Analysis of Alum KAI(SO₄)₂·12H₂O

After a compound has been synthesized, tests should be carried out to verify the compound formed is indeed the compound desired. There are a number of various tests that can be performed to verify that the compound is the one desired. In a previous experiment, alum crystals were prepared. In this experiment we will do several tests to determine if the crystals are really alum.

The first and simplest test is to find the melting point of the compound and compare it to the published value for alum. A small quantity of alum is powered and placed on a melting point apparatus. The crystals are heated on the melting point apparatus on a hot plate, and the temperature at which they melt is recorded and compared to the reported values.

The second test that we can do is to determine the amount of water of hydration present in the alum crystals. Some of the alum is placed in a crucible and weighed. The crucible is heated until all of the water of hydration is driven off. The crucible is then cooled and its mass measured. From the mass of the dry crystals and the mass of the water lost, the ratio of moles water to moles KAI(SO₄)₂ can be calculated and then compared to the correct formula values.

The third test is a chemical test to determine the percent of sulfate in the compound prepared. A weighed quantity of alum is dissolved in distilled water. An excess of barium ions is added to the solution to precipitate all of the sulfate in the compound as barium sulfate. The precipitated barium sulfate is filtered off, dried, and its mass determined. From the mass of the barium sulfate and the initial mass of the alum, the percent sulfate can be calculated and compared with the theoretical percent found from the formula.

Chemicals

Parts 1, 2, and 3

Alum crystals prepared by you in the Lab Known Alum crystals

Part 3

Barium nitrate, Ba(NO₃)₂, 0.2M

Equipment

Part 1

Capillary Tube Melting point apparatus Hot plate Thermometer Mortar and pestle

Part 2

Crucible and cover Clay triangle Ring stand, ring and Bunsen burner

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North Carolina Agricultural Experiment Station

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