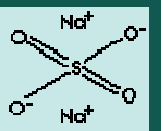
SODIUM SULPHATE



PRODUCT IDENTIFICATION

CAS NO.	7757-82-6 (Anhydrous) 7727-73-3 (Decahydrate)
EINECS NO.	231-820-9
FORMULA	Na_2SO_4
MOL WT.	142.04
H.S. CODE	2833.11.5010
TOXICITY	
SYNONYMS	Disodium monosulfate; Sulfuric acid sodium salt; Disodium sulfate; Sodium sulfate; Sulfuric acid sodium salt; Sulfuric acid disodium salt; Sulfuric acid disodium salt; Salt cake; Bisodium sulfate; Sodium sulfate (2:1); Thenardite; Natriumsulfat; Trona; Dibasic sodium sulfate; Other RN: 1337-28-6
SMILES	S(=O)(=O)([O-])[O-].[Na+].[Na+]
CLASSIFICATION	
EXTRA NOTES	

PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Hygroscopic white powder, Odorless
MELTING POINT	880 - 888 C
BOILING POINT	1100 C (Decomposes)
SPECIFIC GRAVITY	2.66 - 2.75
SOLUBILITY IN WATER	Soluble
pH	Aqueous solution is neutral
VAPOR DENSITY	
AUTOIGNITION	
NFPA RATINGS	Health: 1; Flammability: 0; Reactivity: 0
REFRACTIVE INDEX	
FLASH POINT	
STABILITY	Stable under ordinary conditions

EXTERNAL LINKS & GENERAL DESCRIPTION

Uses: In 1995, bulk sodium sulfate sold for around $70 per tonne in the US, making it a very cheap material. Probably the largest use for sodium sulfate today is as a filler in powdered home laundry detergents. Total consumption of Na2SO4 in Europe was around 1.6 million tons in 2001, of which 80% was used for detergents. However this use is waning, as domestic consumers switch to liquid detergents which do not include sodium sulfate. Another major use for Na2SO4, particularly in the US, is in the Kraft process for the manufacture of wood pulp. Organics present in the "black liquor" from this process are burnt to produce heat, needed to drive the reduction of sodium sulfate to sodium sulfide. However this process is being replaced to some extent by newer processes; use of Na2SO4 in the US pulp industry declined from 980 000 tons in 1970 to only 210 000 tons in 1990. The glass industry also provides another significant application for sodium sulfate, consuming around 30 000 tons in the US in 1990 (4% of total US consumption). It is used as a "fining agent", to help remove small air bubbles from molten glass. It also fluxes the glass, and prevents scum formation of the glass melt during refining. Sodium sulfate is important in the manufacture of textiles, particularly in Japan. It helps in "levelling", reducing negative charges on fibres so that dyes can penetrate evenly. Unlike the alternative sodium chloride, it does not corrode the stainless steel vessels used in dyeing. Glauber's salt, the decahydrate, was formerly used as a laxative. It has also been proposed for heat storage in passive solar heating systems. This takes advantage of the unusual solubility properties

(see above), and the high heat of crystallisation (78.2 kJ/mol). Other uses for sodium sulfate include frosting windows, in carpet fresheners, starch manufacture and as an additive to cattle feed. In the laboratory, anhydrous sodium sulfate is widely used as an inert drying agent for organic solutions; Na2SO4 is added to the solution until the crystals no longer clump together.

Sodium sulfate (Na2SO4) is one of the most important minerals in the chemicals industry. Natural sodium deposits are formed by a long geologic process of the erosion of igneous rocks, the transportation of sodium from these rocks and chemical reactions. First, the sodium is released from igneous rocks when they weather and break down. In the right situation, the sodium is carried by water in rivers, streams and as runoff and collects in basins. Then, when it comes in contact with sulfur, it precipitates out as sodium sulfate. The sulfur can come from the weathering of the mineral pyrite (iron sulfide), from volcanic sources, or from gypsum beds (gypsum is calcium sulfate). The mineral thenardite is natural sodium sulfate. Thenardite was named after the French chemist Louis J. Thenard. It is soluble in water and has a salty taste like the mineral halite.

Sodium sulfate is a white, orthorhombic crystalline solid at room temperatures (a monoclinic structure at > 100 C, a hexagonal structure at > 250C). It is reduced to sodium sulfide at high temperature. But sodium sulfate is a stable compound which does not decompose and does not react with oxidising or reducing agents at normal temperatures. It is neutral (pH of 7) in water. Sodium sulfate is most soluble in water at 32.4 C (49.7g/100 g). Commercial major source of sodium sulfate is salt cake (impure sodium sulfate), a by-product of hydrochloric acid production from sodium chloride by treatment with sulfuric acid. Sodium sulfate is obtained also as a byproduct of rayon production and sodium dichromate production. The decahydrate is known as Glauber's salt. About half of the world's production is from the natural mineral form of the decahydrate (mirabilite). Anhydrous sodium sulfate is found in nature as the mineral thenardite (Na_2SO_4). Other sodium sulfate minerals are metasideronatrite $Na_4Fe_2(SO_4)_4(OH)_2 13H_2O$, krohnkite$Na_2Cu(SO_4)_2 12H_2O$, and schairerite $Na_3(SO_4)(F,Cl)$. Sodium sulfate is consumed in four major categories; powder detergents as a processing aid and as a filler, wood pulp processing for making kraft paper, textile dyeing processes as a levelling agent to penetrate evenly, and molten glass process to remove small air bubbles. Sodium sulfate is employed also as a raw material for the production of various chemicals.

SALES SPECIFICATION	
APPEARANCE	white powder
Na_2SO_4	99.0% min
WATER INSOLUBLES	0.05% max
Mg	0.15% max
Cl	0.35% max
Fe	0.002% max
pH	Neutral to slightly alkaline
MOISTURE	0.2% max
WHITENESS	80% min
PARTICLE SIZE	50% (100 mesh)
TRANSPORTATION	
PACKING	25kgs, 50kgs, 1mt in Bag
HAZARD CLASS	Not regulated
UN NO.	

OTHER INFORMATION

Sulfate (also spelled sulphate in Europe) is any chemical compound containing the SO_4^{2-} ion related to sulfuric acid (H_2SO_4). Sulfates are salts or esters of sulfuric acid, formed by replacing one or both of the hydrogens with a metal or a radical as in sodium sulfate, Na_2SO_4. Sulfates in which both hydrogens are replaced are called normal sulfates. Bisulfate is a compound that has the HSO_4^-

radical. Bisulfate (called also hydrogen sulfate or acid sulfate) is a compound formed by replacing only one hydrogen in sulfuric acid. Sulfite (also sulphite) is a compound that contain the sulfite ion SO_3^{2-}. Sulfites are salts or esters of sulfurous acid (H_2SO_3), formed by replacing one or both of the hydrogens with a metal or a radical as in sodium sulfite, Na_2SO_3. Sulfites in which both hydrogens are replaced are called normal sulfites. Bisulfite is a compound that has the HSO_3^- radical. Bisulfate (called also hydrogen sulfite or acid sulfite) is a compound formed by replacing only one hydrogen in sulfurous acid. The term of 'meta' or 'pyro' is the chemical prefix for oxo acid formed through the loss of one water molecule (dehydration) from two molecules of ortho acid by heating. Pyrosulfuric acid is an example ($2H_2SO_4 - H_2O = H_2S_2O_7$). Ortho acid is the compound fully hydrated acid or its salts. Orthophosphoric acid is an example ($2 \cdot H_3PO_4 = P_2O_5 \cdot 3H_2O$), in contrast to the less hydrated form, pyrophosphoric acid ($2 \cdot HPO_3 = P_2O_5 \cdot H_2O$). $Na_2O_5S_2$ is called sodium metabisulfite ($2 \cdot HNaO_3S - H_2O$). Sulfide is a compound having one or more sulfur atoms in which the sulfur is connected directly to a carbon, metal, or other nonoxygen atom; for example sodium sulfide, Na_2S. Sulfide ion is S^{2-} with oxidation number -2. Bisulfide ion is an anion formed by two sulfur atoms having an overall -2 charge, $(S_2)^{2-}$. Sulfamate is a salt of sulfamic acid (HSO_3NH_2). Calcium sulfamate $Ca(SO_3NH_2)_2$ is an example.