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PREPARATION OF POTASH ALUM

AIM

To prepare crystals of **potash alum**, $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24 \text{H}_2\text{O}$, starting from aluminium foil.

THEORY

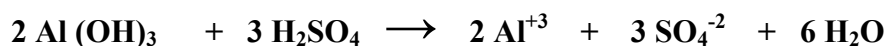
Alum has been used as a coagulant, astringent, mordant, for the removal of phosphate from natural and waste waters, and for fireproofing of fabrics.

This experiment demonstrates the **conversion of scrap aluminium** to a highly useful aluminium compound, **potash alum**, $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24 \text{H}_2\text{O}$.

Aluminium reacts with hot aqueous **KOH** to give K Al (OH)_4 :



By reacting K Al (OH)_4 with **sulfuric acid**, **potash alum** is obtained.



Octahedral shaped crystals of $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24 \text{H}_2\text{O}$ are formed when the solution is cooled in an ice bath.

Potash alum is a **double salt**, yielding the ions K^+ , $\text{Al(H}_2\text{O)}_6^{3+}$ and SO_4^{2-} when dissolved in water.

The term “**alum**” also denotes a series of crystallized double salts that have the general formula $\text{M(I) M(III) (SO}_4)_2 \cdot 12 \text{H}_2\text{O}$, as for example,

chrome alum $\text{K Cr (SO}_4)_2 \cdot 12 \text{H}_2\text{O}$

In this experiment, crystals of **potash alum**, $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24 \text{H}_2\text{O}$ will be prepared, starting **from aluminium foil**.

MATERIALS REQUIRED

Aluminium foil, KOH, H_2SO_4 (6 M), beakers.

PROCEDURE

1. Weigh out **0.5 g of aluminium foil**, cut into very small pieces, and place it in a 250 ml beaker.
2. **Very carefully**, add **15 ml of KOH solution (1.75 g of KOH in 15 ml of water)**.
3. Heat the solution **gently**. Hydrogen will be evolved. Cover it with a watch glass. **Control the heating so that the reaction does not become too vigorous.**
4. Continue heating till all the aluminium has dissolved. An **ash-coloured solution** will be obtained.
Do not heat to dryness.
Replenish the water in case of excessive evaporation.
5. Filter the warm solution **carefully** through a thin layer of cotton or glasswool. **Cool the solution.**
6. **Slowly** add 15 ml of **6 M H₂SO₄** while stirring. A **solid precipitate** is obtained.
7. Heat the solution **gently** till all the solids dissolve.
8. **Cool the clear solution in an ice bath for 20 minutes.**
Alum crystals will be formed.
9. Filter the solution using a funnel and filter paper.
10. After drying the product, determine the **yield** and **yield %**.

NOTE : To calculate the molecular weight of **potash alum**, use the formula **M(I) M(III) (SO₄)₂. 12 H₂O** .

RESULTS

Yield =

Yield % =