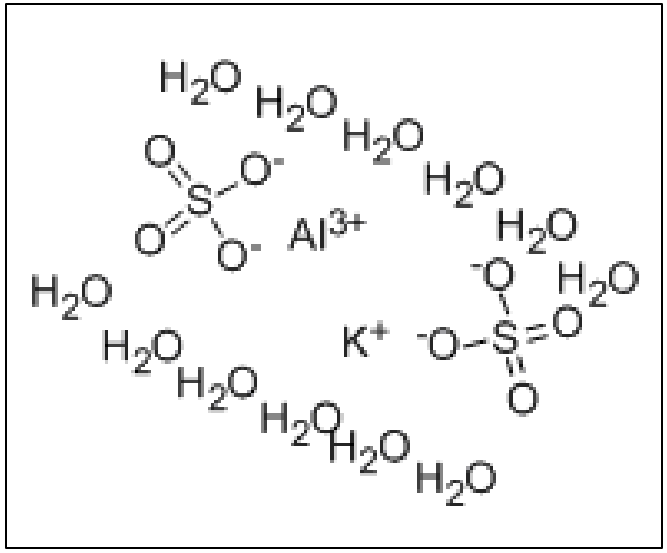
Experiment NO.4

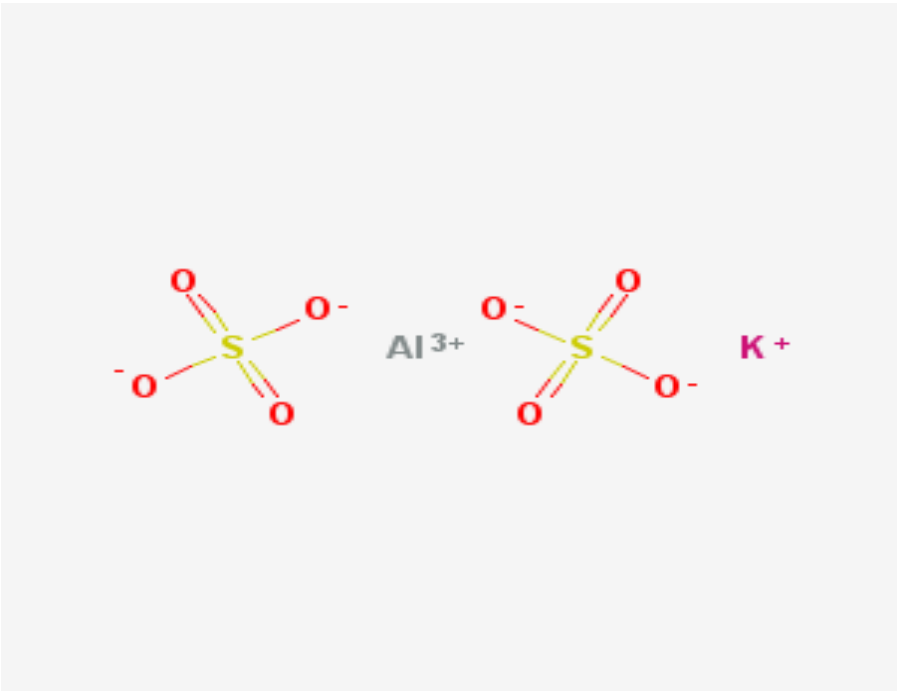
Part I : Preparation of Potash alum

$KAl(SO_4)_2.12H_2O$

Preparation of Potash alum $KAl(SO_4)_2.12H_2O$

The name alum was given originally to the double – salt of potassium and aluminum sulfate.
$K_2SO_4.Al_2(SO_4)_3.24H_2O$.





- *Potash alum prepared by two methods:*

1- Reaction of equi-molar amounts of aluminum sulfate and potassium sulfate.

Potash alum is prepared by mixing equi-molecular masses of potassium sulphate and aluminum sulphate in water followed by evaporation

-
- $K_2SO_4 + Al_2(SO_4)_3 + 24H_2O = 2\ KAl(SO_4)_2.12H_2O$

2- From aluminum metal and potassium hydroxide.

The first step in this synthesis, is to react metallic aluminum with concentrated solution of potassium hydroxide (KOH) to form the potassium salt of the tetrahydroxoaluminate complex $[KAl(OH)_4]$.

$$2Al + 2KOH + 6H_2O \rightarrow 2[KAl(OH)_4] + 3H_2$$

By reacting $KAl(OH)_4$ with sulfuric acid potash alum is obtained.

$$[(KAl(OH)_4] + 2H_2SO_4 + 8H_2O \rightarrow KAl(SO_4)_2 .12\ H_2O) \}\times 2$$

$$2Al + 2KOH + 22\ H_2O + 4H_2SO_4 \rightarrow 2\ KAl(SO_4)_2 .12\ H_2O + 3H_2$$

- ***Reagents required:***

1-Aluminum sulfate [$Al(SO_4)_3$,
2- Potassium sulfate (K_2SO_4),
3-sulfuric acid H_2SO_4

- ***Procedure:-***

1- *Dissolve (0.55 gm) of potassium sulfate (K_2SO_4) in (5)ml of water with (3) drops of dil. H_2SO_4 (1:1) in a crucible.*

2- Dissolve (0.8gm) of aluminum sulfate [Al $(SO_4)_3$ .12 H_2O] in (5) ml of water in separated crucible.

3- Mix the two solutions and filter them.

4- Concentrate the solution by heating while stirring it.

5-Allow the solution to cool at room temperature slowly then moves it inside ice- bath (for about 30 min) on cooling crystals of potash alum will separated out.

6-Separate the crystals by filtration, then wash with cold water & dry it in an air.

7- Calculate the yield percentage and error