



Dr. BRR. GOVERNMENT COLLEGE,
JADCHERLA, MAHABUBNAGAR (Dist.)

Student Study Project

2021 -22

DEPARTMENT OF CHEMISTRY

Topic

To prepare potash alum from aluminium scrap

Conducted by students

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CERTIFICATE

Certificate

This is to certify that this project work is submitted by ANURAG AGARWAL to the Chemistry department, Aditya Birla Public School, Kovaya was carried out by him under the guidance & supervision during academic year 2008-2009.

Principal

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ACKNOWLEDGEMENT

Acknowledgement

I wish to express my deep gratitude and sincere thanks to Principal, Mrs. Raji Jayaprasad, Aditya Birla public school, kovaya for her encouragement and for all the facilities that she provided for this project work. I sincerely appreciate this magnanimity by taking me into her fold for which I shall remain indebted to her.

I extend my hearty thanks to Mr. B.D.KOTWANI, chemistry HOD, who guided me to the successful completion of this project. I take this opportunity to express my deep sense of gratitude for his invaluable guidance, constant encouragement, constructive comments, sympathetic attitude and immense motivation, which has sustained my efforts at all stages of this project work. I am also thankful to Mr. Pankaj Bajpai who has helped in each step of my project work.

I can't forget to offer my sincere thanks to my classmates who helped me to carry out this project work successfully & for their valuable advice & support, which I received from them time to time.

ANURAG AGARWAL.



DECLARATION

Declaration

I do hereby declare that this project work has been originally carried under the guidance and supervision of Mr. B.D. KOTWANI, head of chemistry department, Aditya Birla Public School, Kovaya.

ANURAG AGARWAL.

Roll NO.



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DEDICATION

Dedication

I DEDICATE THIS PROJECT WORK TO THE LOTUS FEET OF

MY FATHER
MR.K.M.AGARWAL
&
MY MOTHER
MRS. RAMA AGARWAL



INTRODUCTION

Introduction

Aluminium because of its low density, high tensile strength and resistance to corrosion is widely used for the manufacture of aeroplanes, automobiles lawn furniture as well as for aluminium cans. Being good conductor of electricity it is used for transmission of electricity. Aluminium is also used for making utensils. The recycling of aluminium cans and other aluminium products is a very positive contribution to saving our natural resources. Most of the recycled aluminium is melted and recast into other aluminium metal products or used in the production of various aluminium compounds, the most common of which are the alums. Alums are double sulphates having general formula



X = Monovalent cation;

M = Trivalent cation

Some important alum and their names are given below:



$\text{Na}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$ - Soda Alum

Introduction

 $\text{K}_2\text{SO}_4 \cdot \text{Cr}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$ - Chrome Alum $(\text{NH})_2\text{SO}_4 \cdot \text{Fe}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$ - Ferric Alum

Potash alum is used in papermaking, in fire extinguishers, in food stuffs and in purification of water soda alum used in baking powders and chrome alum is used in tanning leather and water proofing fabrics.

In addition to these primary uses, alum is also used as

- i. **An astringent** a substance or preparation that draws together or constricts body tissues and is effective in stopping the flow of blood or other secretions. Alum has also been used by conventional hairdressers for treating shaving cuts,
- ii. **A mordant** substances used in dyeing to fix certain dyes on cloth. Either the mordant (if it is colloidal) or a colloid produced by the mordant adheres to the fiber, attracting and fixing the colloidal mordant dye. The insoluble, colored precipitate that is formed is called a lake. Alum is a basic mordant used for fixing acid dyes.



Introduction

iii. *For the removal of phosphate from natural and waste waters* the aluminium ions of alum combine with the orthophosphate around pH 6 to form the solid aluminum hydroxyphosphate which is precipitated and

iv. *For fireproofing fabrics* The major uses of alums are based on two important properties, namely precipitation of Al(OH)_3 and those related to the acidity created by the production of hydrogen ions.



The H^+ ions generated are used for reacting with sodium bicarbonate to release CO_2 . This property is made use of in baking powder and CO_2 fire extinguishers.



AIM

Aim

To prepare potash alum from aluminium scrap

REQUIREMENT

Requirement

- ❖ 250 ml flask
- ❖ Funnel
- ❖ Beaker
- ❖ Scrap aluminium or cola can
- ❖ Potassium hydroxide solution (KOH)
- ❖ 6 M Sulphuric Acid (H_2SO_4)
- ❖ Water Bath

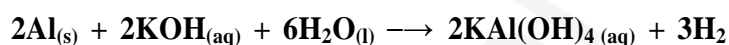


❖ Ethanol

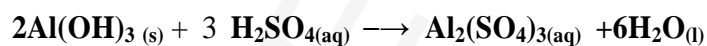
THEORY

Theory

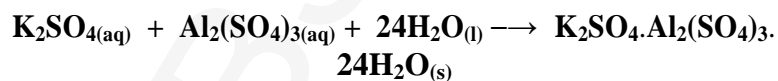
Aluminum metal is treated with hot aqueous KOH solution. Aluminium dissolves as potassium aluminate, $KAl(OH)_4$, salt.



Potassium aluminate solution on treatment with dil. Sulphuric acid first gives precipitate $Al(OH)_3$, which dissolves on addition of small excess of H_2SO_4 and heating.

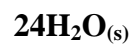
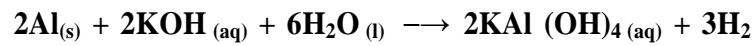


The resulting solution is concentrated to near saturation and cooled. On cooling crystals of potash alum crystallize out.



REACTIONS

Reactions



PROCEDURE

Procedure

- Clean a small piece of scrap aluminium with steelwool and cut it into very small pieces. Aluminium foil may be taken instead of scrap aluminium.
- Put the small pieces of scrap aluminium or aluminium foil (about 1.00g) into a conical flask and add about 50 ml of 4 M KOH solution to dissolve the aluminium.
- The flask may be heated gently in order to facilitate dissolution. Since during this step hydrogen gas is evolved this step must be done in a well ventilated area.
- Continue heating until all of the aluminium reacts.
- Filter the solution to remove any insoluble impurities and reduce the volume to about 25 ml by heating.



Allow the filtrate to cool. Now add slowly 6 M H_2SO_4 until insoluble $\text{Al}(\text{OH})_3$ just forms in the solution.

Procedure

Gently heat the mixture until the $\text{Al}(\text{OH})_3$ precipitatedissolves.

Cool the resulting solution in an ice-bath for about 30 minutes whereby alum crystals should separate out. For better results thesolution may be left overnight for crystallization to continue.

In case crystals do not form the solution may be furtherconcentrated and cooled again.

Filter the crystals from the solution using vacuum pump, washthe crystals with 50/50 ethanol-water mixture.

Continue applying the vacuum until the crystals appear dry.

Determine the mass of alum crystals.



OBSERVATION

Observation

Mass of aluminium metal = g

Mass of potash alum = g

Theoretical yield of potash alum = g

Percent yield = %

RESULT

Result

Potash alum of % yield was prepared from aluminium scrap.



BIBLIOGRAPHY

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