

EXPERIMENT

AIM

To prepare crystals of pure potash from the commercial sample.

THEORY

Pure potash alum has the formula $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$

A commercial sample of alum may contain some impurities. The sample is dissolved in water and the insoluble impurities are separated by filtration. The filtrate is concentrated to crystallisation point. On cooling crystals of potash alum separated out. The soluble impurities are left behind in the mother liquor. The potash alum crystals are octahedral in shape.

MATERIAL REQUIRED

250ml beaker, China dish, measuring cylinder, glass rod, funnel, Burner, tripod stand, wire gauze.

PROCEDURE

Potash alum (Fitrakis) is highly soluble in water. The commercial sample is shaken with water when the alum dissolves. The insoluble impurities are removed by filtration. The solution is concentrated and then cooled. On cooling pure crystals of alum separate. The soluble impurities are left behind in the mother liquor.

(i) Preparation of solution

Take a 400 ml beaker. Put in it about 5-6 gm of the crude sample of potash alum and 25-30 ml water. Stir the contents of the beaker to make the solution clear. Warm to dissolve the whole of the alum present in the sample.

(ii) Filtration of the solution and concentration of the filtrate to the crystallisation point

Filter the solution and collect the filtrate in a China dish. The insoluble impurities are left as residue on the filter paper.

Heat the China dish on a sand bath/wire gauge till the solution is reduced to about one-third of its original volume. As the solution gets heated up, it is stirred well with a glass rod to avoid crust formation on the side of the dish. If the crust is formed, it is dissolved into the solution by removing it with a glass rod.

Take out a drop of the solution at the end of the glass rod and cool it by blowing. The appearance of a thin crust on the glass rod shows that the crystallization point has been reached. Stop heating at this stage by removing the Burner. Transfer the hot saturated solution to a crystallizing dish.

(iii) Cooling the hot saturated solution

Place the dish containing hot saturated solution on a beaker containing water filled to the brim and allow it to cool slowly for some time. Colourless, transparent and octahedral crystals of alum begin to separate. After about half an hour, the crystallization is complete.

(iv) Separation of crystals and drying

Decant off the mother liquor carefully. Wash the crystals with a cold solution of alcohol and water. Remove the crystals on filter paper which soaks the solution. 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 pure potash alum are Colourless, transparent and octahedral.

PRECAUTIONS

- (i) The filtrate should be evaporated slowly by gently heating during concentration.
- (ii) The filtrate is to be evaporated only up to the crystallization point. It should never be heated to dryness. Avoid overheating the solution.
- (iii) The solution should be cooled slowly without disturbing it. It should never be cooled rapidly.
- (iv) Wash the crystals with the washing liquid 3-4 times using a very small amount of the liquid each time.
- (v) In case the crystals obtained are very small, it means that the solution has been concentrated more than that required at the crystallization stage.

VIVA VOCE

Q 1. What is the chemical name of potash?

Ans. Potash refers to compounds containing potassium, typically potassium carbonate (K_2CO_3) or potassium hydroxide (KOH).

Q 2. Why is it important to prepare crystals of pure potash from a commercial sample?

Ans. Commercial samples of potash may contain impurities, which can affect its utility and properties in various applications. By preparing crystals of pure potash, we can obtain a more accurate measure of its purity and ensure its suitability for specific uses.

Q 3. Describe the process of preparing crystals of pure potash from a commercial sample.

Ans. The process typically involves dissolving the commercial sample of potash in water to form a solution, followed by purification through techniques such as recrystallization or fractional crystallization to obtain pure crystals of potash.

Q 4. What is recrystallization, and how does it purify a substance?

Ans. Recrystallization is a purification technique in which a solid substance is dissolved in a suitable solvent at an elevated temperature, and then allowed to cool slowly. As the solution cools, impurities remain in solution or are excluded from the crystal lattice, resulting in the formation of pure crystals.

Q 5. What properties of potash make it suitable for crystallization?

Ans. Potash compounds, such as potassium carbonate or potassium hydroxide, have high solubility in water, making them suitable for dissolution and subsequent crystallization.

Q 6. How can the purity of the obtained crystals 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.