

1. DETERMINATION OF SOLUBILITY OF DRUG AT ROOM TEMPERATURE

Aim: To determine the solubility of benzoic acid at different temperatures.

Requirements: benzoic acid, distilled water, 0.1N Sodium hydroxide, phenolphthalein indicator, filter paper, Measuring cylinder, funnel, beaker, conical flask, 10 ml bulb pipette, rubber bulb, burette, burette stand.

Principle: The amount of drug dissolved in solution at a particular temperature is called solubility.

Example: The solubility of paracetamol is 1 g in 70 ml water at 20 °C. The solubility of a drug is determined by preparing a saturated solution of the drug. A saturated solution is prepared by shaking an excess quantity of the drug with the solvent for a long time (48 hours). This system is filtered, and titration or a suitable analytic method analyses the saturated solution for drug content. In this experiment, benzoic acid solubility is determined using distilled water. The amount of benzoic acid dissolved in the solvent is analysed by titrating with 0.1 N Sodium hydroxide solution using phenolphthalein as an indicator. When a drug (benzoic acid) has poor solubility in water, then the solubility of benzoic acid is improved by temperature rise.

Procedure:

1. Take 50 ml of distilled water into a 100 ml beaker. Add the required quantity of benzoic acid and shake vigorously for 30 minutes. If the added benzoic acid has dissolved, add more and shake to obtain a saturated solution.
2. Heat the benzoic acid in the water bath up to 85°C.
3. Allow the temperature to fall gradually to 80°C.
4. Filter the contents into a clean, dry beaker.
5. Titrate 10 ml of the filtrate with 0.1 N sodium hydroxide solution using phenolphthalein as an indicator.
6. Continue the procedure and obtain solubility data at 70, 60, 50, 40, and 30°C temperatures.
7. Draw a plot by taking the solubility of benzoic acid on the y-axis and temperature on the x-axis.
8. Calculate the solubility of benzoic acid in water.

S.NO	Temperature (°C)	Volume of sodium hydroxide consumed (ml) (V1)	Normality of benzoic acid (N2)	Solubility of benzoic acid (gm/ml)
1.	80			
2.	70			
3.	60			
4.	50			
5.	40			
6.	30			

An equivalent weight of benzoic acid is 122 gm

The normality of sodium hydroxide (N1) is 0.1N

The volume of sodium hydroxide consumed is (V1)

Benzoic acid (V2) is a 10 ml sample taken at different temperatures.

Normality of benzoic acid (N2) = $N1V1 / V2$

Solubility of benzoic acid = $N2 \times 122 / 10$

The solubility of the drugs is expressed in various units in the Merk Index.

Term	Parts of solvent required for 1 part of solute
Very soluble	Less than 1part
Freely soluble	1 to 10 parts
Soluble	10 to 30 parts
Sparingly soluble	30 to 100 parts
Slightly soluble	100to 1000 parts
Very slightly soluble	1000 to 10,000 parts
Practically insoluble	More than 10,000 parts

Report: The solubility of benzoic acid in water.....gm/ml at 80C.As the temperature increases, the solubility of benzoic acid increases.

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