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 structuralformulae. | • FIVE correct in the reaction scheme.• THREE structural formulaewith 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 generatedReagent 1: SOCl2 / PCl3 / PCl5Reagent 2: NH3(*alc*) or conc or Lucas ReagentBoth 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 isSOCl2. 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-amineIdentifies the substitutionreaction for both steps. | Both reaction types.**AND**Both reagents**OR**Both structures. | **Names** and **draws** allmolecules linking to thereaction 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**. CH3CH2OHCompound **C**. CH3CH3Compound **D**. CH3CH2ClReagent **2**: Cr2O72– / H+ or MnO4- / H+Reagent **3**: H2 / Ni or H2 / Pt / 150°CReaction A: addition (hydration)Reaction B: oxidationReaction 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-basereactions 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 saltcontaining 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 incompound **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 theproductsANDCorrectly identifies the type of reaction.Identifies the reagent PCl3 / PCl5 / SOCl2 / LucasOR substitutionOR replaced by Cl. | Any EIGHT correct from (a)(i) and (ii).Writes correctly balanced equation.Explanation of reaction is given. | Justifies the type ofreaction by linking thetype of reaction toproton / 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─CH3Compound **B**. CH3─CH2OHCompound **C**. CH3─COOH or CH3─COH (aldehyde)Reagent **X**. concentrated H2SO4Reaction **1**: substitutionReaction **2**: substitutionReaction **3**: oxidation | * Any THREE correct in (a)(i).

ORAll 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.

ANDCircles ONE of the functional groups. OR Identifies ONE reagent correctly. | * Draws structural formulae for all FOUR organic products.

ANDCircles THREE functional groups. ANDIdentifies 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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