Cambridge IGCSE Chemistry

Topic 2: Experimental techniques

Methods of purification

Notes

Describe and explain methods of purification by the use of a suitable solvent, filtration, crystallisation and distillation (including use of fractionating column). ; (Refer to the fractional distillation of petroleum and products of fermentation)

- Solvent = liquid in which a solute dissolves
  - Need a suitable solvent to ensure the liquid dissolves – preventing any impurities from dissolving with the pure liquid
- Filtration
  - If you have produced e.g. a precipitate (which is an insoluble salt), you would want to separate the salt/precipitate from the salt solution.
    - You would do this by filtering the solution, leaving behind the precipitate
- Crystallisation
  - If you were to have produced a soluble salt and you wanted to separate this salt from the solution that it was dissolved in
    - You would first warm the solution in an open container, allowing the solvent to evaporate, leaving a saturated solution
    - Allow this solution to cool
    - The solid will come out of the solution and crystals will start to grow, these can then be collected and allowed to dry
- Simple distillation
  - Used to separate a solvent from a solution. It is useful for producing water from salt solution.
    - Simple distillation works because the dissolved solute has a much higher boiling point than the solvent.
    - When the solution is heated, solvent vapour evaporates from the solution. The gas moves away and is cooled and condensed.
    - The remaining solution becomes more concentrated in solute as the amount of solvent in it decreases.
- Fractional distillation
  - Used to separate a pure liquid from a mixture of liquids.
    - Works when the liquids have different boiling points.
  - The oil is heated in the fractionating column and the oil evaporates and condenses at a number of different temperatures.
  - The many hydrocarbons in crude oil can be separated into fractions each of which contains molecules with a similar number of carbon atoms
  - The fractionating column works continuously, heated crude oil is piped in at the bottom. The vaporised oil rises up the column and the various fractions are constantly tapped off at the different levels where they condense.
  - The fractions can be processed to produce fuels and feedstock for the petrochemical industry.

Suggest suitable purification techniques, given information about the substances involved

- use information given above in application to a problem/question with given information about the substances involved