



## Mandatory Experiments

(Underlined experiments are for Higher level only.)

- 1.1 Flame tests (Li, Na, K, Ba, Sr and Cu only).
- 1.2 Redox reactions of group VII elements – halogens as oxidising agents (reactions with bromides, iodides,  $\text{Fe}^{2+}$ , and sulfites).  
Displacement reactions of metals (Zn with  $\text{Cu}^{2+}$ , Mg with  $\text{Cu}^{2+}$ ).
- 2.1 Tests for anions in aqueous solutions: chloride, carbonate, nitrate, sulfate, phosphate, sulfite, hydrogencarbonate.
- 3.1 Determination of the relative molecular mass of a volatile liquid (conical flask or gas syringe may be used).
- 4.1 Preparation of a standard solution of sodium carbonate.
- 4.2 Standardisation of a hydrochloric acid solution using a standard solution of sodium carbonate.
- 4.2A A hydrochloric acid/sodium hydroxide titration and the use of this titration in making the salt sodium chloride (Ordinary level only).
- 4.3 Determination of the concentration of ethanoic acid in vinegar.
- 4.4 Determination of the amount of water of crystallisation in hydrated sodium carbonate.
- 4.5 A potassium manganate(VII)/ammonium iron(II) sulfate titration.
- 4.6 Determination of the amount of iron in an iron tablet.
- 4.7 An iodine/thiosulfate titration.
- 4.8 Determination of the percentage (w/v) of hypochlorite in bleach.
- 5.1 Determination of the heat of reaction of hydrochloric acid with sodium hydroxide.
- 5.2 Preparation and properties of ethyne (combustion, tests for unsaturation using bromine water and acidified potassium manganate(VII) solution).
- 6.1 Monitoring the rate of production of oxygen from hydrogen peroxide using manganese dioxide as a catalyst.
- 6.2 Studying the effects on the reaction rate of (i) concentration and (ii) temperature, using sodium thiosulfate and hydrochloric acid.





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- 7.1 Recrystallisation of benzoic acid and determination of its melting point.
- 7.2 Preparation of soap.
- 7.3 Preparation and properties of ethene (combustion and tests for unsaturation using bromine water and acidified potassium manganate(VII) solution).
- 7.4 Preparation and properties of ethanal (properties limited to reactions with: (i) acidified potassium manganate(VII) solution, (ii) Fehling's reagent and (iii) ammoniacal silver nitrate).
- 7.5 Preparation and properties of ethanoic acid (properties limited to reactions with (i) sodium carbonate, (ii) magnesium and (iii) ethanol).
- 7.6 Extraction of clove oil from cloves (or similar alternative) by steam distillation.
- 7.7 Separation of a mixture of indicators using paper chromatography, thin-layer chromatography or column chromatography.
- 8.1 Simple experiments to illustrate Le Chatelier's Principle:
- (i)  $\text{CoCl}_4^{2-} + 6\text{H}_2\text{O} \rightleftharpoons \text{Co}(\text{H}_2\text{O})_6^{2+} + 4\text{Cl}^-$   
- to illustrate the effects of both temperature and concentration changes on an equilibrium mixture.
- (ii)  $\text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O} \rightleftharpoons 2\text{CrO}_4^{2-} + 2\text{H}^+$   
- to demonstrate the effects of concentration changes on an equilibrium mixture.
- (iii)  $\text{Fe}^{3+} + \text{CNS}^- \rightleftharpoons \text{Fe}(\text{CNS})^{2+}$   
- to demonstrate the effects of concentration changes on an equilibrium mixture.
- 9.1 Colorimetric experiment to estimate free chlorine in swimming pool water or bleach (using a colorimeter or comparator).
- 9.2 Determination of total suspended and total dissolved solids (expressed as p.p.m.) by filtration and evaporation respectively. Determination of pH.
- 9.3 Estimation of total hardness using ethylenediaminetetraacetic acid (edta).  
(Balanced ionic equation required.)
- 9.4 Estimation of dissolved oxygen by redox titration.

