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Contact Process: Sulfuric Acid- H_2SO_4 : Properties of Sulphuric Acid Are Listed below (For CBSE, ICSE, IAS, NET, NRA 2022)

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Title: Contact Process

- It is said that, if one could estimate the amount of sulfuric acid produced in a country, then that information is more than enough to estimate the industrial growth of that particular country.
- This is because sulfuric acid is an essential raw material for almost everything that is industrially made.
- The contact process is the current method of producing sulfuric acid in the high concentrations needed for industrial processes.
- It is commonly used in fertilizer manufacturing, oil refining, mineral processing and it is even used in wastewater processing. Some other uses include domestic acidic drain cleaners, the electrolyte in lead-acid batteries, as a dehydrating agent, etc.
- Platinum was initially used as the catalyst for this reaction; however, as it is susceptible to reacting with arsenic impurities in the sulfur feedstock, vanadium (V) oxide is now preferred.
- One of the most popular or common methods to manufacture sulphuric acid is via the contact process.
- This process was invented by a British merchant named Peregrine Phillips. It was patented in the year 1831.
- Apart from being an economical process for manufacturing sulfuric acid, sulfur trioxide and oleum are also obtained from this process.

Sulfuric Acid (H_2SO_4)

- In a nutshell, sulfuric acid is a strong mineral acid characterized by its strong dehydrating and oxidizing nature. It has a chemical formula H_2SO_4 . This acid is colourless with a pungent smell.
- It is soluble in water and releases heat on contact.

- This acid is corrosive to metals and most other organic matters like tissue, wood, etc.
- On contact with such organic substances, sulfuric acid instantly dehydrates those causing char to form. Sulfuric acid has a density of $1.83 \frac{g}{cm^3}$.
- The molecular structure of sulfuric acid is represented below in the form of a line-wedge-dash structure.

Properties of Sulphuric Acid

Chemical formula	$H_2 SO_4$
Molar mass	$98.079 \frac{g}{mol}$
Appearance	Clear, colourless liquid
Density	$1.8302 \frac{g}{cm^3}$
Melting point and boiling point	$50.56^\circ F$ and $639^\circ F$
Solubility in water	Exothermic, miscible
Viscosity	26.7 Cp
<i>Properties of Sulphuric Acid</i>	

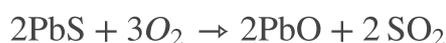
Manufacture of Sulfuric Acid by Contact Process

- There are several ways to manufacture sulfuric acid. Each of them varies in effort, cost, and purity of the sulfuric acid that is produced.
- Though, the most common process among these is the contact process. Let us discuss this process in detail below.

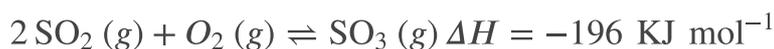
Manufacture of sulfuric acid using contact process involves four steps.

- Extraction of sulfur.
- Preparation of sulfur dioxide.
- Conversion of sulfur dioxide to sulfur trioxide.
- Conversion of sulfur trioxide to sulfuric acid.

Extraction of Sulfur



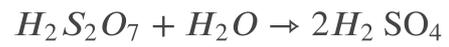
Conversion of Sulfur Dioxide to Sulfur Trioxide



Conversion of Sulfur Trioxide to Sulfuric Acid



Oleum can be further diluted in water to obtain concentrated sulfuric acid.



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