B1.2 Proteins (HL)

What the Cell · DP Biology · worksheet · HL statements B1.2.6–12

Name _____ **Date** _____ **Total** _____ / 40

About 40 minutes, or one section at a time. The number of marks shows how many separate points to make.

Section A: Recall

9 marks

1 **State** two types of R-group found in amino acids. B1.2.6 **[2]**

2 **Name** the amino acid that forms disulfide bonds. B1.2.9 **[1]**

3 **State** which groups in the backbone form hydrogen bonds in secondary structure. B1.2.8 **[1]**

4 **Define** conjugated protein. B1.2.11 **[1]**

5 **State** the number of polypeptide chains in insulin, collagen and haemoglobin. B1.2.11 **[3]**

6 **State** one difference in shape between globular and fibrous proteins. B1.2.12 **[1]**

Section B: Understanding

15 marks

7 **Explain** why the primary structure of a protein determines its three-dimensional shape. B1.2.7 **[3]**

8 **Explain** how a change in pH can disrupt the tertiary structure of a protein. B1.2.9 **[3]**

9 **Explain** where hydrophobic and hydrophilic amino acids are found in an integral membrane protein. B1.2.10 [3]

10 **Explain** how the structure of collagen suits its function. B1.2.12 [3]

11 **Explain** how the chemical variety of R-groups produces a great diversity of proteins. B1.2.6 [3]

Section C: Working with evidence

10 marks

All data in this section are invented for practice. The patterns are realistic.

12 B1.2.7, B1.2.9

An enzyme with one chain of 124 amino acids and eight cysteines was unfolded with urea (which breaks hydrogen bonds and hydrophobic interactions) and a reducing agent (which breaks disulfide bonds). Its activity was then measured under different conditions.

Sample	Treatment	Activity / % of untreated
A	Untreated	100
B	In urea and reducing agent	2
C	B, then urea and reducing agent both removed slowly	92
D	B, then reducing agent removed first and urea an hour later	3
E	D, then a trace of reducing agent added for ten hours	88

a **Explain** why sample B had almost no activity. **[2]**

b **Deduce** what sample C shows about protein structure. **[2]**

c **Suggest** why sample D stayed inactive. **[2]**

d **Suggest** how adding a trace of reducing agent restored activity in E. **[2]**

e **State** the largest number of disulfide bonds this enzyme could have. **[1]**

f **State** which level of protein structure is not affected by urea. **[1]**

Section D: Longer answer

6 marks

13 **Compare and contrast** the structure and function of insulin and collagen. B1.2.11, B1.2.12 **[6]**