

SULFURIC ACID

207E0KIC ACID

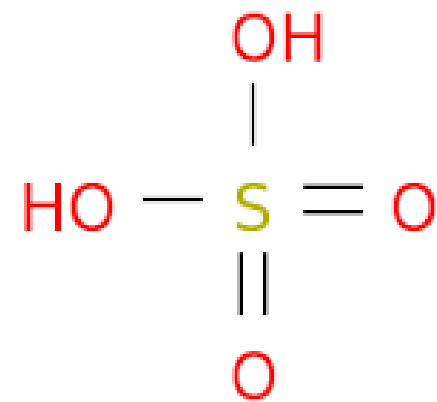
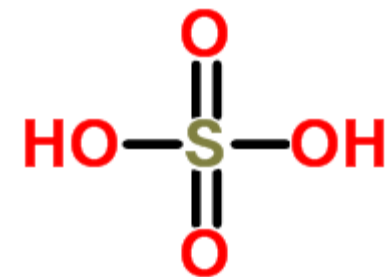


SULFURIC ACID

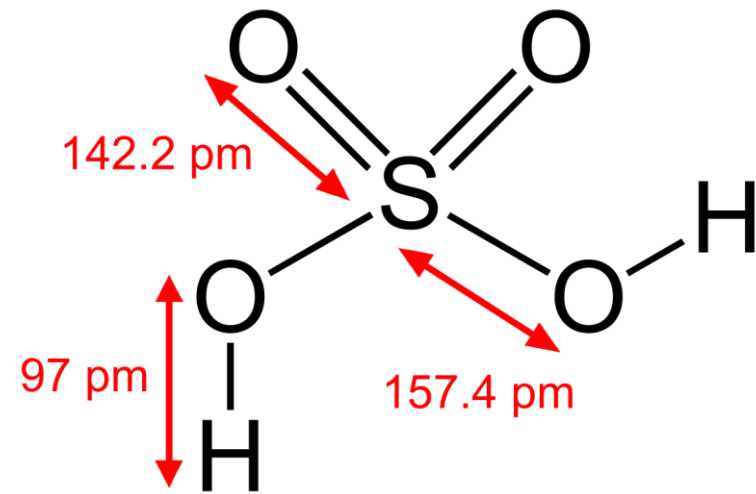
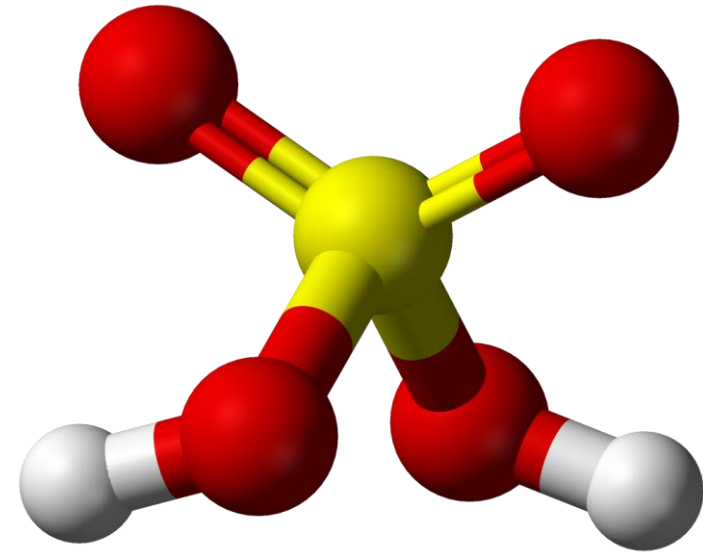
- ▶ Sulfuric acid has a yellow oily liquid
- ▶ It is soluble in water with release of heat
- ▶ It is corrosive to metals
- ▶ It is used to make fertilizers
- ▶ Sulfuric acid is a very strong acid
- ▶ Its chemical formula is H₂SO₄
- ▶ Its average mass is 98.078 amu




Sulfuric Acid 2D Structure



Sulfuric Acid 3D Structure



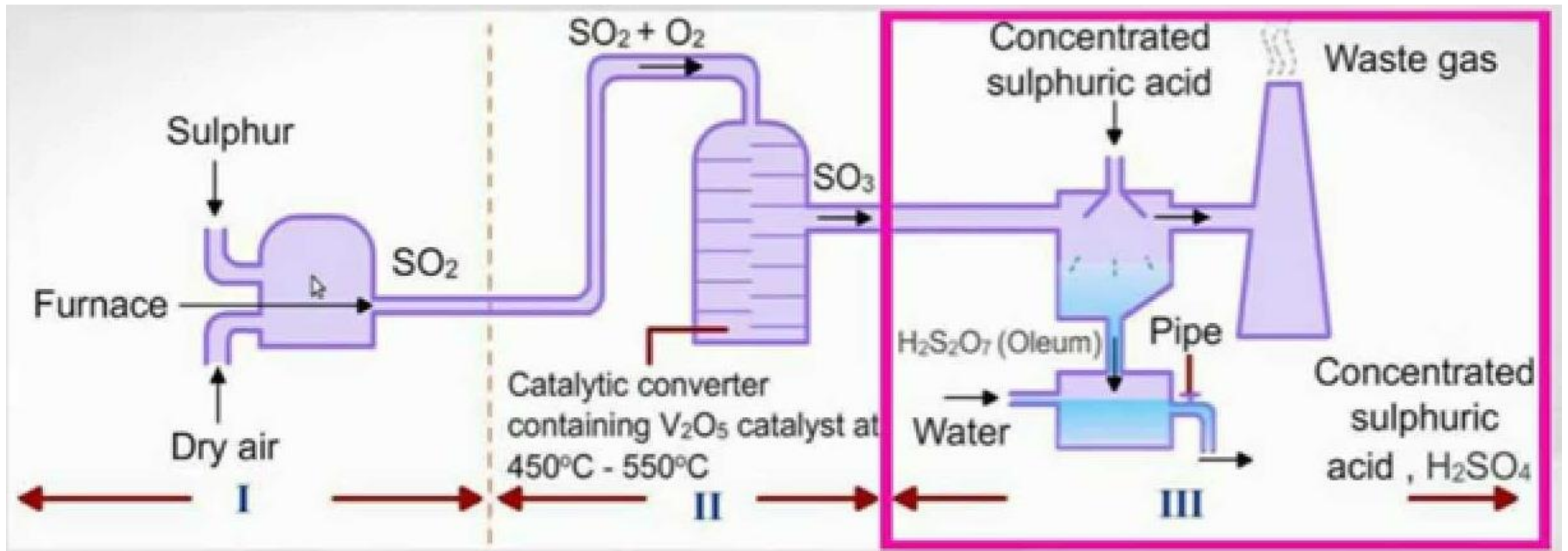


MANUFACTURING PROCESS OF SULFURIC ACID

MANUFACTURING PROCESS TYPES

- ▶ There are Two Types of MANUFACTURING Processes
- ▶ 1) Contact Process
- ▶ 2) Lead Chamber Process

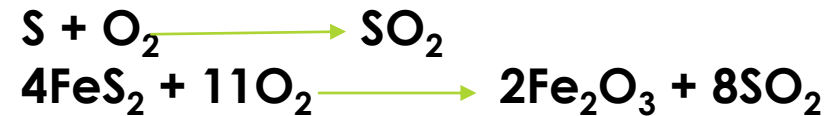
MANUFACTURING CHART



DETAILS OF CONTACT PROCESS

1) PREPARATION OF SO₂.

SO₂ is obtained by burning sulphur or by heating iron pyrite (FeS₂) in pyrite burner.



2) PURIFICATION OF SO₂.

DUST CHAMBER:

SO₂ is first passed through the dust chamber where steam is spread over the gas to remove dust particles, which settle down. Fe(OH)₃ also sprayed over to remove oxides of Arsenic.

WASHING TOWER:

SO₂ is then passed through a washing tower after cooling. Here it is sprayed by water to remove any other soluble impurities.

DRYING TOWER:

The gas is now dried by passing through drying tower where conc. H₂SO₄ (dehydrating agent) is sprayed. H₂SO₄ removes moisture from SO₂

DETAILS OF CONTACT PROCESS

3) OXIDATION OF SO₂ TO SO₃

CONTACT TOWER:

Oxidation of SO₂ is carried out in contact tower where V₂O₅ is filled in different pipes. SO₂ here reacts with air (O₂) to produce SO₃. Under above conditions 98% SO₂ is converted into SO₃.



CONDITIONS NECESSARY FOR MAXIMUM YIELD OF SO₃:

Oxidation of SO₂ is a reversible and exothermic process in which volume of product is less than the volumes of reactants. In order to obtain maximum amount of SO₃,

4) ABSORPTION OF SO₃ IN H₂SO₄

SO₃ is not directly passed in water, because a dense fog of minute particles of H₂SO₄ is produced. It is therefore, dissolved in conc. H₂SO₄ to form pyrosulphuric acid (oleum).



5) DILUTION OF OLEUM

Oleum is now diluted with water to form H₂SO₄ of required concentration.



PHYSICAL PROPERTIES OF SUPHURIC ACID

PHYSICAL PROPERTIES

- ▶ Its specific gravity is 1.834
- ▶ Its freezing point is 10.5`C
- ▶ It is very corrosive to skin and burns the animal tissues

PHYSICAL PROPERTIES OF SUPHURIC ACID

PHYSICAL PROPERTIES

- ▶ Its boiling point is 315 – 338 °C
- ▶ Its melting point is 10.35 °C
- ▶ Its heat capacity is 1.414 J/Kg

CHEMICAL PROPERTIES OF SUPHURIC ACID

REACTION WITH METALS

If sulfuric acid is react with metals then it produces hydrogen gas.



CHEMICAL PROPERTIES OF SUPHURIC ACID

REACTION WITH GASES

▶ Gases such as NH_3 and SO_3 react with H_2SO_4 to give additional products



CHEMICAL PROPERTIES OF SUPHURIC ACID

H_2SO_4 As an Oxidizing Agent

- ▶ H_2SO_4 is a strong Oxidizing Agent



USES OF SULFURIC ACID

USES

- ▶ By far the largest amount of sulfuric acid is used to make phosphoric acid, used, in turn, to make the phosphate fertilizers, calcium dihydrogen phosphate and the ammonium phosphates. It is also used to make ammonium sulfate, which is a particularly important fertilizer
- ▶ Sulfuric Acid is used as a laboratory reagent

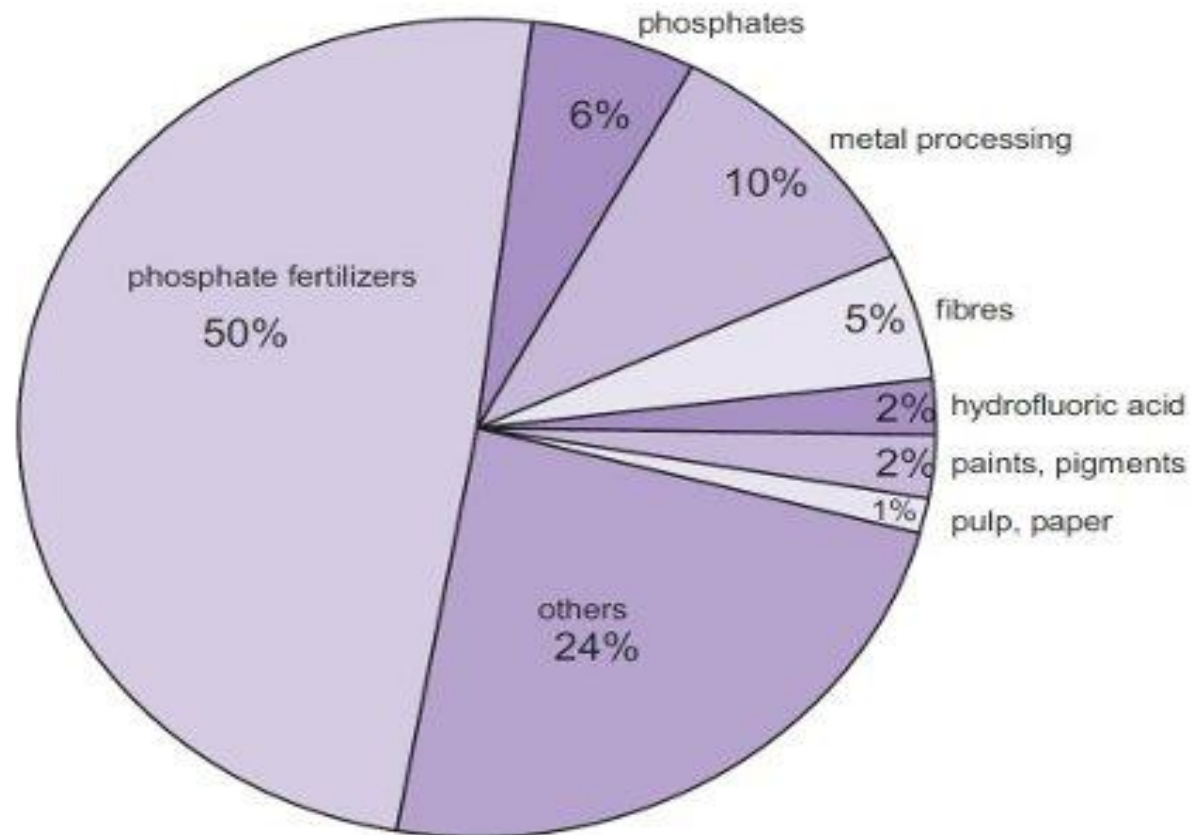
USES OF SULFURIC ACID

USES

- ▶ It is used as an oxidizing agent
- ▶ It is used in refining of petroleum
- ▶ It is Used in manufacturing of many chemicals, dyes , drugs, paints etc
- ▶ It is Used in prepration of explosives
- ▶ It is used in manufacturing of Fertilizers

USES OF SULFURIC ACID

CHART



ANNUAL PRODUCTION OF SULFURIC ACID



World	231 million tones
China	74 million tones
U.S.	37 million tones
India	16 million tones
Russia	14 million tones
Morocco	7 million tones

List of industries producing sulfuric acid

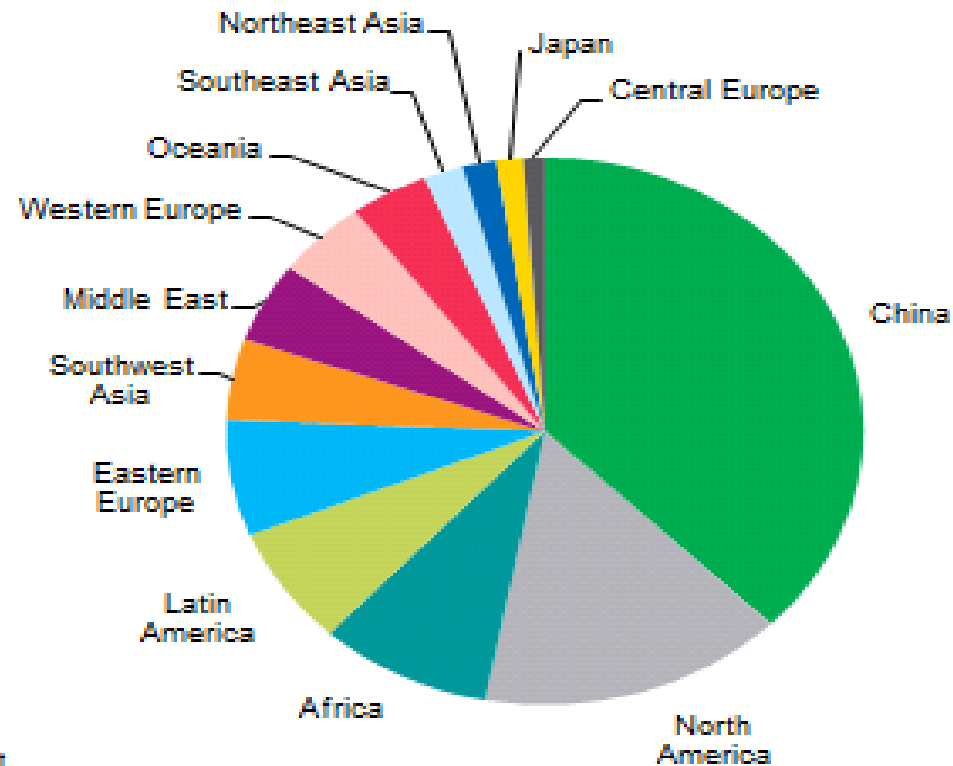
- ▶ **Exide Pakistan**
- ▶ **Tufail Chemicals**
- ▶ **Siraj chemicals**
- ▶ **Itehad Chemicals**
- ▶ **Internation Chemicals**
- ▶ **Hazara fertilizers**
- ▶ **Amber Chemicals**
- ▶ **Akbari Chemicals**

MANUFACTURING OF SULFURIC ACID IN PAKISTAN

- ▶ Following are the industries that produces sulfuric acid in Pakistan
- ▶ **Exide Pakistan** **16500 MTPA**
- ▶ **Tufail Chemicals** **20000 TPA**
- ▶ **Siraj chemicals** **75000 STPA**
- ▶ **Itehad Chemicals** **33000 MTPA**
- ▶ **Internation Chemicals** **300 MTPD**
- ▶ **Hazara fertilizers** **110 MTPD**
- ▶ **Amber Chemicals** **50 MTPD**
- ▶ **Akbari Chemicals** **25 MTPD**

GLOBAL MANUFACTURING OF SULFURIC ACID

World consumption of sulfuric acid—2017

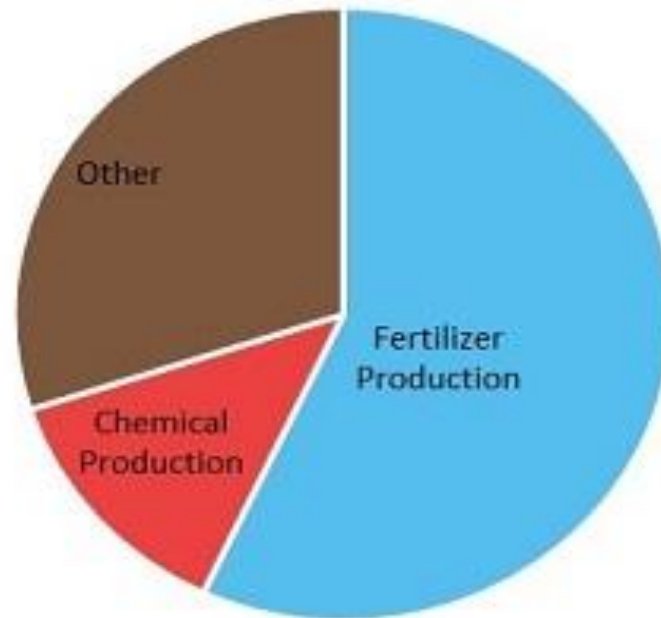


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GLOBAL MANUFACTURING OF SULFURIC ACID

Global Sulfuric Acid Demand by Application





THE END