

# EXPERIMENT

## AIM

To prepare benzoic acid crystals from the crude sample.

## THEORY

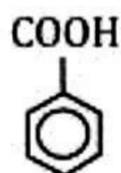
Benzoic acid is soluble in benzene and hence crystallised by making its saturated solution in benzene. Benzene gets vapourised on keeping the solution for sometime, leaving pure benzoic acid crystals.

## MATERIAL REQUIRED

China dish, funnel, Burner, tripod stand beaker.

## PROCEDURE

Benzoic acid is a crystalline solid that has moderate solubility in hot water and low solubility in cold water. Its structure is:



Benzoic acid is recrystallised by dissolving it in hot water.

### (i) Preparation of solution

Take about 150 ml of water in a 250 ml beaker and keep it for boiling using a tripod stand and wire gauze. In another 250 ml beaker take 2-3 gm of the crude sample of benzoic acid and add gradually with stirring minimum quantity of boiling water just sufficient to dissolve benzoic acid. Heating can be done if required.

### (ii) Filtration of the solution

Filter the hot solution immediately using fluted filter paper placed in a funnel. Insoluble impurities are left on the filter paper.

### (iii) Cooling the hot saturated solution

Let the filtered solution come to room temperature by itself. Now cool it by placing it in the cold water trough.

### (iv) Separation of crystals and drying

Separate the crystals by Alteration using a funnel and filter paper. Wash the crystals with cold water. Transfer the crystals to another filter paper and dry them by pressing gently between the folds of the filter paper. Transfer the crystals to a dry test tube and cork it.

## RESULT

The crystals of benzoic acid are opaque white.

- Colour - colourless
- The yield of the crystals = \_\_\_\_\_ g

## PRECAUTIONS

- (i) The vapour of benzene should be away from the flame.
- (ii) Heating should be done only in the water bath.

## VIVA VOCE

**Q 1. What is benzoic acid, and what is its chemical formula?**

**Ans.** Benzoic acid is a white crystalline solid with the chemical formula  $C_7H_6O_2$ .

**Q 2. Why is it important to prepare crystals of benzoic acid from a crude sample?**

**Ans.** Crude samples of benzoic acid may contain impurities, which can affect its properties and applications. By preparing crystals of pure benzoic acid, we can ensure its purity and suitability for various uses, such as in food preservation, pharmaceuticals, and laboratory experiments.

**Q 3. Describe the process of preparing crystals of benzoic acid from a crude sample.**

**Ans.** The process typically involves dissolving the crude sample of benzoic acid in a suitable solvent, such as hot water, and then allowing the solution to cool slowly. As the solution cools, pure crystals of benzoic acid form and can be collected by filtration.

**Q 4. How does the choice of solvent affect the crystallization process of benzoic acid?**

**Ans.** The choice of solvent affects the solubility of benzoic acid and the rate of crystal formation. A suitable solvent should dissolve the benzoic acid at elevated temperatures but have limited solubility at lower temperatures to allow for the formation of pure crystals upon cooling.

**Q 5. Can impurities be removed from the crude sample of benzoic acid through any other methods besides crystallization?**

**Ans.** Yes, impurities can be removed through techniques such as filtration, recrystallization, evaporation, or chemical treatments, depending on the nature of the impurities and the specific properties of the benzoic acid compound.

**Q 6. What factors might affect the yield and quality of the obtained benzoic acid crystals?**

**Ans.** Factors such as the purity of the crude sample, the choice of solvent, the temperature and rate of cooling during crystallization, and the effectiveness of purification techniques can all affect the yield and quality of the obtained benzoic acid crystals.

**Q 7. How can the purity of the obtained crystals of benzoic acid be determined?**

**Ans.** The purity of the obtained crystals can be determined through various analytical techniques, such as melting point determination, elemental analysis, or comparison with known standards.

**Q 8. Are there any safety considerations when working with benzoic acid or its solutions?**

**Ans.** Yes, precautions should be taken to avoid contact with skin or eyes, as benzoic acid can be irritant. Proper ventilation and personal protective equipment should be used when handling benzoic acid or its solutions. Additionally, appropriate disposal methods should be followed for any waste generated during the process.

**Q 9. Can benzoic acid be obtained from natural sources, and if so, how?**

**Ans.** Yes, benzoic acid can be obtained naturally from sources such as gum benzoin or certain fruits. It can be extracted from these sources through processes such as distillation or solvent extraction.