

Topic 6

Fertilisers

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- Plants for food:

- there are three key elements which provide the nutrients required for plant growth: nitrogen, phosphorus and potassium;
- growing plants require nutrients, including compounds containing nitrogen, phosphorus or potassium;
- fertilisers are substances which restore elements, essential for healthy plant growth, to the soil;
- the percentage composition of an element in the fertiliser can be calculated - they are usually shown as percentage amounts on the side of fertiliser packaging.

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- Fertilisers:

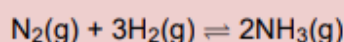
- ammonia and nitric acid are important compounds used to produce soluble, nitrogen-containing salts that can be used as fertilisers;
- ammonia is a pungent, clear, colourless gas which dissolves in water to produce an alkaline solution;
- ammonia solutions react with acids to form soluble salts:

ammonia solution + an acid → an ammonium salt + water

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- The Haber process:

- the Haber process is used to produce the ammonia required for fertiliser production:



- at low temperatures, the forward reaction is too slow to be economical;
- if the temperature is increased, the rate of reaction increases but, as the temperature increases, the reverse reaction becomes more dominant;
- an iron catalyst is used to increase reaction rate;
- ammonia is the starting material for the commercial production of nitric acid.

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- The Ostwald processes:

- the Ostwald process uses ammonia, oxygen and water to produce nitric acid;
- a platinum catalyst is used in this process.

Experiment - Making ammonia in a school lab

