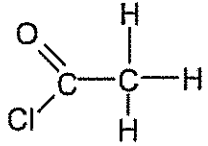
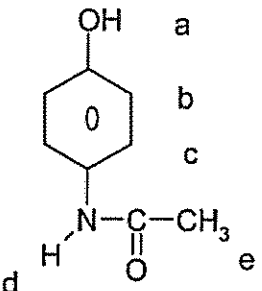
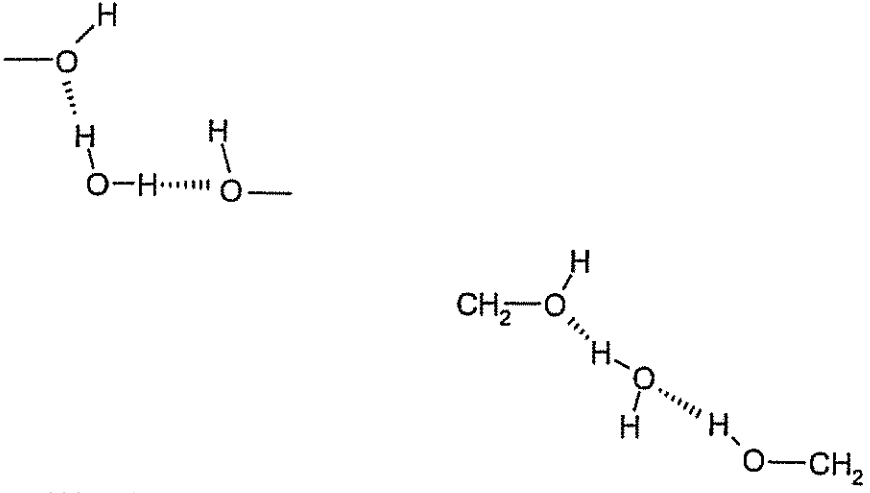


Question 2	Expected Answers	Marks
a	$0.8 - (-0.76) = 1.56V$ must have units	1
b	(high resistance) voltmeter / potentiometer in workable circuit; salt bridge; strip of silver metal and strip of zinc metal; each dipping into a solution of appropriate ions* ; (298K /25°C), 1 mol dm ⁻³ (if temperature quoted must be correct) *charges on ions must be correct /soluble salt should be used	5
c	silver electrode has <u>more positive potential</u> E^{\ominus} /better oxidising agent/ zinc gives up electrons <u>more readily</u> than silver (comparison should be implied) (ignore reference to electron flow)	1
d	$2Ag^+ + Zn \longrightarrow 2Ag + Zn^{2+}$ species (1); balancing (of correct species) (1)-linked	2
	Total	9

Question 3	Expected Answers	Marks
a	Flask or tube with mixture of liver and hydrogen peroxide; Workable method of collection of gas (syringe or over water) no seals no leaks; calibrated collection vessel –(burette, measuring cylinder, gas syringe)	3
b(i)	Double	1
	gets multiplied by 4	1
b(ii)	first order	1
c(ii)	rate = $k[\text{H}_2\text{O}_2]$ [catalase] 4 parts correct -3 marks 3 parts correct -2 marks 2 parts correct- 1mark ecf from b(ii)	3
c(ii)	2 ecf from c(i)	1
d	4 from: <u>Tertiary</u> structure altered/unfolds; because intermolecular forces/ bonds are broken (if temperature raised too much); these are disulphide bond/hydrogen bonds /ionic attractions; thus <u>shape</u> of active site/ <u>specific cleft</u> is altered /deformed; so substrate does not fit (allow substrate and enzyme are not complementary)	4
	Total	14

Question 4	Expected Answers	Marks
a	amide/peptide	1
b(i)	amine	1
b(ii)	Hydrolysis	1
c(i)	<p>Full structural formula: functional group(1); rest (1); <u>(second mark is dependent on first)</u></p> 	2
c(ii)	ethanoyl chloride	1
c(ii)	hydrogen chloride accept hydrochloric acid NOT HCl	1
d(i)	 <p style="text-align: center;">no specific order</p> <p>ade (1); b (1); c(1) all protons in benzene ring as one environment scores 1</p>	3
d(ii)	a:b:c:d:e 1:2:2:1:3 refer to labelling in d(i) 5 correct scores 3 4 correct scores 2 3 correct scores 1	3
e	<p>$7.5/2.5 = 3$ half lives (1) / (1/8 remains scores 1)</p> <p>100% \rightarrow 50% \rightarrow 25% \rightarrow <u>12.5%</u> (1)</p>	2
Total		15

Question 5	Expected Answers	Marks
a	(polymer) made by linking together many/ lots aw; amino acid molecules (joining must be stated or implied)	2
b	secondary structure (1) : coiling of chains primary structure (1) : order of amino acids	2
c(i)	alanine:alanine - instantaneous dipole induced dipole aspartic acid: serine - hydrogen bonding cysteine:cysteine - covalent bonding	3
c(ii)	$\begin{array}{cc} \text{-NH}_3^+ & \text{}^-\text{OOC} \\ (1) & (1) \end{array}$	2
d(i)	 <p>one H bond 1 mark; other H bond and shape of water molecule 1 mark</p>	2
d(ii)	<p>3 from: <u>Washing</u> causes the hydrogen bonds (between helices) to be <u>broken</u>; <u>Heating/ drying</u> causes the evaporation of water /water to be lost; hydrogen bonds <u>between the water molecules and helices/hair fibres</u> are <u>broken</u>; New hydrogen bonds made <u>between the hair fibres/ helices</u>; In a different place.</p>	3
Total		14

Question 1	Expected Answers	Marks
a(i)	$\text{Mg} + \text{S} \rightarrow \text{MgS}$	1
a(ii)	redox	1
b	carbon content is about right/ at 0.5%; but phosphorus content is <u>too high</u> / blow time would need to be longer for phosphorus, so unsuitable.	2
c(i)	(too much) causes the steel to: become brittle/ snap/ become more difficult to shape (ORA)	1
c(ii)	Carbon monoxide is toxic/poisonous (Ignore harmful)	1
d	Silicon with oxygen: $\text{Si} + \text{O}_2 \rightarrow \text{SiO}_2$ (1); Formation of slag: $\text{SiO}_2 + \text{CaO} \rightarrow \text{CaSiO}_3$ (1)	2
e	To prevent oxygen/ air and water/moisture getting to the steel / Forms a protective barrier between the steel and air and water;	1
f	Chromium reacts with air or oxygen/ is oxidised / a layer of chromium (III) oxide is formed (if only formula quoted should be correct); this <u>oxide</u> is impermeable to air (oxygen and water) / <u>oxide</u> layer quickly reforms if surface scratched/ stops steel from oxidising	2
g(i)	$1.38 \times 10^{-2} / 4 = 3.45 \times 10^{-3}$ moles	1
g(ii)	$3.45 \times 10^{-3} \times 52 = 0.179\text{g}$ answer(1) ; units(1) units independent mark	2
g(iii)	$\frac{0.179}{1.50} \times 100\%$ (1) = 11.9% / 12.0%	2
	Answer to 3 sf rounded correctly (1) ecf	
	Total	16