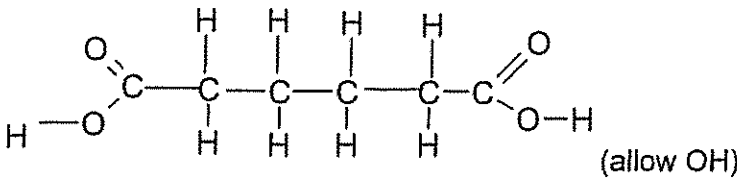
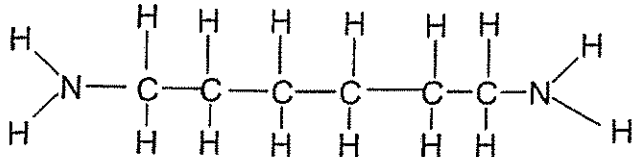
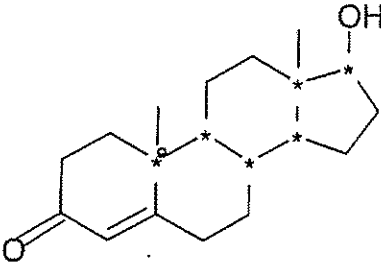




RECOGNISING ACHIEVEMENT

Mark Scheme 2853
June 2003

2 a	<u>Order/sequence</u> (1); in which amino acids (are joined together).	2
b(i)	$H_2NCH_2CONHCH(CH_3)COOH$ or $H_2NCH(CH_3)CONHCH_2COOH$ peptide link; remainder correct	2
b(ii)	CONH group only circled	1
c(i)	Secondary/2 ^o	1
c (ii)	hydrogen bond	1
c(iii)	From H attached to N on one fold; to O double bonded to C on another fold (Charge ^o should be correct if used)	2
d(i)	Reflux; with <u>moderately concentrated/ (4-6M)</u> sulphuric acid/ hydrochloric acid/acid /alkali	2
d(ii)	In each case: Number of carbons with correct number of H's (1) functional groups (1) FULL STRUCTURAL   Correct formulae not full structural scores 1 each	4
e(i)	Any 3 from dissolve/make a solution; in minimum amount (AW) ; of hot solvent (not reflux); cool; 1 from: filter; wash; dry.	4
e(ii)	determine melting point; sharp if pure/compare to expected value	2
	Total	21

3 a	alcohol/ hydroxyl			1
b(i)	Ester			1
b(ii)	either CH ₃ CH ₂ CH ₂ COOH butanoic acid	or (CH ₃ CH ₂ CH ₂ CO) ₂ O butanoic anhydride	or CH ₃ CH ₂ CH ₂ COCl butanoyl chloride	2
b(iii)	conc H ⁺ ; reflux . (must correspond to above)	Anhydrous; reflux (must correspond to above)	Anhydrous; room temperature/cold (must correspond to above)	2
c	<p>Substrate molecules of <u>a different shape</u> do not fit</p> <p>Any 4 from; Enzyme has an <u>active site</u>; Which has a <u>specific shape</u>; because of its tertiary structure/way it folds; folding depends on the <u>sequence of amino acids</u> ; Substrate/reacting molecule can fit into active site/can fit together/<u>complementary shapes</u>; Weak bonds/ H bonds hold enzyme & substrate together/enzyme substrate complex formed; Discussion of denaturing scores 4 max. QWC mark At least 2 consecutive sentences with spelling, punctuation and grammar correct.</p>			5+1
d(i)	First			1
d(ii)	<p>Testosterone is <u>vastly</u> in xs/amount of enzyme is minute; so all the <u>active sites</u> will have substrate molecules attached/ are saturated; The <u>rate</u> of reaction does not depend on the substrate/testosterone concentration or depends on enzyme concentration or enzyme is rate limiting factor or rate reaches a max. regardless of the conc. of the testosterone.</p>			3
e	O-H (1)	type of proton	CH(OH) (1)	2
f(i)	 <p>1 mark each (2max)</p>			2
f(ii)	carbon atom attached to 4 <u>different</u> groups			1
Total				21

4 a	Larger surface area	1
b	$K_c = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$ [products] divided by [reactants](1). K_c and Powers outside square brackets (1)	2
c(i)	$2.09 \times 0.142 \times (1.36)^3 = [\text{NH}_3]^2$ correct rearrangement original formula or correct substitution(1) $0.864 \text{ mol dm}^{-3}$ (1) answer to 3sf (1) ecf from b only if upside down (0.413)	3
c(ii)	There would be no change	1
d	The equilibrium constant would decrease; because: the equilibrium moves in favour of the <u>endothermic</u> reaction; to side of reactants/the left;	3
	Total	10

5 a(i)	Correct shape (octahedral) using correct notation (1); all water molecules bonded via oxygen atoms (unambiguous)	2
a(ii)	6	1
b	It has 6; <u>lone pairs</u> or forms 6 bonds; these are dative	2
c(i)	Standard electrode potential for Cu^{2+}/Cu is <u>more positive</u> ORA; 2 from Copper is formed; Copper is reduced ORA/ Cu^{2+} accepts electrons from Fe ORA/iron is a better reducing agent ORA $\text{Cu}^{2+} + \text{Fe} \rightarrow \text{Cu} + \text{Fe}^{2+}$	3
c(ii)	0.78V	1
d	Difference between the two energy levels corresponds to <u>visible light</u> ; (allow in context of emission for 1 mark) frequencies /light not absorbed/complementary colour; is transmitted	3
e	4 from: suitable filter; zero colorimeter (with water); prepare solutions of <u>known; different concentration</u> ; suitable range; measure <u>absorbance</u> of these; plot graph; and measure absorbance of groundwater sample and <u>read off concentration</u> from calibration curve	5
f(i)	$\underline{[\text{Cu}(\text{H}_2\text{O})_6]^{2+}}(\text{aq}) + 2 \underline{\text{OH}^-}(\text{aq}) \rightarrow \underline{[\text{Cu}(\text{H}_2\text{O})_4(\text{OH})_2]}(\text{s}) + 2\text{H}_2\text{O}(\text{l})$ $\underline{\text{Cu}^{2+}}(\text{aq}) + 2\underline{\text{OH}^-}(\text{aq}) \rightarrow \underline{\text{Cu}(\text{OH})_2}(\text{s})$ correct underlined species; correct state symbols underlined species. Completely correct balanced equation;	3
f(ii)	<ul style="list-style-type: none"> ▪ ppt dissolves/a solution is formed; ▪ which is <u>deep</u> (AW) blue ; $[\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+} / [\text{Cu}(\text{NH}_3)_4]^{2+}$ ligands and number correct(1); charge based on suitable species ie NH_3 must be included max 6 ligands (1)	4
	Total	24