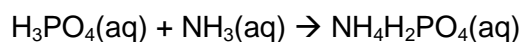


Preparation of ammonium dihydrogenphosphate

Student worksheet

Ammonium dihydrogen phosphate is a complex fertiliser. This simple salt is a source of two nutrients – nitrogen and phosphorous. It can be made by partially neutralising dilute phosphoric acid with dilute ammonia solution.



Equipment and materials

- Evaporating basin
- Tripod and gauze
- Bunsen burner
- 10 cm³ pipette
- Burette and stand
- 100 cm³ conical flask
- Filter funnel, filter paper and conical flask (to stand funnel on)
- Glass rod
- 1 mol dm⁻³ phosphoric acid
- 1 mol dm⁻³ ammonia solution
- Methyl orange indicator solution

Method

Care: Wear eye protection. 1 mol dm⁻³ ammonia solution and 1 mol dm⁻³ phosphoric acid are irritants to the eyes, skin, lungs and the respiratory system. Work in a well-ventilated lab.

1. Use a pipette to transfer 10 cm³ of 1 mol dm⁻³ ammonia solution to a conical flask and add a few drops of methyl orange indicator to the conical flask.
2. Add 1 mol dm⁻³ phosphoric acid to the flask from a burette until the indicator changes colour. Make a note of the volume of acid added.
3. Use a pipette to transfer 10 cm³ of 1 mol dm⁻³ ammonia solution to an evaporating basin.
4. Use a burette to add the volume of 1 mol dm⁻³ phosphoric acid noted in step 3 to the evaporating basin.
5. 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.
6. Allow the concentrated solution to cool until crystals form. 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.
7. Label a sample tube with the name of the product, your name and the date. Weigh the labelled sample tube and record its mass.
8. Tip your dry product into the sample tube. Weigh the tube again. Record its mass.
9. Store the dried product in a suitably labelled sample bottle.

Calculations

Calculate the theoretical yield and percentage yield of ammonium dihydrogenphosphate, NH₄H₂PO₄.