# Assessment Schedule – 2008

## Science: Describe selected organic compounds and their uses (90730)

## Evidence Statement

| Question | Achievement | Achievement with Merit | Achievement with Excellence |
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| ONE<br>(a) | • The second number of the notation represents the number of C=C bonds present in the fatty acid.<br>• The number of C=C bonds will alter the melting point of the fatty acid.<br>• The larger the second number of the notation, the lower the melting point.<br><br>ONE point needed. | The **second** number of the notation represents the number of C=C bonds present in the fatty acid which means as the number of C=C bonds increases, the melting point of the fatty acid decreases. | |
| (b) | • Stearic acid relates to brown / orange colour remaining and Oleic acid relates to brown / orange colour decolourises / disappears.<br>• Decolourises due cardon to carbon bond (C=C). | Identifies colour changes AND explains decolourisation, that is shows the presence of carbon to carbon double bonds (C=C) / unsaturation. | |
| (c) | • Monounsaturated fatty acids **reduce** cholesterol levels in blood vessels.<br>• Monounsaturated fatty acids **reduce** the chances of heart disease.<br>• 'Good' fatty acids contain more 'cis' fatty acids / fewer 'trans' fatty acids.<br>• 'Cis' fatty acids are healthier for the body.<br>• Reference to saturated acids increasing cholesterol / heart disease.<br>• Clear annotated diagram<br><br>One needed. | Answer must relate to ONE aspect of monounsaturated fatty acid structure and health consequence to humans.<br><br>• Monounsaturated fatty acids form fewer intermolecular bonds between chains resulting in a reduction of cholesterol / heart disease.<br>• 'Good' fatty acids contain more 'cis' fatty acids, which result in lower cholesterol levels.<br>• 'Good' fatty acids contain more 'cis' fatty acids, which result in a lower chance of heart disease.<br><br>One needed. | Discusses with reference to two of<br>• **Fewer intermolecular forces** forming between chains.<br>• **Reduction of the levels of cholesterol** within the circulatory system,<br>• Resulting in a **lower chance of heart disease**.<br><br>AND<br><br>Monunsaturated fatty acids contain higher levels of '**cis**' fatty acids, which produce '**kinks**' in the structure of the fatty acid chain (either 'cis' or 'kinks' stated) |

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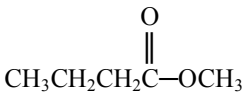
| TWO<br>(a) | • Oil (long-chain hydrocarbons) is **non-polar** and will not mix with water.<br>• Oil will not mix with **polar** water.<br>• Oil is non-polar and will not mix with water which is polar.<br>One needed. | Long chain hydrocarbons have C–H or C–C bonds, which are not polar so cannot form **hydrogen bonds** with water. | |
| (b) | • Micelles form about the fuel oil.<br>• Hydrophobic (non-polar) parts of the detergent molecules bind to the fuel oil.<br>• Hydrophilic (polar) parts of the detergent molecules join with water.<br>• Detergent emulsifies (or description of) fuel oil.<br>• Micelles are dispersed.<br>• Micelles scatter light.<br>• Labelled miscelle diagram.<br><br>ONE needed. | • Detergents form micelles around the fuel oil by the hydrophobic (non-polar) tails binding to the fuel-oil and the hydrophilic (polar) head joining with water molecules.<br>• Detergent molecules (micelles) emulsify (or description of) the fuel oil, dispersing it making it look as if it has disappeared.<br><br>ONE explanation needed. | Discussion relates BOTH Merit bullet points to the TWO **observations** made in the test tube. **Miscelles** must be mentioned.<br><br>Labelled diagrams can be used to discuss the different bullet points. |
| THREE<br>(a)(i)<br>(ii) | • Methanol.<br>• $CH_3OH$<br>• Circle around –OH.<br><br>ALL needed. | | |
| (b) | • Acts as a catalyst to speed up the reaction.<br>• Acts as a dehydrating agent.<br>• Causes the reaction equilibrium to move towards the products.<br><br>ONE needed. | • Acts as a catalyst to speed up the reaction.<br>• Acts as a dehydrating agent to remove the water to allow the reaction equilibrium to move towards making more product.<br><br>BOTH needed. | |
| (c) |  | | |

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| FOUR<br>(a) | • Alcohol dissolves the ingredients in the perfume / aftershave.<br>• Alcohol evaporates when on the skin to release the perfume / aftershave smell.<br><br>One needed. | • Alcohol is a solvent so dissolves the ingredients of the perfume / aftershave, AND due to a lower boiling point, the alcohol evaporates on the skin to release the perfume / aftershave smell.<br>• Alcohol is a solvent and can dissolve both polar and non-polar chemicals.<br><br>One needed. | |
| (b) | • Hexanoic acid<br>• $CH_3(CH_2)_4COOH$ (or structural formula).<br><br>Both needed. | | |
| (c) | From orange to green (or blue). | | |
| (d) | • Butanol burns cleaner than butene.<br>• Butanol burns by complete combustion.<br>• Butene burns by incomplete combustion.<br>• Butene produces more soot (and carbon monoxide) than butanol.<br>• Butene produces more energy than butanol per unit of fuel.<br><br>ONE needed. | • Butanol burns **cleaner** than butene because it produces less carbon / soot / carbon monoxide.<br><br>Supported by correct symbol equation(s). | Discussion relates all of the following<br>• Butene burns by incomplete combustion.<br>$C_4H_8 + \mathbf{2}O_2 \rightarrow \mathbf{4}C + \mathbf{4}H_2O$<br>or<br>$C_4H_8 + \mathbf{4}O_2 \rightarrow \mathbf{4}CO + \mathbf{4}H_2O$<br><br>• Butanol burns by complete combustion.<br>$2C_4H_9OH + \mathbf{13}O_2 \rightarrow \mathbf{8}CO_2 + \mathbf{10}H_2O$<br>• Butanol burns cleaner than butene because it produces less carbon / soot / carbon monoxide.<br><br>(Correct formulae, balancing not needed.) |
| (e) | $C_4H_{10} + O_2 \rightarrow C + H_2O$<br><br>All FOUR correct formulae. | $C_4H_{10} + \mathbf{2.5}O_2 \rightarrow \mathbf{4}C + \mathbf{5}H_2O$<br><br>OR<br><br>$\mathbf{2}C_4H_{10} + \mathbf{5}O_2 \rightarrow \mathbf{8}C + \mathbf{10}H_2O$<br><br>Correct formulae and fully balanced. | |

**Judgement Statement**

| Achievement | Achievement with Merit | Achievement with Excellence |
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| Total of SEVEN opportunities answered at Achievement level (or higher)<br><br>$7 \times A$ | Total of SEVEN opportunities answered with FOUR at Merit level (or higher) plus THREE at Achievement level<br><br>OR<br><br>ONE opportunity answered at Excellence plus TWO at Merit level plus FOUR at Achievement level<br><br>$4 \times M + 3 \times A$ or $1 \times E + 2 \times M + 4 \times A$ | Total of SEVEN opportunities answered with ONE at Excellence level plus FOUR at Merit level (or higher) plus TWO at Achievement level (or higher).<br><br>$1 \times E + 4 \times M + 2 \times A$ |