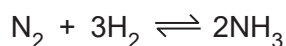


GCSE Chemistry A (Gateway Science)
J248/02 C4-C6 and C7 Foundation (Foundation Tier)

Question Set 26

1 The Haber process is used to make ammonia, NH_3 .



(a) The reaction reaches a **dynamic equilibrium**.

(i) What happens to the **rate** of the forward and backward reactions at dynamic equilibrium? [1]

Rates are equalised

(ii) What happens to the **concentrations** of the reacting substances at equilibrium? [1]

Concentrations remain constant (not changing)

(b) Ammonia is used to make fertilisers.

Fertilisers usually contain nitrogen.

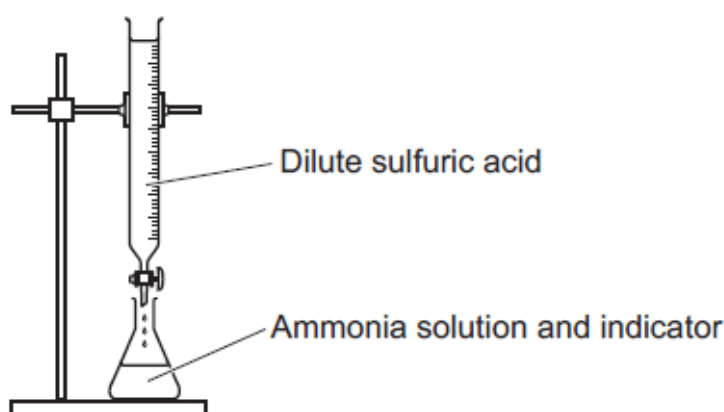
Name the **two** other elements that fertilisers usually contain.

.....**phosphorus**..... and**potassium**..... [2]

(c) Ammonium sulfate is a salt used as a fertiliser.

Ammonium sulfate can be made in a laboratory in a batch process.

Ammonia solution is titrated with dilute sulfuric acid to make a solution of ammonium sulfate, as shown in the diagram.



Describe how you would make **dry crystals** of ammonium sulfate from ammonium sulfate solution. [2]

Slowly heat the solution to evaporate the water off then let it cool down to crystallise.

(d) Calcium sulfate is another salt.

A student made some calcium sulfate.

Look at the method he used:

- pour 100 cm³ of calcium nitrate solution into a beaker
- add drops of sodium sulfate solution until a precipitate appears
- allow the precipitate to settle to the bottom of the beaker
- pour off the liquid
- use a spatula to transfer the solid calcium sulfate onto a piece of filter paper.

Describe and explain **two** ways that the student could improve his method to **increase** the amount of **pure, dry** calcium sulfate made.

- 1 Wash the precipitate with distilled water & dry it in ^{warm oven} ✓
- 2 Filter the solid from liquid with Buchner funnel vacuum pump to ensure all the liquid is drained. [4]

Total Marks for Question Set 26: 10

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