



Sulfuric Acid

Sulfuric acid is one of the most important compounds made by the chemical industry.

It is used to make, literally, hundreds of compounds needed by almost every industry.

The Contact Process

Now a days, sulphuric acid is prepared by contact process all over the world.

Preparation of sulphuric acid by contact process is based upon the catalytic oxidation of SO_2 to SO_3

Details of the process

Step 1: Formation of SO_2

Step 2: Purification of SO_2

Step 3: Oxidation of SO_2 to SO_3

Step 4: Formation of H_2SO_4



a = Pyrite Burner
 b = Dust Filter Chamber
 c = Washing Tower

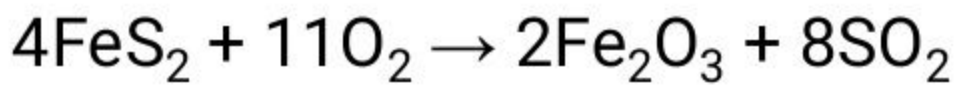
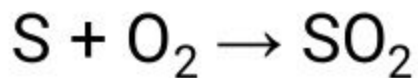
d = Drying Tower
 e = Contact Chamber
 f = Absorption Tower

g = Dilution Tower

H_2SO_4

Formation of SO₂

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



Purification of SO₂

SO₂ contains a number of impurities such as dust particles, Arsenous oxide, vapours, sulphur etc.

These impurities must be removed otherwise catalyst loses its efficiency (catalyst poisoning).

a. 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.

b. Washing Tower

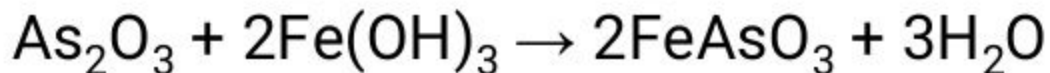
SO_2 is then passed through a washing tower after cooling. Here it is sprayed by water to remove any other soluble impurities.

c. Drying Tower

The gas is now dried by passing through drying tower where conc. H_2SO_4 (dehydrating agent) is sprayed. H_2SO_4 removes moisture from SO_2 .

d. Tyndall Box

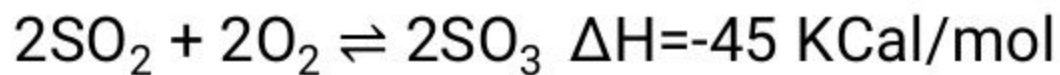
Arsenic oxide is a poison for the catalyst. It is removed when the gas is passed over ferric hydroxide.



In order to remove traces of As_2O_3 , it is passed through a test box, where a strong beam of light is thrown against the gas. If there is no scattering of light in the box, it indicates that gas is free from As_2O_3 .

Oxidation of SO₂ to SO₃

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.



The energy released in this reaction is utilized to produce enough electricity which can carry out the whole process

Conditions to increase yield of SO_3

Oxidation of SO_2 is a reversible and exothermic process. In order to obtain maximum amount of SO_3 , according to Le-Chatelier's Principle following conditions are necessary

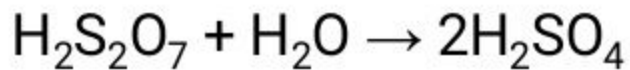
- Excess of O_2
- Temperature 450°C to 500°C
- Pressure 1.5 to 1.7 atm
- Catalyst V_2O_5

Formation of H_2SO_4

SO_3 is not directly passed in water, because a dense fog of minute particles of H_2SO_4 is produced. It is therefore, dissolved in conc. H_2SO_4 to form pyrosulphuric acid (oleum).



Oleum is now diluted with water to form H_2SO_4 of required concentration



Glass

- Definition
- Preparation
- Composition
- Variety
- Uses

