO_4^{2-}). Each molecule gives two H^+ ions, thus sulfuric acid is dibasic, which 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, $NaHSO_4$).

Dilute solutions of sulfuric acid show all the behavior characteristics of acids. It turns blue litmus red. It conducts electricity, neutralizes alkalies, corrodes active many metals, releasing hydrogen gas, and forming the sulfates. It reacts with most hydroxides and oxides, with some carbonates and sulfides, and with some salts.

Concentrated sulfuric acid, formerly called oil of vitriol, is a weak acid and a poor electrolyte because relatively little of it is dissociated into ions. When concentrated sulfuric acid is heated, it behaves also as an oxidizing agent dissolving relatively unreactive metals as copper, mercury, and lead to produce metal sulfate, sulfur dioxide, and water. Because the concentrated acid has a fairly high boiling point, it can be used to release more volatile acids from their salts, or common salts, when are heated with concentrated sulfuric acid, HCl gas is evolved. As concentrated sulfuric acid has a very strong affinity for water, it is a valuable desiccating agent, is used as a drying agent and can be used to dehydrate many compounds. It removes water from, and therefore chars, wood, cotton, sugar, and paper. It is used in the manufacture of ether, nitroglycerin, and dyes for its property as a desiccant. Sulfur trioxide dissolves readily in concentrated sulfuric acid to form pyrosulfuric acid, $H_2S_2O_7$, which is also called fuming sulfuric acid or oleum.

Sulfuric acid is prepared industrially by the reaction of water with sulfur trioxide, which in turn is

made by chemical combination of sulfur dioxide and oxygen either by the contact process or the chamber process. The lead chamber process is used to produce much of the acid used to make fertilizers. It produces a relatively dilute acid (62% - 78%). The contact process produces a more concentrated acid but requires purer raw materials and the use of expensive catalysts. Some sulfuric acid is also made from ferrous sulfate waste solutions from pickling iron and steel and from waste acid sludge from oil refineries.

The uses of sulfuric acid are so varied that the volume of its production provides an approximate index of general industrial activity. Its main use is in phosphate fertilizer production, both superphosphate of lime and ammonium sulfate. It is widely also used to manufacture chemicals, e.g., in making hydrochloric acid, nitric acid, sulfate salts, synthetic detergents, dyes and pigments, explosives, drugs, other acids, parchment paper, glue and wood preservatives. It is used in the purification of petroleum to wash impurities out of gasoline and other refinery products.Sulfuric acid is used in processing metals, e.g., in pickling (cleaning) of metal, electroplating baths, nonferrous metallurgy. Rayon is made with sulfuric acid. In one of its most familiar applications, 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).

Any of numerous chemical compounds related to sulfuric acid, formed by replacing one or both of the hydrogens with a metal or a radical are called sulfates (also spelled sulphates). Sulfates are salts or esters of sulfuric acid. One group of these derivatives is composed of salts containing the sulfate ion, and positively charged ions such as those of sodium, magnesium, or ammonium; a second group is composed of esters, in which the hydrogen atoms of sulfuric acid have been replaced by carbon-containing combining groups such as methyl (CH_3) or ethyl (C_2H_5). Most metal sulfates are readily soluble in water, but calcium and mercuric sulfates are only slightly soluble, while barium, lead, strontium, and mercurous sulfates are insoluble. In chemical analysis, the sulfate ion, SO_4^{2-}, is usually detected by adding barium chloride solution; the white barium sulfate precipitate that forms is insoluble in hydrochloric acid. Sulfates are widely distributed in nature. Barium sulfate occurs as barite; calcium sulfate is found as gypsum, alabaster, and selenite; Epsom salts is magnesium sulfate; sodium sulfate occurs as its decahydrate, Glauber salt; and strontium sulfate occurs as celestite. Some sulfates were formerly known as vitriols; blue vitriol is cupric sulfate, green vitriol is ferrous sulfate, and white vitriol is zinc sulfate. Alums are solid sulfates, containing two different metals and two sulfate radicals. Organic sulfates are esters. They can be formed by reacting an alcohol with cold sulfuric acid. They are also formed by the reaction of sulfuric acid with a solid bond in an alkene; the product is called an alkyl hydrogen sulfate. An alkyl hydrogen sulfate can be broken down to an alcohol and sulfuric acid by heating it with water (hydrolysis); this reaction is often used to synthesize alcohols.