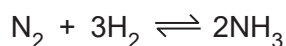


**GCSE Chemistry A (Gateway Science)**

**J248/02 C4-C6 and C7 Foundation (Foundation Tier)**

**Question Set 26**

1 The Haber process is used to make ammonia, NH<sub>3</sub>.



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

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

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

(b) Ammonia is used to make fertilisers.

Fertilisers usually contain nitrogen.

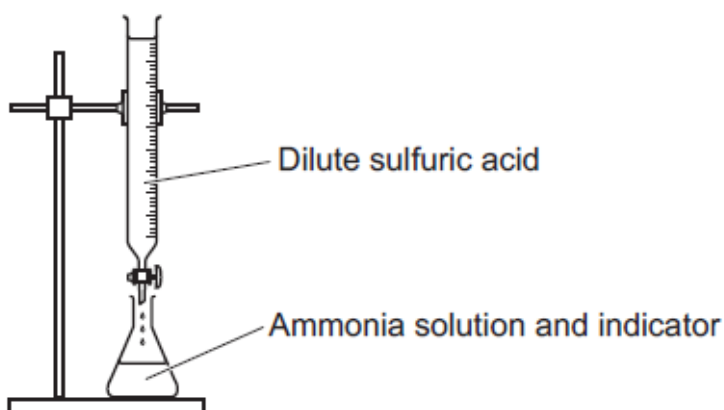
Name the **two** other elements that fertilisers usually contain.

..... **and** ..... [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]

(d) Calcium sulfate is another salt.

A student made some calcium sulfate.

Look at the method he used:

- pour 100 cm<sup>3</sup> 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 .....

2 .....

[4]

**Total Marks for Question Set 26: 10**

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