

# Edexcel IAL Chemistry A-level

## Unit 6: Practical Skills in Chemistry II Definitions

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## Practical 9: Following the rate of the iodine-propanone reaction

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

**Catalysts:** Provide a lower activation energy for a reaction to occur by providing an alternative reaction route. A catalyst does not affect the equilibrium since it increases the rate of the forward and backward reaction equally.

**Excess:** When a reactant is in excess there is more than the required amount for the reaction, having certain reactants in excess can be required so that further substitution reactions do not occur.

**Flammable:** A substance that can be set on fire easily.

**Irritant:** A substance which causes an inflammation or discomfort to the body, contact with these substances should be avoided.

## Practical 10: Finding the Activation Energy of a Reaction

**Activation energy:** The minimum energy required for a reaction to occur.

**Arrhenius equation:**  $k = Ae^{-E_a/RT}$ , where  $k$  is the rate constant,  $A$  is the pre-exponential factor,  $E_a$  is the activation energy,  $R$  is the gas constant and  $T$  is the temperature.

**Indicator:** Chemical solutions whose colour depends on the pH of the solution they are in.

**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.

**Rate constant:** Relates the rate of a chemical reaction at a given temperature to the product of the concentrations of reactants.

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



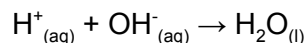
## Practical 11: Finding the Ka Value for a Weak Acid

**Buffer:** A solution that is able to resist changes in pH when small volumes of acid or base are added.

**End point:** The point during the titration when the indicator changes colour. A suitable indicator should change colour near the equivalence point (so should have a pH range within the pH change during the equivalence point).

**Indicator:** Chemical solutions whose colour depends on the pH of the solution they are in.

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



**pH:** A value that represents the acidity or alkalinity of a solution. Acidic solutions have a pH of less than 7 while alkali solutions have a pH of greater than 7. Neutral solutions have a pH of 7.

$$\text{pH} = -\log[\text{H}^+]$$

$$[\text{H}^+] = 10^{-\text{pH}}$$

**pH meter:** An instrument that measures the pH of a solution. A digital pH meter is better than a universal indicator as it can give a more precise value.

**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 and 10.

**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.

## Practical 12: Investigating Electrochemical Cells

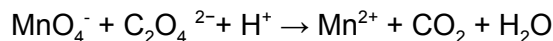
**Cell potential:** A measure of the potential difference between two half cells, calculated by combining two standard electrode potentials. The calculated cell potential can be used to predict feasibility of a reaction, although this doesn't consider concentration or kinetics.

**E.M.F:** Electromotive force, measured in volts. The difference between the potential differences of the cathode and anode in an electrochemical cell.

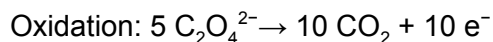
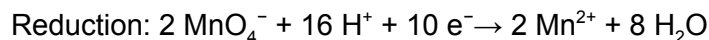




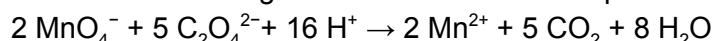
**Half equation:** A full redox equation can be split into two half-equations, one involving oxidation and the other involving reduction. This is useful for balancing complex redox reactions, such as:



can be split into:



And combined to give the balanced redox equation:



**Salt bridge:** A porous substance soaked with a solution of an inert, strong electrolyte, e.g. a filter paper soaked in  $\text{KNO}_3(\text{aq})$ . The salt ions flow through the bridge to complete the circuit and balance charges in solutions.

**Standard conditions:** These conditions are solutions of  $1.0 \text{ mol dm}^{-3}$  concentration, a temperature of 298K and 100 kPa pressure.

### Practical 13: Redox Titrations

**Concordant results:** Results are said to be concordant if they are within  $0.20 \text{ cm}^3$  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.

**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.

**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.





**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 14: Preparation of a Transition Metal Complex**

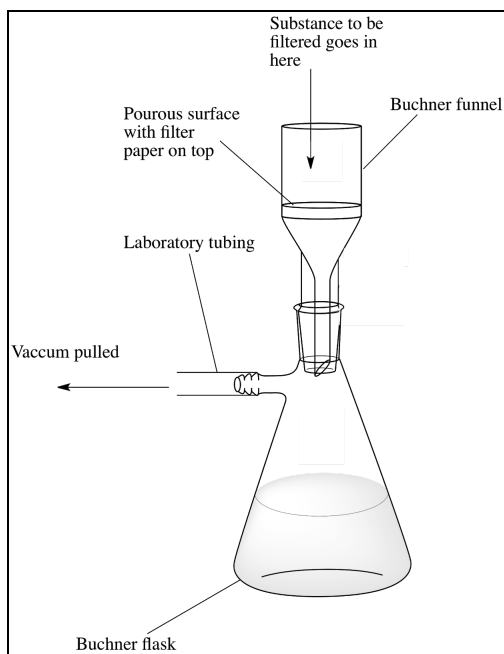
**Accuracy:** Relates to how closely the measured value in an experiment corresponds to a true value.

**Percentage yield:** The percentage ratio of the actual yield of product from a reaction compared with the theoretical yield.

$$\text{Percentage yield} = \frac{\text{Actual yield}}{\text{Theoretical Yield}} \times 100$$

**Vacuum filtration:** A technique used to separate a solid product from a liquid using high pressures.

**Diagram - vacuum filtration**



**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 15: 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.

## Practical 16: The Preparation of Aspirin

**Acetylation:** A type of reaction which introduces an acetyl functional group into a compound.

**Corrosive:** A substance which will destroy another by means of a chemical reaction.

**Precipitation:** The formation of a solid from a solution.

**Purification:** The process of removing impurities or contaminants from a product.

**Recrystallisation:** A purification technique used to purify a compound by dissolving the impurities and the compound in a particular solvent. The compound or impurities can be removed from this solution, leaving the other behind. The compound no longer contains the impurities.



