C12 – Chemical Analysis

Lessons TBAT	Key Knowledge	Practical	Assessment
TBAT: Define pure and impure substances and use data to distinguish between them. TBAT: Explain why formulations are useful. TBAT: Explain how obtain Rf values from chromatograms.	5.8.1.1 Pure substances In chemistry, a pure substance is a single element or compound, not mixed with any other substance. Pure elements and compounds melt and boil at specific temperatures. Melting point and boiling point data can be used to distinguish pure substances from mixtures. In everyday language, a pure substance can mean a substance that has had nothing added to it, so it is unadulterated and in its natural state, eg pure milk. Students should be able to use melting point and boiling point data to distinguish pure from impure substances. 5.8.1.2 Formulations A formulation is a mixture that has been designed as a useful product. Many products are complex mixtures in which each chemical has a particular purpose. Formulations are made by mixing the components in carefully measured quantities to ensure that the product has the required properties. Formulations include fuels, cleaning agents, paints, medicines, alloys, fertilisers and	Required practical activity 12: investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. Testing for gases Melting points (Pure/impure)	Required practical 6 mark question and shorter answer questions. Maths focus Use ratios, fractions and percentages. Make estimates of the results of simple calculations.

TBAT: Describe how to test for gases.	foods. Students should be able to identify formulations given appropriate information. Students do not need to know the names of components in proprietary products. 5.8.1.3 Chromatography Chromatography can be used to separate mixtures and can give information to help identify substances. Chromatography involves a stationary phase and a mobile phase. Separation depends on the distribution of substances between the phases. The ratio of the distance moved by a compound (centre of spot from origin) to the distance moved by the solvent can be expressed as its Rf value: Rf = distance moved by substance/distance moved by solvent Different compounds have different Rf values in different solvents, which can be used to help identify the compounds. The compounds in a mixture may separate into different spots depending on the solvent but a pure compound will produce a single spot in all solvents. Students should be able to: • explain how paper chromatography separates mixtures • suggest how chromatographic methods can be used for distinguishing pure substances from impure substances • interpret chromatograms and determine Rf values from chromatograms • provide answers to an appropriate number of significant figures. 5.8.2 Identification of common gases 5.8.2.1 Test for hydrogen	Key stage 3 Pure and impure substances • the concept of a pure substance • mixtures, including dissolving • diffusion in terms of the particle model • simple techniques for separating mixtures: chromatography • the identification of pure substances.

	The test for hydrogen uses a burning splint held at the open end of a test tube of the gas. Hydrogen burns rapidly with a pop sound. 5.8.2.2 Test for oxygen The test for oxygen uses a glowing splint inserted into a test tube of the gas. The splint relights in oxygen. 5.8.2.3 Test for carbon dioxide The test for carbon dioxide uses an aqueous solution of calcium hydroxide (lime water). When carbon dioxide is shaken with or bubbled through limewater the limewater turns milky (cloudy). 5.8.2.4 Test for chlorine The test for chlorine uses litmus paper. When damp litmus paper is put into chlorine gas the litmus paper is bleached and turns white.	

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