Edexcel IAL Chemistry A-level

Unit 3: Practical Skills in Chemistry I

Definitions

Practical 1: Finding the Molar Volume of a Gas

Avogadro's law: This law states that the same volume of every gas, at the same temperature and pressure, contains the same number of molecules.

Effervescence: The bubbling of a liquid as gas is released, also known as fizzing.

Slightly/Sparingly soluble: A material which has a low solubility (only around 0.1-1g will dissolve in 100ml of solute).

Weighing by difference: The weight of a substance is calculated to be the difference between the weight of the weighing boat with the material and the weight of the weighing boat after the material has been transferred. It is a common way to weigh materials accurately.

Practical 2: Determination of the Enthalpy Change of a Reaction using Hess's Law

Decomposition: The chemical breakdown of a single compound into its elements or two or more simpler compounds.

Endothermic: A reaction that takes in energy from the surroundings (ΔH is positive). The reaction mixture and surroundings will decrease in temperature as heat energy is absorbed by the reaction.

Enthalpy change (ΔH): The heat energy change measured under a constant pressure.

Exothermic reaction: A reaction that releases energy to the surroundings (ΔH is negative) so the temperature of the surroundings increases.

Extrapolate: To extend a graph by inferring some values from trends in the data.

Hess's law: The enthalpy change for a reaction is independent of the route taken.

Neutralisation: A reaction between an acid and a base to form water and a salt. The ionic equation for neutralisation is:

$$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$$

Practical 3: Titration to find the Concentration of a Solution of Hydrochloric Acid

Accuracy: Relates to how closely the measured value in an experiment corresponds to the true value.

Acidic solution: A solution with a pH of less than 7.

Basic solution: A solution with a pH of more than 7.

Concordant results: Results are said to be concordant if they are within 0.20 cm^3 of each other.

End-point: The point at which the indicator changes colour in an acid-base titration.

Indicator: A chemical substance that changes colour at a certain pH.

Mean titre: The average of all the concordant titre results.

Methyl orange: A type of pH indicator. It is yellow in a basic solution and red in an acidic solution. This indicator changes colour between pH 3.1-4.4.

Neutral solution: A solution with a pH of 7.

Phenolphthalein: A type of pH indicator. It is colourless in an acidic solution and pink in a basic solution. This indicator changes colour between pH 8.3-10.

Trial titration: A titration that is used to find the approximate endpoint of the reaction, so it is known roughly how much of the solution in the burette is needed to neutralise the other solution. This means the next titrations can be done faster and with more accuracy.

Practical 4: Preparation of a Standard Solution and Titration

Concordant results: Results are said to be concordant if they are within 0.20 cm^3 of each other.

End-point: The point at which the indicator changes colour in an acid-base titration.

Indicator: A chemical substance that changes colour at a certain pH.

Neutralisation: A reaction between an acid and a base to form water and a salt. The ionic equation for neutralisation is:

$$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$$

Phenolphthalein: A type of pH indicator. It is colourless in an acidic solution and pink in a basic solution. This indicator changes colour between pH 8.3-10.

Pure: A substance that consists of only one type of compound/element. This is not a mixture.

Standard solution: A solution with a known concentration of a compound/element.

Titration: The addition of a solution with a known concentration to a solution with a known volume and an unknown concentration until the reaction reaches neutralization. This is often indicated by the colour change of an indicator.

Weighing by difference: The weight of a substance is calculated to be the difference between the weight of the weighing boat with the material and the weight of the weighing boat after the material has been transferred. It is a common way to weigh materials accurately.

Practical 5: Investigating the Rates of Hydrolysis of Halogenoalkanes

Precipitation: The formation of a solid from a solution.

Uncertainty: The degree of error in taking a measurement. This is estimated to be + or - half the smallest scale division of the apparatus.

Water bath: A piece of laboratory equipment which is filled with water to keep samples at a constant, specified temperature.

Practical 6: Chlorination of 2-methylpropan-2-ol with Concentrated Hydrochloric Acid

Drying agent: A substance used to remove water from an organic molecule in a solution.

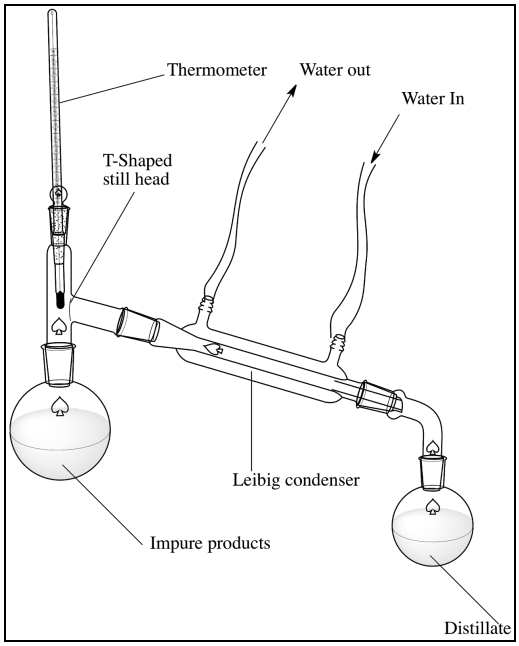
Separating funnel: A piece of equipment used in liquid-liquid extractions, when separating two immiscible liquids of different densities.

Practical 7: Oxidation of Propan-1-ol to Produce Propanal and Propanoic Acid

Anti-bumping granules: Added to a mixture being heated to prevent the formation of large gas bubbles that cause violent boiling.

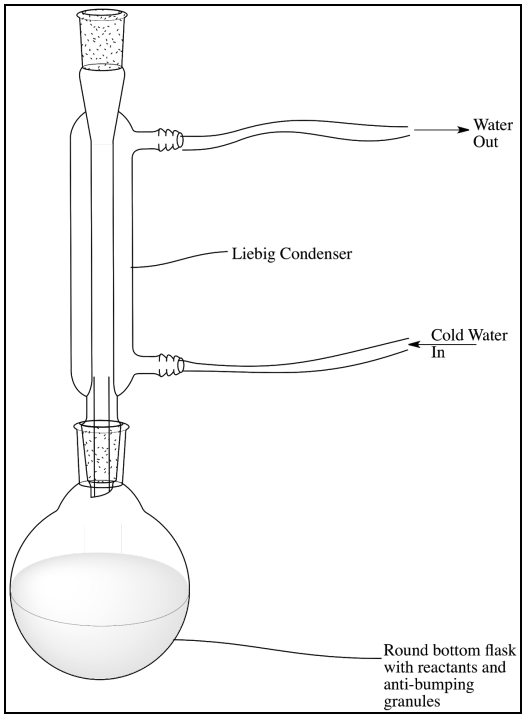
Distillation apparatus: A technique used to purify a liquid by heating and cooling. When the liquid evaporates it moves into a condenser where it is cooled, recondenses and collected.

Diagram - Distillation



Reflux: The continual boiling and condensing of a reaction mixture. This technique is often used to make sure a volatile liquid reaches a high enough temperature to ensure that the reaction goes to completion.

Diagram - Reflux



Practical 8: Analysis of Some Inorganic and Organic Unknowns

Anion: A negatively charged ion.

Cation: A positively charged ion.

Distillation apparatus: A technique used to purify a liquid by heating and cooling. When the liquid evaporates it moves into a condenser where it is cooled, recondenses and collected.

Effervescence: The bubbling of a liquid as a gas is released, also known as fizzing.

Flame test: An analytical technique used to identify certain elements and ions based on the colour produced when a nichrome wire is dipped into a solution of the species and held in a blue bunsen flame.

Halogen: Elements found in Group 7 of the periodic table are known as halogens.

Precipitation: The formation of a solid from a solution.

Transition metal elements: d-block elements that can form one or more stable ions with an incomplete d-subshell. Transition elements have more than one oxidation state, form coloured ions and can often act as catalysts.

Universal indicator paper: Paper which uses multiple indicators to determine how acidic or basic a solution is and changes colour depending on the acidity/basicity.