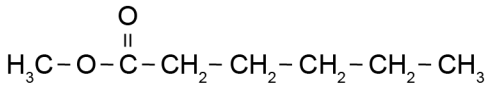
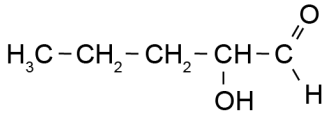
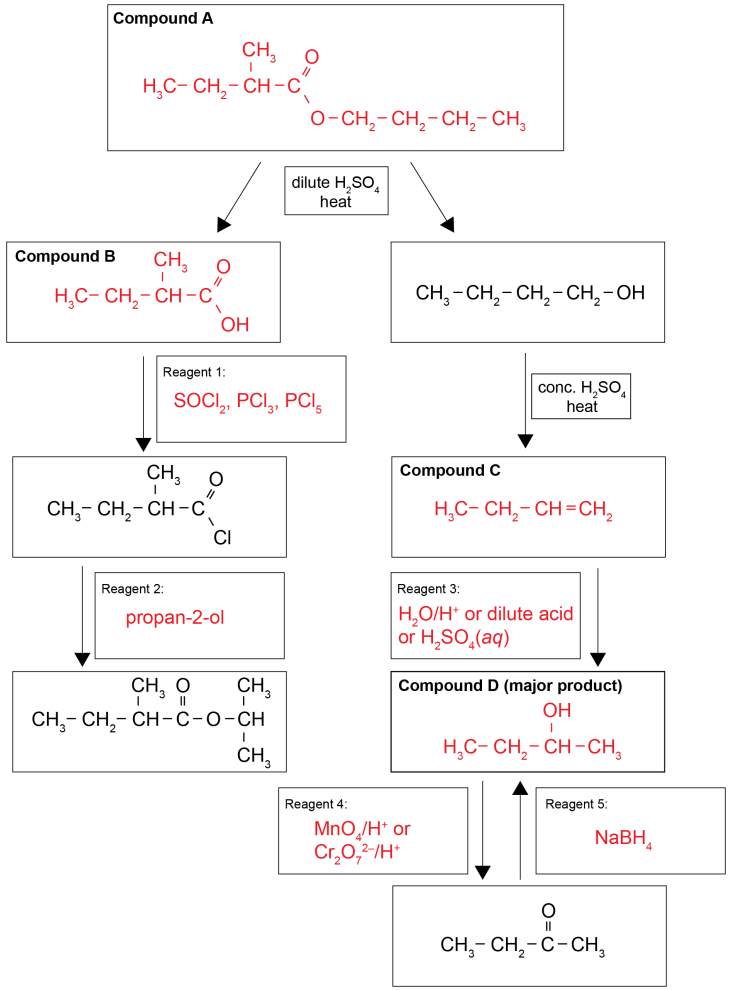
Assessment Schedule – 2022

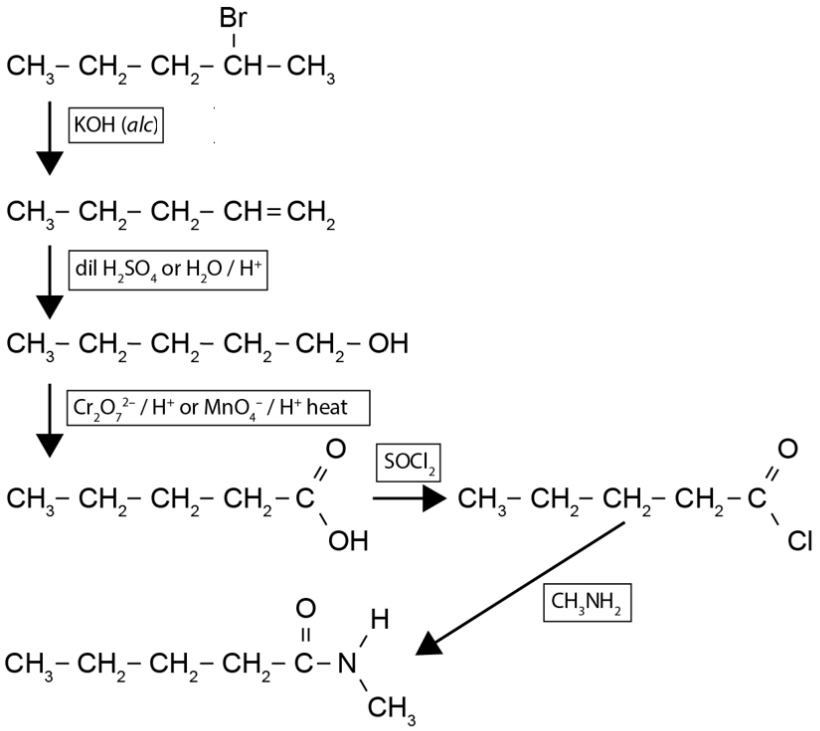
Chemistry: Demonstrate understanding of the properties of organic compounds (91391)

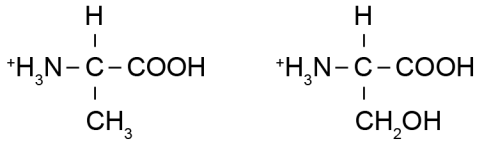
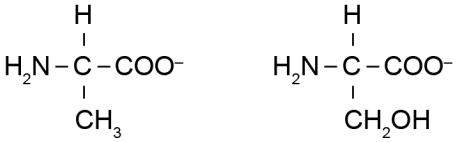
Evidence Statement

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	 2-methyl OR methylpropanoyl chloride  3-bromobutanamide	• Names and / or draws THREE structures correctly.		
(b)	Add water to a sample of all three liquids. Propanoyl chloride will react vigorously, producing fumes. (Damp litmus paper could be held to these fumes, confirming the presence of HCl.) This is a substitution/hydrolysis reaction. The product formed is propanoic acid, CH_3CH_2COOH. Add damp blue litmus paper to each of the remaining two liquids. Propanoic acid is a weak acid and will therefore change the colour of litmus from blue to red. This is an acid-base reaction. Propan-1-ol is positively identified by heating with acidified potassium dichromate. The colour change observed will be orange to green. This is an oxidation reaction. Either propanal, CH_3CH_2CHO, or propanoic acid, CH_3CH_2COOH, will be formed.	• Identifies TWO reaction types. • ONE product structure. • States TWO observations.	• Links one test to the correct observation AND reaction type OR product for one molecule. • Links one test to the correct observation AND reaction type OR product for a second molecule.	• Develops a valid procedure to identify all THREE liquids including correct tests, observations, reaction types, and structural formulae of organic products.

(c)		• Any FIVE answers correct.	• Any SEVEN answers correct.	• ALL answers correct.

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

Q	Evidence	Achievement	Merit	Excellence
TWO (a)	When pentanal is heated with Benedict's solution, the blue solution will form an orange-red (solid / precipitate). This is an oxidation reaction producing pentanoic acid, $CH_3CH_2CH_2CH_2COOH$. Pentan-3-one, is a ketone that cannot undergo further oxidation so there is no change in colour (Benedict's solution will remain blue).	• Identifies aldehydes undergo oxidation. OR Correct observation used to distinguish.	• Explains how Benedict's solution is used to distinguish pentanal and pentan-3-one.	
(b)		• ONE correct conversion in their scheme with reagent. • Understands that the position of the functional group must change (makes an attempt)	• THREE correct conversions in their scheme with reagents.	• Devised reaction scheme ALL correct (allow minor omission for conditions).

(c)(i)	Circle around peptide bond	• Identifies amide (peptide) bond.		
(ii)	Water is used to break the amide (peptide) bond/split the dipeptide into two molecules (amino acids). Acidic hydrolysis uses dilute acid such as sulfuric acid and basic hydrolysis uses dilute base such as NaOH and both require heat (under reflux). The NH_2 group is protonated in acidic conditions and the COOH group is deprotonated in basic conditions. Acidic hydrolysis  Basic hydrolysis 	• Describes hydrolysis. OR TWO amino acids drawn.	• Explains hydrolysis using either reagents OR proton transfer AND draws TWO structural formulae of products formed from hydrolysis. OR All four structures correct.	• Explains hydrolysis and draws ALL structural formulae of products formed from BOTH types of hydrolysis.

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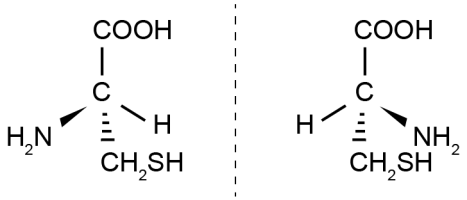
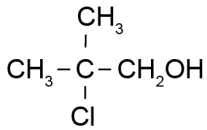
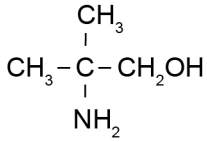
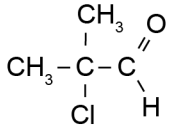
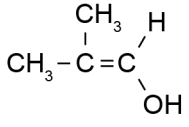
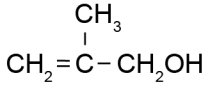
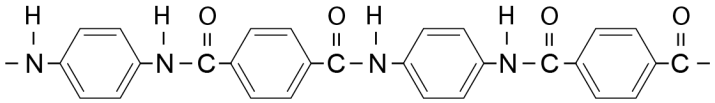
No response; no relevant evidence.	1a	2a	3a	4a	2m	3m	2e with minor error / omission	2e

Q	Evidence	Achievement	Merit	Excellence
THREE (a)(i)		• Recognises tetrahedral arrangement of atoms / groups about asymmetric C atom. AND	• Two correct structures of cysteine. AND	
(ii)	Cysteine can exist as enantiomers because it has an asymmetric/chiral carbon atom, i.e. a carbon atom with four different atoms or groups of atoms attached.	Identifies the asymmetric C atom.	Explains requirement for enantiomers.	
(b)	K  L  M  N  O 	• TWO structures correct. OR TWO correct structures following from an incorrect K.	• THREE structures correct.	• ALL structures correct.

(c)(i)	So the chain can extend in both directions to form a polymer.	• Recognises chain needs to extend in both directions.		• Parts (i), (ii), and (iii) correct.
(ii)		• Draws polymer with minor error/amide linkage.	• Correctly draws TWO repeating units. AND	
(iii)	Kevlar is formed from condensation polymerisation because small organic molecules / monomers join together to make a larger organic molecule / polymer, with the release of a small molecule, HCl, for each amide link formed.	• Identifies condensation (polymerisation) reaction.	Explains condensation (polymerisation) reaction.	

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No response; no relevant evidence.	1a	2a	3a	4a	2m	3m	2e with minor error / omission	2e

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – ~~7~~	8 – 14	15 – 18	19 – 24