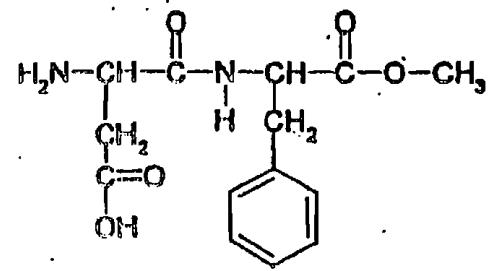
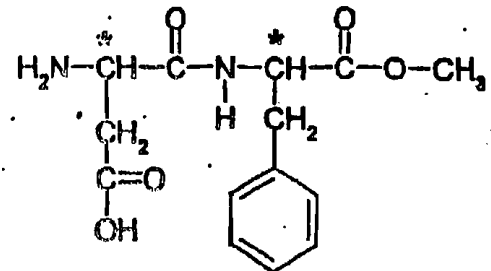
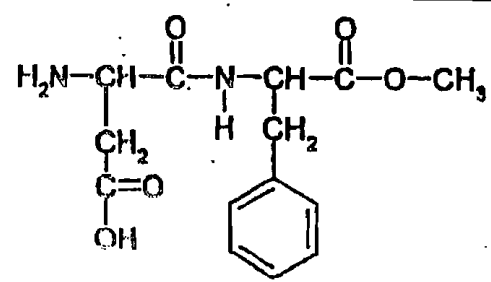
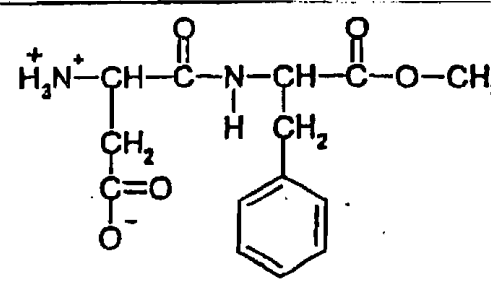


QWC

Expected Answers	Marks
<p>2(a) 3 from: dissolve/ forms a solution; in <u>minimum</u> <u>quite</u> amount ;of hot methanol (not reflux/distill/to evaporate) cool to crystallise; 1 from: filter/dry/ wash;</p> <p>QWC: Min. of 2 sentences/ bullet points with 2 of the following processes correctly used: dissolve, filter, solvent/methanol, solution.</p>	4(+1)
<p>2(b)</p>  <p>Correctly labelled. (ie no labels scores 1)</p>	2
<p>2(c)(i)</p> 	2
<p>2(c)(ii) <u>four different</u> groups attached to the carbon atom</p>	1
<p>2(d)</p>  <p>Deduct 1 mark for each additional H circled above 3. (max 3)</p>	3
<p>2(e)</p>  <p>Correct zwitterion without charges scores 1 (accept condensed formula for carboxylate ion) Proton must be transferred to and from correct functional groups</p>	2

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2(f)	reflux/heat/warm (not high temperature/boll); with <u>moderately concentrated</u> (4M-6M) hydrochloric acid/sodium hydroxide/ sulphuric acid/ acid/alkali; (not nitric acid)	2
2(g)	amide link correct; rest of molecule;	2
any structure shown i.e. structural or skeletal		Total: 19

Question	Expected Answers	Marks
3(a)(i)	Compound X is C_2H_5OH (1) Other product is H_2O (1)	2
3(a)(ii)	concentrated sulphuric acid allow formula	1
3(b)	structural formula of acyl chloride group; rest of molecule;	2
(no ambiguous attachments)		
3(c)(i)	$R-CH_3 = 1.2$; $R-OH = 2.7$; $R-CH_2-O = 3.8$; must have R group	3
3(c)(ii)	full structural formula of ethanol ; (no ambiguous attachments)	1
		Total: 9

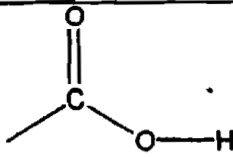
Question	Expected Answers	Marks
4(a)(i)	correctly plotted data (2) (all points should be +/- 1 scale division), 1 incorrect point ((1); smooth curve;	3
4(a)(ii)	each half life correctly drawn and clearly labelled = 1 mark (2 max) (two half lives correctly drawn without labels scores 1) Half life clearly labelled in words or letters showing the correct horizontal portion	2
4(a)(iii)	1800-2200g	2
4(a)(iv)	first order wrt sucrose; half lives (almost) constant; ecf from (a)(iii) half lives not constant; therefore not first order (no ecf to 4b); (half lives must be present in (a)(iii) to get reason mark) (values should be different by ≥ 100 to score different mark)	2
4(a)(v)	draw a <u>tangent</u> to the curve <u>at t=0s</u> <u>ovtte</u> ; find the gradient ie concentration+time; not just line	2
4(b)	rate = $k[H^+]$ [sucrose]; 1 mark for each correct component of RHS ecf if zero or second order wrt sucrose in (a)(iv)	3
4(c)	rate would halve	1
		Total:15

5 (a)	different sized atoms ; interrupt orderly arrangement of atom in metal lattice/less regular lattice; layers of atoms prevented from slipping; (Marks can be awarded for clearly annotated diagram) (Diagram showing different sized atom scores 1)	3
5 (b)	4 from: make up solutions of known concentrations; range/different concentrations; range in correct region; choose filter/ set colorimeter at the correct wavelength; zero with water; measure absorbance/transmittance;	4
5 (c)(i)	$2.65 \times 10^{-2} - 2.70 \times 10^{-2} (\text{mol dm}^{-3})$	1
5 (c)(ii)	$2.65 \times 10^{-2} \times 63.5(1) = 1.68\text{g in } 1\text{dm}^3$; ecf $2.70 \times 10^{-2} \times 63.5 = 1.71\text{g}$ answer $\times 10$ (1) $0.168\text{g} - 0.171\text{g in sample (1) } 2/3\text{sf}$	3
5 (c)(iii)	$\frac{0.168}{0.200} \times 100 = 84.0\%$ - $\frac{0.171}{0.200} \times 100 = 85.5\%$	1
	allow ecf only if < 100%	Total 12

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Question	Expected Answers	Marks
6(a)(i)	$\text{Cu}^{2+} + \text{Zn} \rightarrow \text{Zn}^{2+} + \text{Cu}$	1
6(a)(ii)	1.1V	1
6(b)(i)	$3d^{10}; 4s^1$; (allow 1 mark for $3d^9; 4s^2$)	2
6(b)(ii)	9	1
6(c)	(central) metal ion; (ignore atom) surrounded by/bonded to ligands/ negatively charged ions/molecules with lone pairs;	2
6(d)	4 from: <u>ligands</u> cause splitting of sub shell into two <u>energy levels</u> ; d orbitals partially filled; electron is promoted/excited from lower energy level to a higher energy level difference in energy corresponds to visible region of EMS/ <u>light</u> (energy) is absorbed; light not absorbed/transmitted/reflected gives colour;	4
6(e)	Equilibrium lies neither to the left or right; AW	1
6(f)	$K_c = \frac{[\text{CuCl}_4(\text{H}_2\text{O})_2]^{2-} \cdot 1 \cdot (\text{H}_2\text{O})^4}{[\text{Cu}(\text{H}_2\text{O})_6]^{2+} [\text{Cl}]^4}$ top component = 1 bottom component = 1 K_c & powers = 1	3
6(g)(i)	solution would turn <u>pale blue</u> ; stability constant is <u>greater for edta⁴⁻ complex / edta⁴⁻ complex</u> is more stable than $[\text{CuCl}_4(\text{H}_2\text{O})_2]^{2-}$;	2
6(g)(ii)	solution would remain <u>pale blue/ no colour change</u> ; stability constant for <u>ammonia complex</u> is <u>smaller/ ammonia complex</u> is less stable than <u>edta⁴⁻ complex</u> ;	2
		Total 19

7(a)(i)	Primary (1).	1
7(a)(ii)	There are 2 Hs on the C to which the OH is attached or C with OH is attached to <u>one other C atom</u> or OH at end of chain (1).	1
7(b)(i)	<i>1 mark for each point seen in bold, 1 mark for any of the other points shown up to a maximum of 5:</i> Pencil line near bottom; of plate; spot small sample of mixture on line; solvent in beaker below sample; cover beaker with lid/film; leave until solvent front nears top of plate/ may be shown by line on plate; remove and dry plate; (UV light or iodine) to locate (use of locating agent); 2 different spots; one of which is salicyl alcohol.	5

7(b) (ii)	Iron(III) chloride (solution) <i>allow any Iron(III) salt or yellow iron chloride (1) do not allow Iron chloride.</i> turns purple (1).	2
7(c)	 (1) <i>allow OH. Note: Allow any or no group bonded to COOH.</i>	1
7(d) (i)	Look for the peak of highest mass / peak furthest right (1). <i>Do not allow 'highest peak'.</i>	1
7(d) (ii)	H ₂ O/water (1). <i>Allow any combination of two Hs and 1 O. Do not allow 18.</i>	1
7(d) (iii)	C ₇ H ₄ O ₂ <i>Correct formula (1); ignore charge.</i>	1
7(e) (i)	Neutralisation/ acid-base(alkali) (1).	1
7(e) (ii)	(Graduated or bulb) pipette <i>allow burette (1).</i>	1
7(e) (iii)	Moles of NaOH = 0.015 x (33.3/1000) (1); = 0.000500 mol (or 5.00 x 10 ⁻⁴) (1). <i>Ignore sig. figs.</i> <i>Give 1 mark if the only mistake is to miss the 1000 for the conversion of units.</i>	2
7(e) (iv)	Moles of salicylic acid = 0.5 x 5.00 x 10 ⁻⁴ mol = (2.50 x 10 ⁻⁴) (1) <i>Ignore sig. figs. ecf.</i>	1
7(e) (v)	Concentration = moles/volume (dm ³) (1) <i>even if numbers are incorrect,</i> (2.50 x 10 ⁻⁴) / (25/1000) = 0.0100 mol dm ⁻³ (1). <i>Ignore sig. figs. ecf.</i>	2
7(f)	Hydrogen bonding (1); <i>Then 2 from 3 other possible answers:</i> instantaneous (dipole)-induced dipole forces / van der Waal's forces (1); (permanent) dipole-(permanent) dipole forces (1); permanent (dipole)-induced dipole forces (1). The marks are for interactions and answers such as <i>permanent dipole forces</i> do not receive credit. If any type of chemical bonding is listed there is a maximum of 2 marks only.	3
7(g) (i)	H ₂ O / water molecule gains / accepts a proton / H ⁺ (1). <i>Do not allow H alone.</i>	1
7(g) (ii)	Concentration of COO ⁻ is increased (1); (by Le Chatelier's Principle), position of equilibrium moves to left (to counteract change) (1); leads to <u>decrease</u> in concentration of H ₃ O ⁺ (1).	3
Total mark		27