OCR B GCSE Chemistry

Topic 6: Making useful chemicals

What useful products can be made from acids?

Notes

1. Recall that acids react with some metals and with carbonates and write equations predicting products from given reactants

acid + metal carbonate → salt + water + carbon dioxide
acid + metal → salt + hydrogen

- salts produced:
  - first part of name comes from metal in alkali e.g. sodium from sodium hydroxide
  - second part of name comes from acid used:
    - HCl (hydrochloric acid) → chloride
    - HNO_3 (nitric acid) → nitrate
    - H_2SO_4 (sulfuric acid) → sulfate

2. Describe practical procedures to make salts to include appropriate use of filtration, evaporation, crystallisation and drying

to prepare an insoluble salt:

1. mix the two solutions needed to form the salt
2. filter the mixture using filter paper, which the insoluble salt will be left on
3. wash the salt using distilled water
4. leave the salt to dry on filter paper (water will evaporate, speed this process up by drying it in an oven)

to prepare a soluble salt from an insoluble base:

1. add an excess of the base to your acid
2. use a filter and filter paper to filter off any copper oxide that hasn't reacted (your solution should be blue as copper sulfate solution has been formed)
3. evaporate off the water by placing your final solution in a water bath

to prepare a soluble salt from a soluble base:

1. use a titration to find the exact amount of acid that reacts with your base
2. react these exact amounts
3. the solution left is your salt with water
4. warm to evaporate the water, leaving behind crystals of the salt

3. Use the formulae of common ions to deduce the formula of a compound

- Charges of the ions must cancel out for the formula of a compound

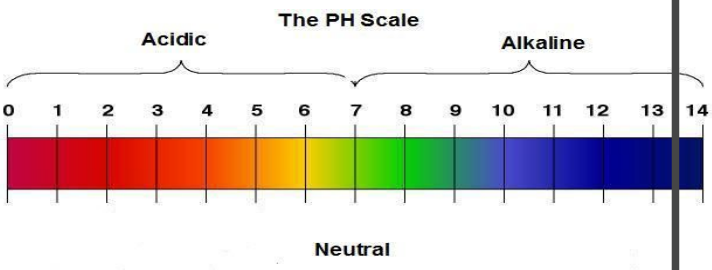
common ion charges:

- groups that lose electrons: group 1 +1 charge, group 2 +2 charge, group 3 +3 charge
- groups that gain electrons: group 5 -3 charge, group 6 -2 charge, group 7 -1 charge

- charges from acids:
  - HCl: Cl^-
  - HNO_3: NO_3^-
  - H_2SO_4: SO_4^{2-}

4. Recall that relative acidity and alkalinity are measured by pH including the use of universal indicator and pH meters

- Acids produce H^+ ions in aqueous solutions
- Alkalis produce OH^- ions in aqueous solutions
- The pH scale (0 to 14) measures the acidity or alkalinity of a solution, and can be measured using universal indicator of a pH probe
  - pH 7 is neutral
  - < pH 7 is acidic
  - > pH 7 is alkaline



5. (HT only) use and explain the terms dilute and concentrated (amount of substance) and weak and strong (degree of ionisation) in relation to acids including differences in reactivity with metals and carbonates

- Strong acid = completely ionised (where it releases H^+) in aqueous solution
  - Hydrochloric, nitric and sulfuric acids
- Weak acid = partially ionised in aqueous solution
  - Ethanoic, citric and carbonic acids
- Stronger an acid, lower the pH (for a given conc. of aq. solutions)
- Strong and weak is NOT the same as concentrated and dilute:
  - concentrated/dilute refers to the amount of substance in a given volume
  - strong/weak refers to the above – the H^+ ion conc. in aq. solutions

6. (HT only) use the idea that as hydrogen ion concentration increases by a factor of ten the pH value of a solution decreases by one

7. (HT only) describe neutrality and relative acidity and alkalinity in terms of the effect of the concentration of hydrogen ions on the numerical value of pH (whole numbers only)

see 4 and 6 as well as below...

- when a solution is neutral, concentration of OH^- = concentration of H^+
- when a solution is acidic, concentration of H^+ is greater than concentration of OH^-
- when a solution is acidic, concentration of OH^- is greater than concentration of H^+