**ANSWERS: Acid Base reactions**

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| **2019** | **Evidence** | **Achieve** | **Merit** | **Excellence** |
| (i)(ii) | Sodium carbonate, Na2CO3, solid or solution can be used as it will fizzwith **C**, which is a carboxylic acid in an **acid-base reaction** /neutralisation. The amine functional group of **B** would not react, as it is abase like the sodium carbonate.Any carbonate or hydrogen carbonate is acceptable.OR add a strip of Mg metal to both **B** and **C**. **C** will fizz, producing gasas it is an **acid-metal reaction** because **C** is a carboxylic acid.The amine (**B**) functional group would not react with the Mg metal. | • Identifies TWO functional groups.• Identifies TWO correct observations for two tests.Chooses a valid reagent. | Links TWO functional groupsto correct reagent andobservations.Links correct reagent to correctobservations. | Accurate table withexplanation of a reaction, and observations thatdistinguish the functional groups. |

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| **2018** | **Evidence** | **Achieve** | **Merit** | **Excellence** |
| (i)(ii) | Ethanoic acid is an acid so will react with the solid sodiumhydrogen carbonate to produce carbon dioxide gas as this is anacid-base reaction. Therefore fizzing will be observed. Thepropan-1-amine is a base and will not react with the NaHCO3.Propyl ammonium ethanoate / propan-1-amine ethanoate | • Identifies that the acid will reactwith the NaHCO3. | • Links the acid-base reactionto **observations** to identify the liquids• Names or draws the salt formed. |  |

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| **2017** | **Evidence** | **Achieve** | **Merit** | **Excellence** |
| (a)(b) (i)(ii) | 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*) + CH3CH2NH3+(*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. | • Identifies a distinguishing test for both compounds.• Correctly identifies the productsANDCorrectly identifies the type of reaction. | • Writes correctly balanced equation. | • Justifies the type ofreaction by linking thetype of reaction toproton / H+ transfer witha correctly balancedequation.(*Proton / H+ transfer**only required at E**level.*) |

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| **2016** | **Evidence** | **Achieve** | **Merit** | **Excellence** |
|  (i)(ii) | CH3CH2NH2(*aq*) + HCl(*aq*) → CH3CH2NH3+(*aq*) + Cl–(*aq*) OR CH3CH2NH3Cl(*aq*)Carboxylic acids have acidic properties because when they react, some of the acid molecules donate H+ to water molecules. CH3COOH(*aq*) + H2O(*l*) → CH3COO–(*aq*) + H3O+(*aq*) | * Completes a balanced equation correctly.
* Identifies H+ is transferred from ethanoic acid to water molecules.

ORIdentifies H+ / H3O+ as a product of the reaction.ORIdentifies an acidic property, e.g. indicator, neutralisation reaction. | * Explains why carboxylic acids have acidic properties, e.g. donates a proton to water / produces hydronium ions.

ANDWrites a balanced equation for a reaction. |  |

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| **2014** | **Evidence** | **Achieve** | **Merit** | **Excellence** |
| (i)(ii) | When propanoic acid reacts with sodium carbonate, an acid-base reaction occurs in which sodium propanoate, water and carbon dioxide are formed. It is acid-base because the propanoic acid donates a proton, forming the propanoate ion.When propanamine reacts with HCl or H2SO4, acid-base reactions occur. Amines are bases and as a result, amines accept protons from acids. In these two reactions both sulfuric acid and hydrochloric acid donate protons to the amine to form organic salts.When propan-1-ol reacts with HCl, a substitution reaction occurs; in this reaction the Cl from HCl replaces the –OH group from propan-1-ol, forming a haloalkane.The reaction between conc. H2SO4 / heat, and propan-1-ol is an elimination reaction because an –OH group attached to C1, and a hydrogen atom from C2 are both removed from the organic molecule. A double bond forms between C1 & C2, with the elimination of water, forming propene. | * Has one product correct for either reaction (i) or (ii).
* States THREE correct types of reaction.

**OR** States a correct type of reaction with a supporting reason. | * Full explains one of the acid-base reactions.

**OR**Identifies **AND** partially explains TWO different types of reactions.© <https://www.chemical-minds.com>NCEA questions and answers reproduced with permission from NZQA | Compares and contrasts the reactions by:* Fully explaining one of the acid- base reactions.

**AND**Fully explaining the substitution reaction. **AND** Fully explaining the elimination reaction. |