# Year 12 Chemistry Self-Assessment Organic and Biological Chemistry

### Topic 4.1: Systematic Nomenclature

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| ***Expectation***  From SACE Subject Outline | ***4.1-4.8***  ***Test Q*** | ***Proficiency***  (beginning/sometimes/proficient) | ***Comments/questions*** | ***Assignment question(s)*** |
| Identify the functional groups in the structural formulae of alcohols, aldehydes, ketones, carboxylic acids, amines, esters, and amides. | **1(f)**  **4(a)**  **5(c)** |  |  |  |
| State, given its structural formula, the systematic name of an organic compound containing:  • up to eight carbon atoms arranged as either a straight chain or a branched chain  • one or more of the same functional groups (with these limited to hydroxyl, aldehyde, ketone, carboxyl, or primary amino groups). | **1(a)-(c)**  **6(a)** |  |  | Assignment 2 Q5 |
| Given its systematic name, draw the structural formula of an organic compound containing:  • up to eight carbon atoms arranged as either a straight chain or a branched chain  • one or more of the same functional groups (with these limited to hydroxyl, aldehyde, ketone, carboxyl, or primary amino groups). | **6(c)** |  |  | Assignment 1 Q1 |

### Topic 4.2: Physical Properties

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Predict and explain the melting points and boiling points of an organic compound in comparison with those of other compounds that contain the same functional group. | **-** |  |  | Assignment 1 Q2(c) |
| Predict and explain the boiling points of alcohols in comparison with those of aldehydes and ketones of similar molar mass. | **-** |  |  | Assignment 1 Q3 |
| Predict and explain the boiling points of esters in comparison with those of isomeric acids. | **1(e),(g)** |  |  | Assignment 2 Q3 |
| Explain the insolubility in water of most organic compounds. | **3** |  |  |  |
| Predict and explain the solubility in water of the smaller amino acids, carboxylic acids, alcohols, aldehydes, and ketones. | **-** |  |  |  |
| Predict and explain the relative solubilities in water of two organic compounds, given their structural formulae. | **-** |  |  |  |

### Topic 4.3: Alcohols

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Describe the conditions, and write equations, for the hydrolysis of polysaccharides and disaccharides, and the production of ethanol by the fermentation of glucose. | **2** |  |  |  |
| Identify a hydroxyl group in an alcohol as primary, secondary, or tertiary, given the structural formula. | **6(b)** |  |  | Assignment 2 Q2 |
| Describe how primary and secondary alcohols can be distinguished from tertiary alcohols by their reaction with acidified dichromate solution. |  |  |
| Predict the structural formula(e) of the product(s) of dichromate oxidation of a primary or secondary alcohol, given its structural formula. |  |  |

### Topic 4.4: Aldehydes and Ketones

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Given the structural formula of the aldehyde or ketone, draw the structural formula of the alcohol from which it could be produced by oxidation, and describe the necessary reaction conditions. | **-** |  |  |  |
| Draw the structural formula of the oxidation product of a given aldehyde in either acidic or alkaline conditions. | **-** |  |  | Assignment 1 Q4 (b) |
| Describe how acidified dichromate solution and Tollens’ reagent (ammoniacal silver nitrate solution) can be used to distinguish between aldehydes and ketones. | **-** |  |  |  |

### Topic 4.5: Carboxylic Acids

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Identify the aldehyde or primary alcohol from which a carboxylic acid could be produced by oxidation, given its structural formula. | **-** |  |  |  |
| Write an equation for the ionisation of a carboxylic acid in water. | **-** |  |  |  |
| Write equations for the reactions of carboxylic acids with hydroxides, carbonates, and hydrogencarbonates, and describe changes that accompany these reactions. | **5(b)** |  |  | Assignment 1 Q5 |
| Explain why some drugs with carboxyl groups are usually taken in the form of their salts. | **5(a)** |  |  |  |

### Topic 4.6: Amines

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Draw the structural formula of the protonated form of an amine, given the structural formula of its molecular form, and vice versa. | **7(c)** |  |  | Assignment 2 Q4(c) |
| Identify an amino group in an amine as primary, secondary, or tertiary, given the structural formula. | **1(d)**  **7(b)** |  |  |  |
| Explain why some drugs with amine groups are usually taken in the form of their salts. | **-** |  |  |  |

### Topic 4.7: Esters

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Draw the structural formula of the ester that could be produced by the condensation reaction between an alcohol and a carboxylic acid, given their structural formulae, and write an equation for the reaction. | **5(d)** |  |  | Assignment 1 Q2 (d)  Assignment 2 Q4 (b) |
| Explain the use of heating under reflux and the presence of a trace of concentrated sulfuric acid in the laboratory production of esters. | **-** |  |  |  |
| Identify the products of hydrolysis of an ester, given its structural formula. | **1(h)**  **4(b)** |  |  |  |

### Topic 4.8: Amides

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| ***Expectation*** | ***4.1-4.8***  ***Test Q*** | ***Proficiency*** | ***Comments/questions*** | ***Assignment question(s)*** |
| Draw the structural formula of the amide that could be produced by the condensation reaction between an amine and a carboxylic acid, given their structural formulae. | **-** |  |  |  |
| Identify the products of hydrolysis of an amide, given its structural formula. | **-** |  |  |  |