ANSWERS: Level 2 Organic Reactions flow charts

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| **2019** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (i)  (ii) | The three structural formulae of bromoethane, ethanol, choloroethane; the name ethanol beside its structural formula; and the two reagents –  KOH(*aq*) and SOCl2 / PCl3 / PCl5. | • THREE correct in the reaction scheme.  • TWO correct structural  formulae. | • FIVE correct in the reaction scheme.  • THREE structural formulae  with one correct reagent. | • SIX of seven correct in the reaction scheme. |

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| **2018** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (i)  (ii) | A screenshot of a cell phone  Description automatically generated  Reagent 1: SOCl2 / PCl3 / PCl5  Reagent 2: NH3(*alc*) or conc or Lucas Reagent  Both reactions are substitution reactions because one atom or group of atoms is substituted by another. In the first step, the OH group on the alcohol, pentan-2-ol is substituted by a Cl atom to make a chloroalkane, 2-chloropentane. The reagent used is  SOCl2. To convert the chloroalkane to an amine requires conc NH3 (alc). This causes the Cl to be substituted by an NH2 to form the amine. (This is so that the OH group in aqueous ammonia does not get substituted onto the chloroalkane.) | Draws pentan-2-amine  Identifies the substitution  reaction for both steps. | Both reaction types.  **AND**  Both reagents  **OR**  Both structures. | **Names** and **draws** all  molecules linking to the  reaction type and reagents with condition(s). |

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| **2017** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (a) (i)  (ii)  (b)  (c) (i)  (ii)  (d) | Compound **A**. CH3CH2OH  Compound **C**. CH3CH3  Compound **D**. CH3CH2Cl  Reagent **2**: Cr2O72– / H+ or MnO4- / H+  Reagent **3**: H2 / Ni or H2 / Pt / 150°C  Reaction A: addition (hydration)  Reaction B: oxidation  Reaction C: addition (hydrogenation)  Reaction D: substitution (halogenation)  Reaction E: substitution.  Red litmus paper will turn blue in a solution of compound **E**, but will not change in **B**.  Blue litmus paper will turn red in a solution of compound **B**, but will not change in **E**.  CH3COOH(*aq)* + CH3CH2NH2(*aq)* → CH3COO–(*aq*) + CH3CH2NH+(*aq*)  (or amide condensation reaction)  The reaction between **B** and **E** is an acid-base (neutralisation) reaction. Acid-base  reactions involve a proton / H+ transfer.  Protons / H+, are released from the carboxylic acid functional group, –COOH, resulting in a salt forming containing the –COO– group.  The proton / H+ is accepted by the amine functional group, –NH2, this forms a salt  containing the –NH3+ group.  PCl3 / PCl5 / SOCl2 can be used to convert compound **A**, CH3CH2OH, an alcohol, to the chloroalkane, CH3CH2Cl. This is a substitution reaction where the –OH group in  compound **A** is replaced by a Cl atom from PCl3 / PCl5 / SOCl2. | Any THREE correct in (a)(i).  THREE correct in  (a)(ii).  Identifies a distinguishing test for both compounds.  Correctly identifies the  products  AND  Correctly identifies the type of reaction.  Identifies the reagent PCl3 / PCl5 / SOCl2 / Lucas  OR substitution  OR replaced by Cl. | Any EIGHT correct from (a)(i) and (ii).  Writes correctly balanced equation.  Explanation of reaction is given. | Justifies the type of  reaction by linking the  type of reaction to  proton / H+ transfer with a correctly balanced equation.  (*Proton / H+ transfer*  *only required at E level.*) |

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| **2016** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (a)(i)  (ii) | Compound **A**. CH3─CH3  Compound **B**. CH3─CH2OH  Compound **C**. CH3─COOH or CH3─COH (aldehyde)  Reagent **X**. concentrated H2SO4  Reaction **1**: substitution  Reaction **2**: substitution  Reaction **3**: oxidation | * Any THREE correct in (a)(i).   OR  All THREE correct in (a)(ii). | * Any SIX correct. |  |

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| **2015** | **Evidence** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| (a)(i) | ass91165Q3b1 | * Draws structural formulae for TWO organic products.   AND  Circles ONE of the functional groups.  OR  Identifies ONE reagent correctly. | * Draws structural formulae for all FOUR organic products.   AND  Circles THREE functional groups.  AND  Identifies ONE reagent correctly. |  |
| (ii) | Functional groups circled. |  |  |  |
| (iii) | Reagent X is concentrated sulfuric acid, conc H2SO4, or c.H2SO4.  Reagent Y is alcoholic potassium hydroxide, KOH (*alc*)  or alcoholic sodium hydroxide, NaOH (*alc*). |  |  |  |

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