

# *thebiotutor*

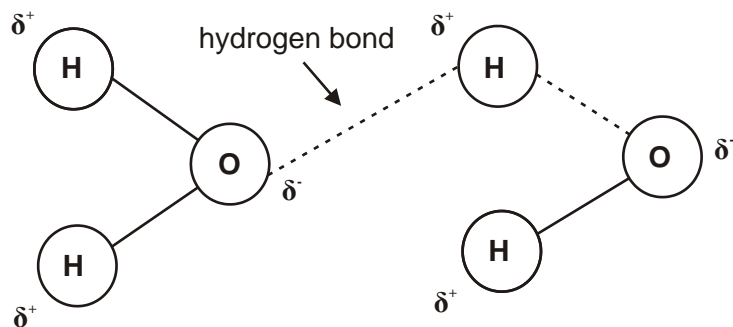
Unit F212: Molecules, Biodiversity, Food and Health

1.1 Biological molecules

Answers

2.1

1.



- 1 hydrogen bond represented as, horizontal / vertical, dashed line between **O** on one molecule and **H** on the adjacent molecule;

*DO NOT CREDIT if >1 H bond is drawn between the same two molecules*

- 2 hydrogen / **H**, bond label (on any drawn bond between 2 molecules);

- 3 (delta positive)  $\delta^+$  on **each** drawn **H**  
**and** (delta negative) (2)  $\delta^-$  on **each** drawn **O**;

*if both molecules drawn,  $\delta^+$  and  $\delta^-$  on **all** atoms.*

*ACCEPT d (lower case) for  $\delta$*

[3]

2. hydrolysis / hydrolytic;  
hydrophilic;

*ACCEPT phonetic spelling throughout*

*IGNORE head*

[2]

3. (a) (i) L;  
M;  
J;  
*If 2<sup>nd</sup> letter given, no mark* 3
- (ii) **CREDIT** answers from clearly drawn diagrams with bonds labelled
- 1 peptide bond;  
**ACCEPT** peptide link
- 2 between, amine / **J** group (of one amino acid) and carboxyl / **L** group (of another);
- 3 H (from amine group) combines with OH (from carboxyl group);
- 4 condensation reaction  
**OR**  
water, lost / eliminated / produced / created / AW;
- 5 covalent; 3 max
- (b) 1 some R groups, attract / repel;
- 2 disulfide, bridges / bond;
- 3 between, cysteine / SH / S (atoms);
- 4 hydrogen / H, bonds;  
**DO NOT CREDIT** in context of *secondary* structure
- 5 ionic bonds between, oppositely charged / + and -, R groups;
- 6 hydrophilic R groups, on outside of molecule / in contact with water (molecules);
- 7 hydrophobic R groups, on inside of molecule / shielded from water (molecules); 4 max
- [10]**
4. (i) haemoglobin / haem; **R Hb** 1
- (ii) iron / Fe<sup>2+</sup> / Fe<sup>3+</sup>; **R ion / Fe / Fe<sup>+</sup>** 1
- [2]**

5. (i) polypeptide; **A** oligopeptide 1
- (ii) glycine; **A** proline / alanine 1
- (iii) *in this answer assume that*  
*chain = polypeptide*  
*molecule = groups of 3 polypeptide chains*
- A** *ecf* for named amino acid from (ii) but **NOT** a name of a base  
 amino acids / glycine, small (to allow close packing);  
 the small one is, every 3<sup>rd</sup> amino acid / at every level in the molecule;  
 chains, form a tight coil / lie close to each other;  
 held together by hydrogen bonds; *ignore other bonds*
- bonds form between R groups of lysines;  
 molecules form, fibres / bonds with adjacent molecules; **A** fibril  
 covalent bond between, adjacent molecules / CO-NH groups;  
 fibres composed of parallel molecules;  
 ends of parallel molecules staggered;  
 prevents line of weakness; 2 max
- [4]
6. active site; 1 [1]
7. activation (energy); 1 [1]
8. (a) active site correctly labelled; 1
- (b) **C**; 1
- (c) shape of active site;  
complementary;  
 correct shape / correct molecule / correct substrate / **C**, will, fit /  
 form ESC;  
 any other shape / any other molecule / any other substrate /  
**A / B / D / E**, will not;  
*award 2 marks if candidate writes 'only correct .....*
- 3 max

- (d) *look for points relating to the substrate changing shape  
ignore refs to enzyme changing shape*

puts strain on the bonds in the substrate / bonds break more easily;  
**A** weakens bonds

lowers activation energy;  
AVP; e.g. referring to anabolic reaction

1 max

[6]

9. (i) glycosidic; **A** covalent / C-O-C / oxygen bridge  
**R** oxygen bond / 'glucosidic'

1

- (ii) hydrolysis / hydrolytic; *if qualified, needs to be correct*

1

[2]

10. *accept ✓ = yes    ✗ = no  
each correct row = 1 mark*

	gum arabic	amylase	cellulose	glycogen
branched structure		no;		yes;
heteropolysaccharide		no;		no;
found in animals/plants		plants;		animals;
function in organism		storage / reserve; <b>R</b> 'energy' alone	structural / strength / stops bursting / cell wall / support / gives cell shape;  <b>R</b> protects rigid = neutral	

[4]

11. gene / allele; **A** cistron **R** genes / alleles / operon / intron

1

[1]

12. cell wall(s);  
 $\beta$  / beta; **A B**  
glycosidic; **NOT** glucosidic  
180;  
straight; **A** polysaccharide / unbranched / linear  
hydrogen / H; **NOT** H<sub>2</sub> 6 **[6]**
13. (i) 4; 1
- (ii) deoxyribose; **NOT** ribose  
phosphate;  
nitrogen(ous) / organic / named, base; **A** purine / pyrimidine  
**NOT** uracil  
**NOT** letter  
**NOT** thiamine / thiamine  
take a correct base from a list unless that list includes uracil 3 **[4]**
14. 1 2, molecules / helices, (of DNA) produced;  
2 identical (molecules of DNA produced);  
3 (each made up of) 1, original / parent / old, strand;  
4 1 new strand;  
5 original / parent / old, strands, act as template / described;  
6 ref to (free DNA) nucleotides; 3 max **[3]**
15. ribose (instead of deoxyribose);  
uracil / U, replaces thymine;  
single stranded (instead of double stranded);  
smaller molecule / different 3-D structure to DNA; **[3]**
16. (a) (i) add / mix with, alcohol / ethanol / propanone / (suitable)  
organic solvent;  
then, add to / add / mix with, water;  
*water alone = 0*  
**R** heat 2
- (ii) emulsion / milky colour / cloudy / AW; **R** precipitate 1

(b) *phospholipids have*

1 less fatty acid (residue) / 2 fatty acid (residues) not 3; **A** hydrocarbon  
 1 less ester bond / 2 ester bonds not 3;  
 phosphate;  
 choline / base / nitrogen;  
 hydrophilic / polar, end / head;

max 3

(c) (i) add, copper sulphate (solution) and sodium hydroxide (solution) /  
 biuret (reagent);

**R** Biuret test unqualified

**R** heat

1

(ii) purple / mauve / lilac; **R** blue

1

[8]

17. (i) add / use, Benedict's (reagent);  
 heat; **NOT** use water bath alone  
 (blue to) green / yellow / orange / brown / red (precipitate);

3

(ii) hydrolysis;  
 boil / heat, with (dilute), acid / HCl; **A** (dil) NaOH  
 (add) hydrolytic enzyme / sucrase / invertase;

1 max

[4]

**18. Marking points 2 – 6 can be applied to the standard solutions or the sample**

1 using, standard / known, concentrations (of reducing sugar);

2 heat with, Benedicts (solution) /  $\text{CuSO}_4 + \text{NaOH}$ ;

3 (use of) same volumes of solutions (each time);

4 (use of) excess Benedicts;

5 changes to, green / yellow / orange / brown / (brick) red;

6 remove precipitate / obtain filtrate;

7 calibrate / zero, colorimeter;

8 using, a blank / water / unreacted Benedicts;

9 use (red) filter;

10 reading of, transmission / absorbance;

11 more transmission / less absorbance, of filtrate  
 = more sugar present; **ora**

12 (obtain) calibration curve;

13 plotting, transmission / absorbance,  
 against (reducing) sugar concentration;

2.1

- 14 use reading of unknown sugar solution and read off graph  
to find conc.;

*e.g. serial dilutions*

**ALLOW** boil / > 80°C      **DO NOT CREDIT** warm

**DO NOT CREDIT** amount / quantity

**CREDIT** description of method

*e.g. filtering / centrifuging & decanting*

**ACCEPT** 'measure how much light, does / does not,  
pass through'

If precipitate is **clearly indicated** as being present in  
sample, **ALLOW** 'less transmission / more absorbance,  
= more sugar present'

[6]