

Chemistry
Class-10
Chapter-10
Mineral Resources: Metals and Non-metals
Subject teacher- Syeeda Sultana
Sulphuric Acid

Uses of Sulphuric acid

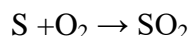
- Used in the preparation of fertilizers like $(\text{NH}_4)_2\text{SO}_4$
- Used in detergents, paints, dyes and pharmaceutical purposes
- Manufacture of plastic items like rayon, nylon etc.
- Manufacture of electrolytes eg, different batteries
- Used in petroleum refining and explosives

Industrial preparation of sulphuric acid

Steps in preparation of sulphuric acid

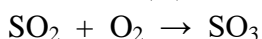
Step-1: Making sulphur dioxide

Sulphur burns in oxygenated air to form Sulphur dioxide.



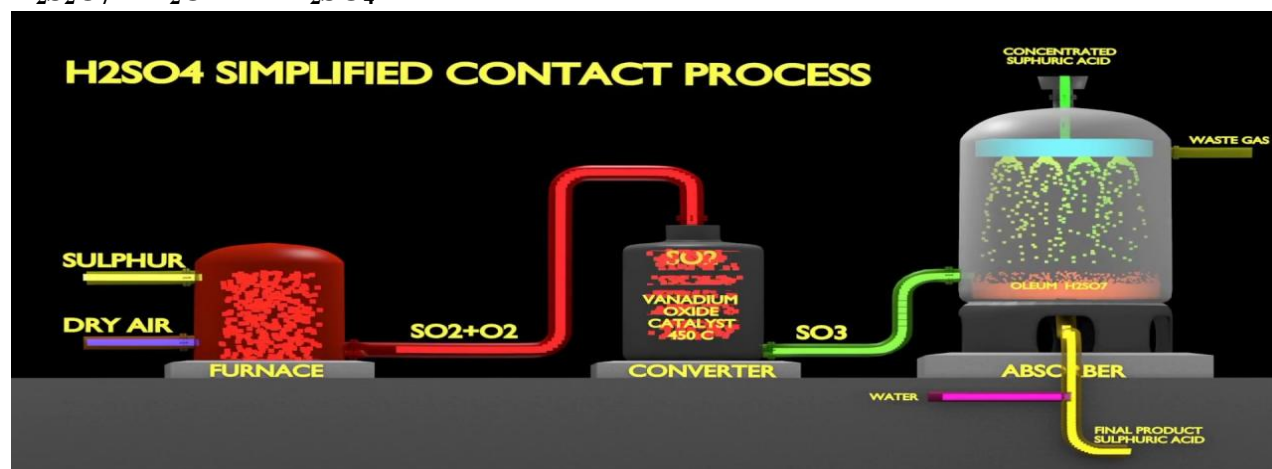
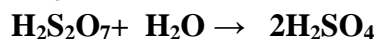
Step-2: Converting sulphur dioxide into sulphur trioxide

The sulphur dioxide reacts with excess oxygen in presence of a suitable catalyst such as vanadium (V) oxide or platinum and produce Sulphur trioxide at 450°C .



Step-3: Converting sulphur trioxide into concentrated sulphuric acid

Sulphur trioxide passes through the heat exchanger and is dissolved in concentrated sulphuric acid in the absorption tower to form oleum. Water is carefully added to oleum to form concentrated sulphuric acid.

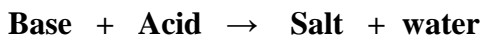


Physical properties of Sulphuric acid

- Colourless
- Odourless
- Oily liquid in pure state
- Slightly sour in taste
- Soluble in water

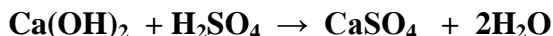
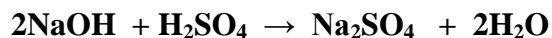
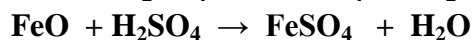
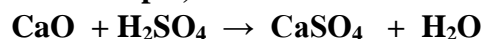
Chemical properties of Sulphuric acid

- Reaction of sulphuric acid with base/ alkali:



This is known as neutralization reaction

For example,



Reaction of sulphuric acid with carbonate/ bicarbonate salts



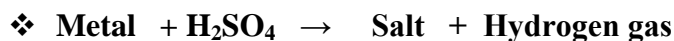
For example,



For example,

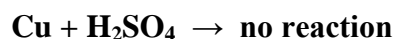
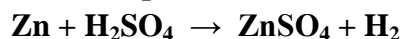


Reaction of sulphuric acid with reactive metals



Dilute H_2SO_4 does not react with metals which occur below hydrogen in the reactivity series (E.M.F. series). Metals above hydrogen react to give H_2 with dilute H_2SO_4 .

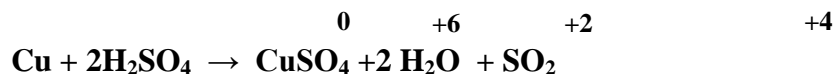
For example,



❖ Action of concentrated sulphuric acid

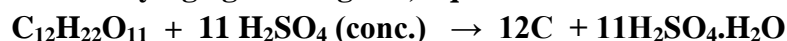
- Have strong oxidizing action and acts as an oxidizing agent
- It oxidizes metals and non-metals

H_2SO_4 Oxidizes copper and produces Cu^{+2} ion to form copper sulphate and reduces itself into sulphur dioxide



❖ **Concentrated H_2SO_4 as a dehydrating agent**

Concentrated H_2SO_4 has great affinity for water. Hence it is used as an efficient drying agent for gases, liquids and solids which do not react with it chemically.



Exercise:

Make 10 MCQs from the lesson yourself and write down the answers of the following questions on your copy.

Questions:

1. Describe the contact method to prepare sulphuric acid from sulphur.
2. Why sulphuric acid is needed to produce sulphuric acid in contact method?
3. Explain that H_2SO_4 acts as an acid, oxidant and dehydrating agent.
4. Analyze the economic significance of sulphuric acid.
5. Let's take 2-3 mL lime water in a test tube and a few drops of dilute sulphuric acid to it. Observe the changes and write the reason with chemical equation.
6. Let's take a pinch of potassium iodide (KI) in a test tube and add a few drops of concentrated sulphuric acid to it. Write the reason of change with chemical equation.
7. What is oleum?
8. Take a spoon of sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in a test tube and add a few drops of concentrated sulphuric acid to it. Write the reason of change with chemical equation.
9. Explain the reactions given below showing that sulphuric acid is an oxidizing agent:
 - a) $\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + 2\text{H}_2\text{O} + \text{SO}_2$
 - b) $\text{C} + \text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$