Year 9 Chemistry Half Termly 2 Topic sheet for January - March 2020

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| TOPIC: Experimental Techniques |

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| Theme: The separation of mixtures | Level: Year 9 |
| Objectives: To develop an understanding of the separation and analysis of mixtures | |

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| Focussing Statements | Key Words Practical | | |
| 1. **Name appropriate apparatus for the measurement of time, temperature, mass and volume, including burettes, pipettes and measuring cylinders** 2. **Demonstrate knowledge and understanding of paper chromatography**  * Experimental work can involve simple inks, sweets, leaves, dyes and food colourings. Non-permanent felt-tip pens work well.  1. **Interpret simple chromatograms, including the use of Rf values**  * use Rf values to compare the height of the spots on the chromatograms obtained  1. **Outline how chromatography techniques can be applied to colourless substances by exposing chromatograms to substances called locating agents**  * Experimental work can be extended to include separating a mixture of amino acids (using ninhydrin as a locating agent) and simple sugars. This may be best done as a teacher demonstration.  1. **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.  1. **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. This could be set as a brief research activity.  1. **Describe and explain methods of purification by the use of a suitable solvent, filtration, crystallisation and distillation (including use of fractionating column)**  * Typical solvents to use are water (salt/sand) or ethanol (salt/sugar). Filtration is used in one of the salt preparation methods above 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.  1. **Suggest suitable purification techniques, given information about the substances involved**  * This may be linked to magnetic properties (less important) and varying solubilities (more important). | | Chromatography  Burettes  Pipettes  Mass  Volume  Rf values  Locating Agents  Purity  Alloy  Solvent  Solute  Solution  Filtration  Crystallisation  Distillation  Fractional Distillation  Solubility | Chromatography of sweets: [www.practicalchemistry.org/experiments/chromatography-of-sweets%2C194%2CEX.html](http://www.practicalchemistry.org/experiments/chromatography-of-sweets%2C194%2CEX.html)  and  www.rsc.org/learn-chemistry/resource/res00000455/smarties-chromatography  Chromatography of leaves:  [www.practicalchemistry.org/experiments/chromatography-of-leaves,199,EX.html](http://www.practicalchemistry.org/experiments/chromatography-of-leaves,199,EX.html)  Another paper chromatography experiment:  [www.scienceprojectlab.com/paper-chromatography-experiment.html](http://www.scienceprojectlab.com/paper-chromatography-experiment.html)  Practical procedure for comparing melting points of lead, tin and solder:  [www.nuffieldfoundation.org/practical-chemistry/solid-mixtures-tin-and-lead-solder](http://www.nuffieldfoundation.org/practical-chemistry/solid-mixtures-tin-and-lead-solder) | |

**Textbooks and worksheets**