Scheme of work – Cambridge IGCSE® Chemistry (0620)

Unit 1: Experimental techniques

Recommended prior knowledge

Basic knowledge on particle theory.

Context

The concepts and practical skills introduced in this unit will be revisited in future topics.

Outline

This unit contains a considerable amount of practical work and introduces a variety of practical techniques that future units will build on. The unit starts by focusing on the variety of purification techniques available to chemists. This unit is cross-referenced to assessment objectives A2–4, B1–7, C1–4.

(Please note: **(S)** in **bold** denotes material in the Supplement (Extended syllabus) only)

Syllabus ref	Learning objectives	Suggested teaching activities	Learning resources
2.1	Name appropriate apparatus for the measurement of time, temperature, mass and volume, including burettes, pipettes and measuring cylinders	This could be introduced by measuring the temperature, mass, and volumes of different coloured liquids [water/food dye]. This will be reinforced when all experimental work is conducted.	*Cambridge IGCSE Chemistry, S.Goodman & C. Sunley*, Collins, 2006. CD ROM video clips 1–6

Syllabus ref	Learning objectives	Suggested teaching activities	Learning resources
2.2(a)	Describe paper chromatography; Interpret simple chromatograms	Experimental work can involve simple inks, sweets, leaves, dyes and food colourings. Non-permanent felt tipped pens work well.	*Cambridge IGCSE Chemistry, S.Goodman & C. Sunley*, Collins, 2006.CD ROM video clip 7 www.practicalchemistry.org/experiments/chromatography-of-sweets%2C194%2CEX.html www.practicalchemistry.org/experiments/chromatography-of-leaves,199,EX.html www.scienceprojectlab.com/paper-chromatography-experiment.html An excellent collection of animations and video clips: Royal Society of Chemistry Particles in Motion CD ROM, 2006.
2.2(a) (S)	**Interpret simple chromatograms, including the use of R_f values**	Use R_f values to compare the height of the spots on the chromatogram with advanced students.	www.chemguide.co.uk/analysis/chromatography/paper.html
2.2(a) (S)	**Outline how chromatography techniques can be applied to colourless substances by exposing chromatograms to substances called locating agents (knowledge of *specific* locating agents is not required)**	Experimental work can be extended to include separating a mixture of amino acids (using ninhydrin as a locating agent) and simple sugars.	www.biotopics.co.uk/as/amino_acid_chromatography.html
2.2(a)	Identify substances and assess their purity from melting point and boiling point information	This can be demonstrated by dissolving sodium chloride or other salts in water or by comparing the melting point of the alloy, solder, with those of lead and tin. The use of salt on roads to melt ice could be mentioned in this context.	www.practicalchemistry.org/print/experiments/introductory/mixtures-and-separations/solid-mixtures-a-tin-and-lead-solder,197,EX.html
2.2(a)	Understand the importance of purity in substances in everyday life, e.g. foodstuffs and drugs	Chemists need pure substances to study their properties. Pure substances are used in industry to make useful products such as food and drugs.	

Syllabus ref	Learning objectives	Suggested teaching activities	Learning resources
2.2(b)	Describe methods of purification by the use of a suitable solvent, filtration, crystallisation, distillation (including use of fractionating column) (Refer to the fractional distillation of crude oil in section 14.2 and products of fermentation in section 14.6 of the syllabus)	Typical solvents to use are water (salt/sand) or ethanol (salt/sugar). Filtration is used in one of the salt preparation methods to remove the excess solid. Crystallisation is used in most salt preparations to obtain the final product. Experimental work can involve: • Purification of an impure solid; • Demonstration of the extraction of iodine from seaweed; • Distillation of coca-cola or coloured water; • Demonstration of the (partial) separation of ethanol from water by distillation; • Demonstration of the separation of 'petroleum fractions' from mixtures of hydrocarbons using 'artificial' crude oil. Extension – the separation of oxygen and nitrogen from liquid air by fractional distillation.	*Cambridge IGCSE Chemistry, S.Goodman & C. Sunley, Collins*, 2006. CD ROM video clips 8-11. An excellent collection of animations and video clips: Royal Society of Chemistry Particles in Motion CD ROM, 2006. www.practicalchemistry.org/print/experiments/introductory/mixtures-and-separations/separating-sand-and-salt,192,EX.html www.practicalchemistry.org/print/experiments/introductory/mixtures-and-separations/purification-of-an-impure-solid,196,EX.html www.practicalchemistry.org/print/experiments/intermediate/separation-and-analysis/extracting-iodine-from-seaweed,256,EX.html Various methods of purification 1.6.1–1.6.3 & 1.7.1–1.7.3: *R. Norris & R. Stanbridge. Chemistry for IGCSE*, Nelson Thornes, 2009, ISBN 9781408500187, p12-15.
2.2(b)	Suggest suitable purification techniques, given information about the substances involved	This may be linked to magnetic properties (less important) and varying solubilities (more important).	