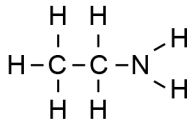
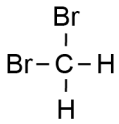
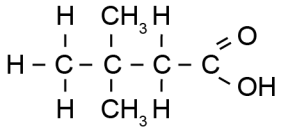
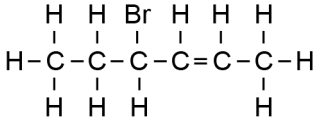
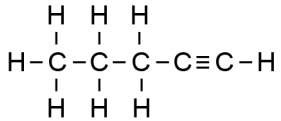
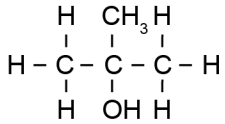
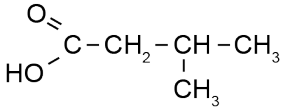
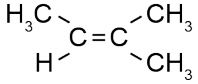
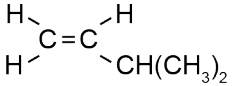
Assessment Schedule – 2025

Chemistry: Demonstrate understanding of the properties of selected organic compounds (91165)

Evidence

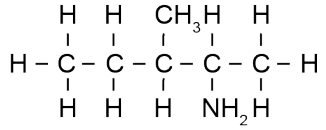
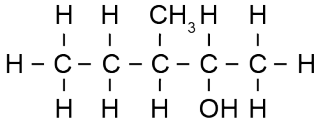
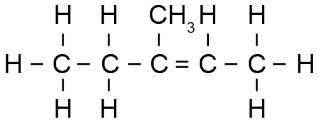
<table>
<tr><th>Q</th><th>Evidence</th><th>Achievement</th><th>Merit</th><th>Excellence</th></tr>
<tr>
<td>ONE
(a)</td>
<td>
<table>
<tr><th>Compound</th><th>Structure</th><th>Name</th></tr>
<tr><td>A</td><td>  </td><td>ethanamine</td></tr>
<tr><td>B</td><td>  </td><td>dibromomethane</td></tr>
<tr><td>C</td><td>  </td><td>3,3-dimethylbutanoic acid</td></tr>
<tr><td>D</td><td>  </td><td>4-bromohex-2-ene</td></tr>
<tr><td>E</td><td>  </td><td>1-pentyne</td></tr>
<tr><td>F</td><td>  </td><td>2-methyl propan-2-ol</td></tr>
</table>
</td>
<td>• THREE of six correct.</td>
<td>• SIX of six correct.</td>
<td></td>
</tr>
</table>

(b)	Acidified dichromate will react with the alcohol group in Compound H, but will not react with G. This is an oxidation reaction, producing a carboxylic acid. This reaction must be heated to occur. The dichromate solution will be orange when mixed with the alcohol and turn green as the alcohol is oxidised. 	• Identifies type of reaction. OR Colour change. OR Compound H chosen.	• Full explanation missing one aspect (reaction type, conditions, structure of product or observation).	• Full explanation with product drawn correctly and reference to G not reacting.
(c)(i)	Compound G: Primary Compound I: Tertiary Compound J: Primary Compound K: Secondary	• TWO of four correct.		
(ii)	 Major  Minor	• Correctly identifies alkene is made.	• Both structures. AND Major / minor correct.	
(iii)	Compound K is an asymmetrical haloalkane, meaning two products can be formed depending upon which neighbouring carbon the hydrogen atom is eliminated from. The major product forms when the Cl group is eliminated, along with a H atom from the neighbouring carbon with the least number of H atoms attached. In Compound K, C1 has three H atoms, while C3 only has one; therefore the major product is when the hydrogen is eliminated from C3, forming 2-methylbut-2-ene (and the minor product is 3-methylbut-1-ene).	• Identifies the haloalkane is asymmetrical. OR States how major / minor products can be identified.	• Explains why two products are formed. OR Explains how major / minor products can be identified.	• Justifies why two products are formed and how to identify major / minor products, with reference to the structure of Compound K.

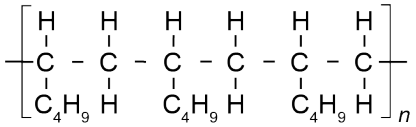
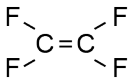
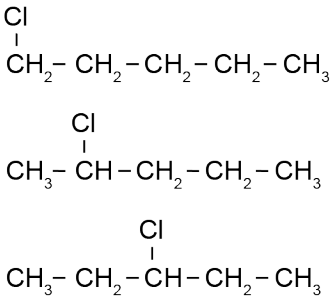
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	1a	2a	3a	4a	3m	4m	2e minor error	2e

<table>
<tr><th>Q</th><th>Evidence</th><th>Achievement</th><th>Merit</th><th>Excellence</th></tr>
<tr>
<td>TWO
(a)(i)

(ii)

(iii)</td>
<td>
<table>
<tr><th>Compound B</th><th>Compound C</th><th>Compound D</th></tr>
<tr>
<td>  </td>
<td>  </td>
<td>  </td>
</tr>
</table>
Reaction type W: substitution
Reaction type X: elimination
Reaction type Y: addition
Reaction type Z: substitution

Reagent 4: HCl
</td>
<td>• FOUR of eight correct.</td>
<td>• SIX of eight correct.</td>
<td>• EIGHT of eight correct.</td>
</tr>
</table>

(b)(i)		• Correctly drawn polymer.		
(ii)	C=C, carbon to carbon double bond In an addition polymerisation reaction, C=C double bonds are broken in order for new single bonds to form between monomers, joining into long repeating chains called polymers. The monomers have an unsaturated C=C double bond, which is much more reactive than the resulting C–C saturated single bond in the polymer structure. This is why the monomer can undergo addition polymerisation, while the polymer with only C–C single bonds, cannot.	• Double bond is broken. OR Identifies polymer is saturated (C-C) or monomer is unsaturated (C=C).	• Links saturated / unsaturated nature of polymer / monomer to materials reactivity. • Explains addition polymerisation.	• Explains the difference of monomer and polymer in terms of structure, reactivity. AND Links Teflon does not melt at high temperatures to use. OR Links Teflon is not (chemically) reactive to use.
(iii)		• Correctly drawn monomer.		
(iv)	Teflon does not melt at high temperatures. The polymer Teflon is not (chemically) reactive.	• States Teflon has a high melting point. OR States that Teflon is not (chemically) reactive.	• Links Teflon does not melt at high temperatures to use. OR Links Teflon is not (chemically) reactive to use.	
(c)		• THREE correct.		

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	1a	2a	3a	4a	3m	4m	2e minor error	2e

Q	Evidence	Achievement	Merit	Excellence
THREE (a)(i)	Carboxylic acid.	• Correct group.		
(ii)	1-heptanamine and 1-propanamine both contain a polar amine group, which is soluble in water, as the forces of attraction between the water and the amine group (solvent to solute) are sufficient to overcome the solute-solute interactions. However, 1-propanamine has a short chain of 3 carbons, so will be water soluble, while 1-heptanamine has a longer chain with 7 carbons; therefore it is not fully soluble in water. Identify by mixing a sample of each with water. 1-heptanamine will form two layers, but 1-propanamine will not. The longer carbon chain also means 1-heptanamine has a higher melting and boiling point. Therefore, heating each compound to observe the temperature at which they boil will allow identification. 1-propanamine will boil first at a lower temperature, due to the shorter carbon chain length.	• Gives a basic method (water / heating). OR Identifies a difference in properties (solubility / boiling point).	• Explains that chain length will determine which is soluble in water. OR Explains that chain length will determine which has lower/higher boiling point.	• Fully explains either method, including associated observation, for correct identification and explains relevant carbon chain length effect.
(iii)	Gallic acid contains a carboxylic acid group which will turn damp blue litmus red as it is acidic. 1-heptanamine is an amine, which is basic. Therefore, the sample will turn damp red litmus blue.	• Correct observations.		
(iv)	L2 acid reaction. The acid reacts with a metal carbonate in an acid-base reaction, forming a metal salt, carbon dioxide, and water. The CO_2 will form as a gas, so bubbles will be observed in the solution.	• A correct method is described.	• A correct method is explained with observations.	

(b)(i)	Group B.	• Identifies B.		
(ii)	B forms cis / trans isomers, as it has both requirements for geometric isomerism. It contains a C=C double bond, which prevents rotation of atoms about the bond. A also has this. However, the second requirement is that each carbon of the double bond is bonded to two different atoms or groups. A doesn't meet this requirement, as one of the carbons has two CH_3 groups attached. In B, one of the carbons of the double bond has a hydrogen atom and an R_3 group, while the other has a CH_3 group and a different R_2 group. This means that B can be arranged differently in space, forming geometric isomers.	• Identifies C=C double bond. OR Identifies two different atoms / groups need to be attached to the carbons in the double bond.	• Explains why the double bond is required for geometric isomerism. • Explains why both C atoms on the double bond must have two different atoms / groups.	• Justifies why B forms geometric isomers, while A does not.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	1a	2a	3a	4a	2m	3m	2e minor error	2e

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 18	19 – 24