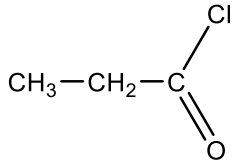
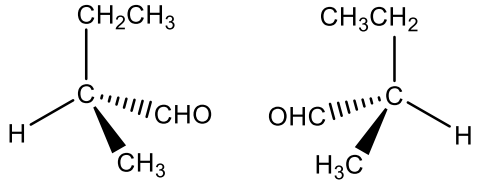
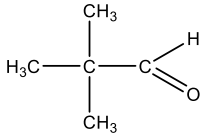
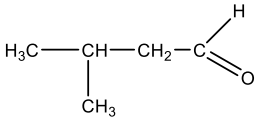
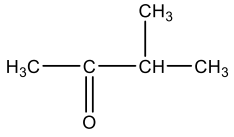
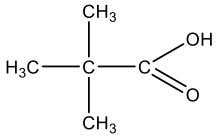
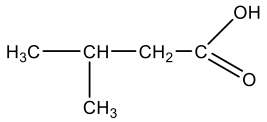
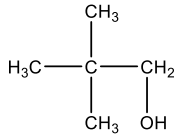
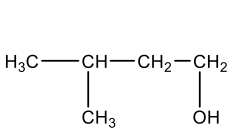
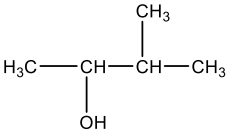
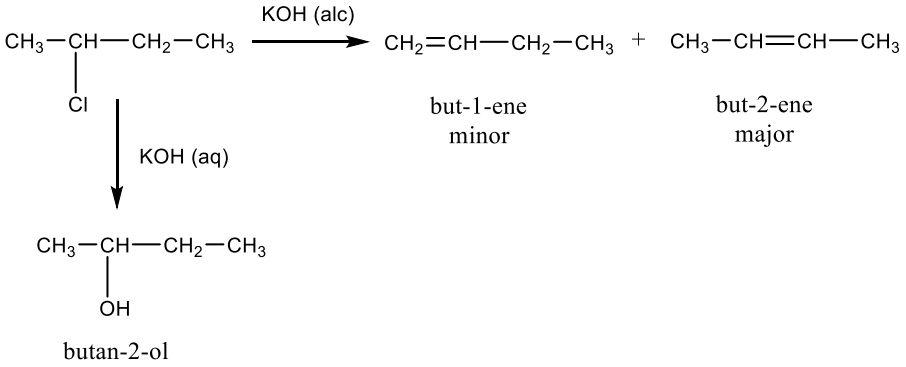
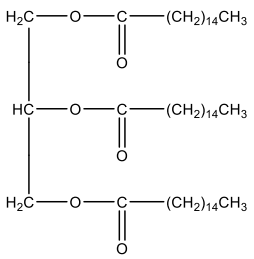
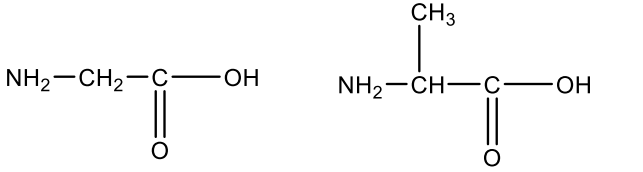
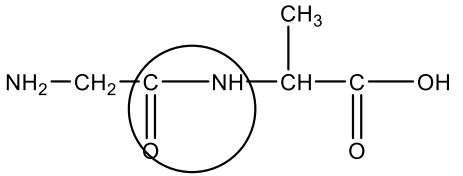
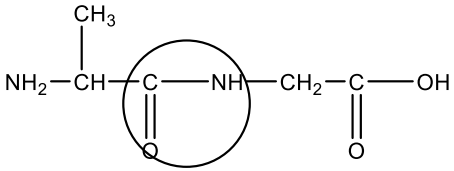
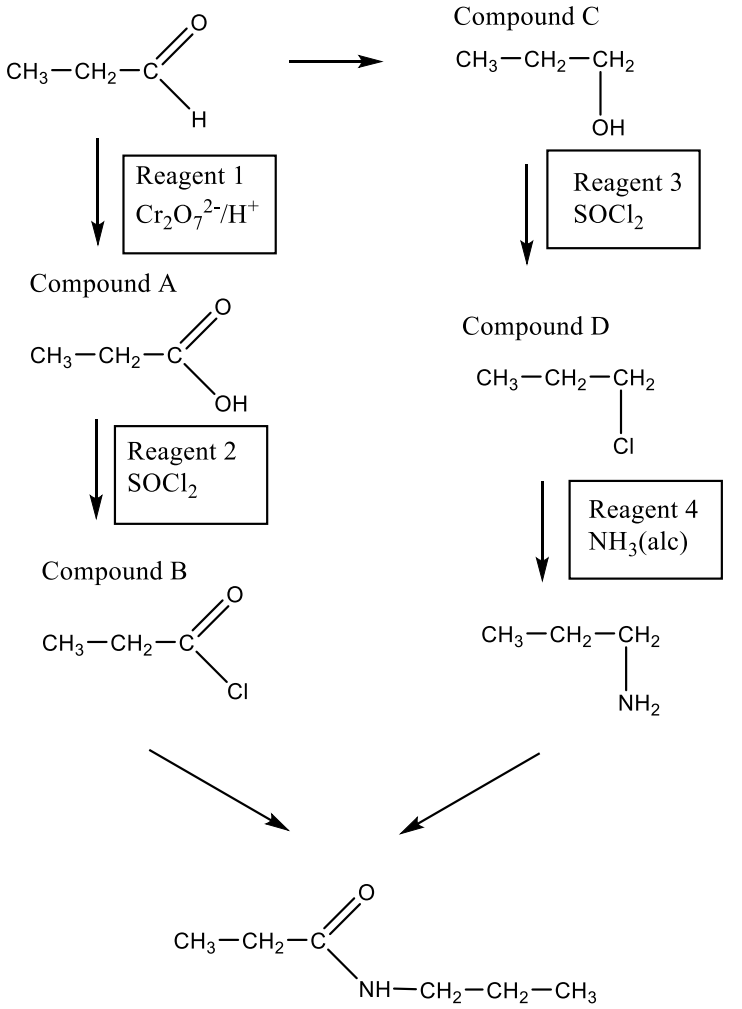
Q	Evidence	Achieved	Merit	Excellence
One a)	A. 5-chloropentanamide  B. C. 2-methylbutanal	• TWO correct – Names and / or structure. OR THREE correct but with errors in numbering.		
b)	 The structures are non-superimposable mirror images. For this to happen there needs to be a chiral carbon atom i.e. one that contains 4 different atoms/groups of atoms bonded to it – only Compound C meets this requirement.	• ONE isomer drawn correctly with 3D arrangements of groups around asymmetric carbon. OR BOTH isomers drawn but an error in the way the groups are connected to asymmetric carbon. • Description of molecules OR chirality	• Correct 3D arrangements drawn, representing molecules that are enantiomers OR enantiomers explained\ linked to chiral carbon	• Correct 3D arrangements drawn, representing molecules that are enantiomers and enantiomers explained, relating structure to properties
c)	 Compound D  Compound E  Compound F  Compound G  Compound H  Compound I  Compound J  Compound K	• A branched chain aldehyde or ketone drawn (may not be identified correctly as D, E or F) • G or H are branched chain carboxylic acids (order may be incorrect) • I, J or K are branched chain alcohols (order may be incorrect)	• D, E and F all correct • I, J and K all correct • Two columns correct	• Table complete

NØ	No response or does not address the question.
N1	Any ONE statement from the Achievement criteria column.
N2	Any TWO statements from the Achievement criteria column.
A3	Any THREE statements from the Achievement criteria column.
A4	Any FOUR statements from the Achievement criteria column.
M5	Any THREE statements from the Merit criteria column.
M6	Any FOUR statements from the Merit criteria column.
E7	BOTH statement from the Excellence criteria column – allow 1 error or omission
E8	All the evidence from the Excellence criteria column.

Q	Evidence	Achieved	Merit	Excellence
Two (a)	(i) $CH_3CH_2CH_2COOH + CH_3CH_2OH \rightleftharpoons CH_3CH_2CH_2COOCH_2CH_3 + H_2O$ (H^+) (ii) Reflux – Reagents need to be heated to increase rate of reaction, but are volatile, and could evaporate before reacting, limiting the amount of product formed. In the reflux process the vaporised reagents are condensed back into the reaction mixture so no reactants or products are lost during the heating process. (iii) Advantage - Reaction between ethanol and butanoyl chloride will be faster with a lower energy requirement (doesn't need heating) than the reaction with butanoic acid. Also conc H_2SO_4 not needed as catalyst and reaction is not an equilibrium so there is a higher yield. Disadvantage: the inorganic by-product formed is hazardous HCl, not H_2O (as is the case with the reaction with butanoic acid) and butanoyl chloride is volatile/reacts with moisture to produce HCl/ is very reactive (hazardous to use).	• Structure of ethyl butanoate • One advantage or disadvantage • States that volatile reagents are not lost on heating • Identifies elimination or substitution	• Equation correct OR • Reflux apparatus linked to the volatility of organic reagents • One advantage and one disadvantage explained	• In depth understanding demonstrated in explanation of choice of reflux apparatus AND comparing reaction of butanoyl chloride with that of butanoic acid.
b)	(i) When 2-chlorobutane is reacted with alcoholic KOH, an **elimination** reaction occurs. The Cl atom and an H atom from an adjacent C atom will be removed from the chloroalkane. When the H atom is removed from the first (end) C atom, the minor product but-1-ene is formed. When the H atom is removed from the 3rd C atom in the chain the major product, but-2-ene, is formed (in greater concentration). With aqueous KOH **substitution** is the predominant reaction. In this case the Cl atom is replaced by the -OH group to form the alcohol, butan-2-ol.  butan-2-ol (ii) Compound A: $CH_3CH_2CH_2CH_2OH$ – butan-1-ol (name or formula) Reagent 1: H^+/H_2O Reagent 2: $KMnO_4/ H^+$ or $K_2Cr_2O_7/H^+$	OR • Major and minor products in elimination reaction identified. • Identify butan-2-ol formed if too much water present • TWO of Compound A or Reagents 1 or 2 identified	• Links elimination and substitution to the presence or absence of water, with explanation of the type of reaction. • Compound A and both reactants recognised	• Comprehensive compariosn of the possible reaction products under the two different conditions including equations.

NØ	No response or does not address the question.
N1	Any ONE statement from the Achievement criteria column.
N2	Any TWO statements from the Achievement criteria column.
A3	Any THREE statements from the Achievement criteria column.
A4	Any FOUR statements from the Achievement criteria column.
M5	Any THREE statements from the Merit criteria column.
M6	Any FOUR statements from the Merit criteria column.
E7	ONE statement from the Excellence criteria column.
E8	All the evidence from the Excellence criteria column.

Q	Evidence	Achieved	Merit	Excellence
Three (a)	ester:  Reagent A: NaOH(aq)/sodium hydroxide Reagent B: HCl (aq)/hydrochloric acid	• NaOH / HCl / ester correct	• NaOH and HCl correct and ester drawn correctly	
(b)	(i)  aminoethanoic acid 2-aminopropanoic acid (ii) Either of the dipeptides drawn   (iii)peptide link circled	• 1 acid structure OR peptide link circled	• Acid structures correct OR dipeptide drawn corectly	
(c)				

Q	Evidence	Achieved	Merit	Excellence
	 Note: Reagent 1 could also be MnO_4^- ($/H^+$) or Fehlings or Tollens' Reagent 2 and 3 could be PCl_3/PCl_5	• TWO of products A to E drawn • ONE reagent correct • Structure of Compound E correct	• Column 1 correct (Reagents 1 and 2, Compounds A, B and E) • Column 2 correct (Reagents 3 and 4 and Compounds C, D and E)	• All components of the scheme correct (allow a minor error in a structure)

NØ	No response or does not address the question.
N1	Any ONE statement from the Achievement criteria column.
N2	Any TWO statements from the Achievement criteria column.
A3	Any THREE statements from the Achievement criteria column.
A4	Any FOUR statements from the Achievement criteria column.
M5	Any THREE statements from the Merit criteria column.
M6	All FOUR statements from the Merit criteria column.
E7	ONE error/omission in reaction scheme
E8	ALL reaction scheme correct

Judgement Statement:

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 12	13 – 18	19 – 24