

Preparation of ammonium sulfate

Student worksheet

Making ammonium sulfate

Ammonium sulfate is a complex fertiliser. This simple salt is a source of two nutrients – nitrogen and sulfur.

About 90 percent of ammonium sulfate is produced by 3 different processes:

- as a by-product from the production of caprolactam;
- synthetically by reacting anhydrous ammonia and sulfuric acid;
- as a by-product of coke ovens, by reacting ammonia from coke oven gas with sulfuric acid.

Ammonium sulfate can be made in the laboratory by neutralising dilute sulfuric acid with ammonia solution.



Equipment and materials

- Evaporating basin
- Bunsen burner, tripod and gauze
- 50 cm³ measuring cylinder
- Filter funnel and filter paper
- Conical flask (to collect filtrate)
- Watch glass
- Glass rod
- 1 mol dm⁻³ sulfuric acid, 25 cm³
- 2 mol dm⁻³ ammonia solution, 25 cm³
- Full range indicator paper

Method

Care: Wear eye goggles. 1 mol dm⁻³ sulfuric acid is corrosive. 2 mol dm⁻³ ammonia solution is an irritant to lungs and the respiratory system and can cause eye damage. Work in a well-ventilated lab.

1. Using a measuring cylinder, measure out 20 cm³ of 1 mol dm⁻³ sulfuric acid into an evaporating basin.
2. Wash the measuring cylinder and then add about 25 cm³ of 2 mol dm⁻³ ammonia solution to it. Slowly add the ammonia solution to the evaporating basin, stirring the solution as you do so. After you have added about 15 cm³ check with indicator paper to see if the pH has reached 7. Add further 1 cm³ amounts of ammonia solution if necessary, checking the pH after each addition, until the pH is 7 or above.
3. Put the evaporating basin on a tripod and gauze. Slowly evaporate the solution until it is about one-fifth of its original volume. Caution: Do not boil the solution as it may spit.
4. Allow the concentrated solution to cool until crystals form.
5. Filter off the crystals and put the filter paper and crystals on a watch glass and dab dry with another piece of filter paper. Cover them with a piece of clean filter paper and leave them to dry at room temperature.
6. Label a sample tube with the name of the product, your name and the date. Weigh the labelled sample tube and record its mass.

7. Tip your dry product into the sample tube. Weigh the tube again. Record its mass.