

Experiment No. (5)

Chromium (III) Potassium Sulfate Dodecahydrate

Chrome alum or chromium(III) potassium sulfate is the potassium double sulfate of chromium. Its chemical formula is $\text{KCr}(\text{SO}_4)_2$ and it is commonly found in its dodecahydrate form as $\text{KCr}(\text{SO}_4)_2 \cdot 12(\text{H}_2\text{O})$. It is used in leather tanning.

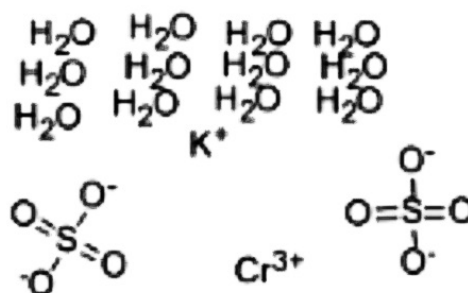
Chromium alum crystallizes in regular octahedra with flattened corners and it is very soluble in water. The solution reddens litmus and is an astringent. Its aqueous solution is dark violet and turns green when it is heated above 50°C . In addition to the dodecahydrate, the hexahydrate $\text{KCr}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$, dihydrate $\text{KCr}(\text{SO}_4)_2 \cdot 2\text{H}_2\text{O}$, and the monohydrate $\text{KCr}(\text{SO}_4)_2 \cdot \text{H}_2\text{O}$ are known.



Chrome alum

Application:

Chromium potassium sulfate dodecahydrate is used in catalyst, mordant, ceramics, tanning, developer and dyes



The Reagent Required:

1. Potassium dichromate $\text{K}_2\text{Cr}_2\text{O}_7$ (1.75 g).
2. Sulfonic acid conc. H_2SO_4 (1.5 ml).
3. Absolute ethanol $\text{CH}_3\text{CH}_2\text{OH}$ (3.5 ml).
4. Distilled water.

Procedure:

- 1) Dissolve (1.75 g) of potassium dichromate $\text{K}_2\text{Cr}_2\text{O}_7$ in (8 ml) of distilled water in a beaker and warm it with swirling until all solid compound is dissolved.
- 2) Add (1.5 ml) of sulfonic acid H_2SO_4 drop wise and carefully swirl the flask with stirring rod.
- 3) Add (3.5 ml) of absolute ethanol drop wise, during this addition a dark green solution will be formed.
- 4) Heat the solution in a water bath at (70°C) for 30 minutes.
- 5) Prepare an ice bath and put the solution, then you will notice formation of violate crystals.
- 6) Separate the crystals, then dry them, leave the solution until next week if the crystallization has not been performed.

Questions:

1. Write the equation of this reaction.
2. Give the properties of chromium Alum.
3. What is the basic idea of this experiment? Explain.
4. What is the color of the yield? Why?