

Task 7 – Protein Chemistry Quiz

Name: Solutions

Answer the following questions in the spaces provided. You have been supplied a Data Sheet and a copy of the "Biuret Test for Proteins".

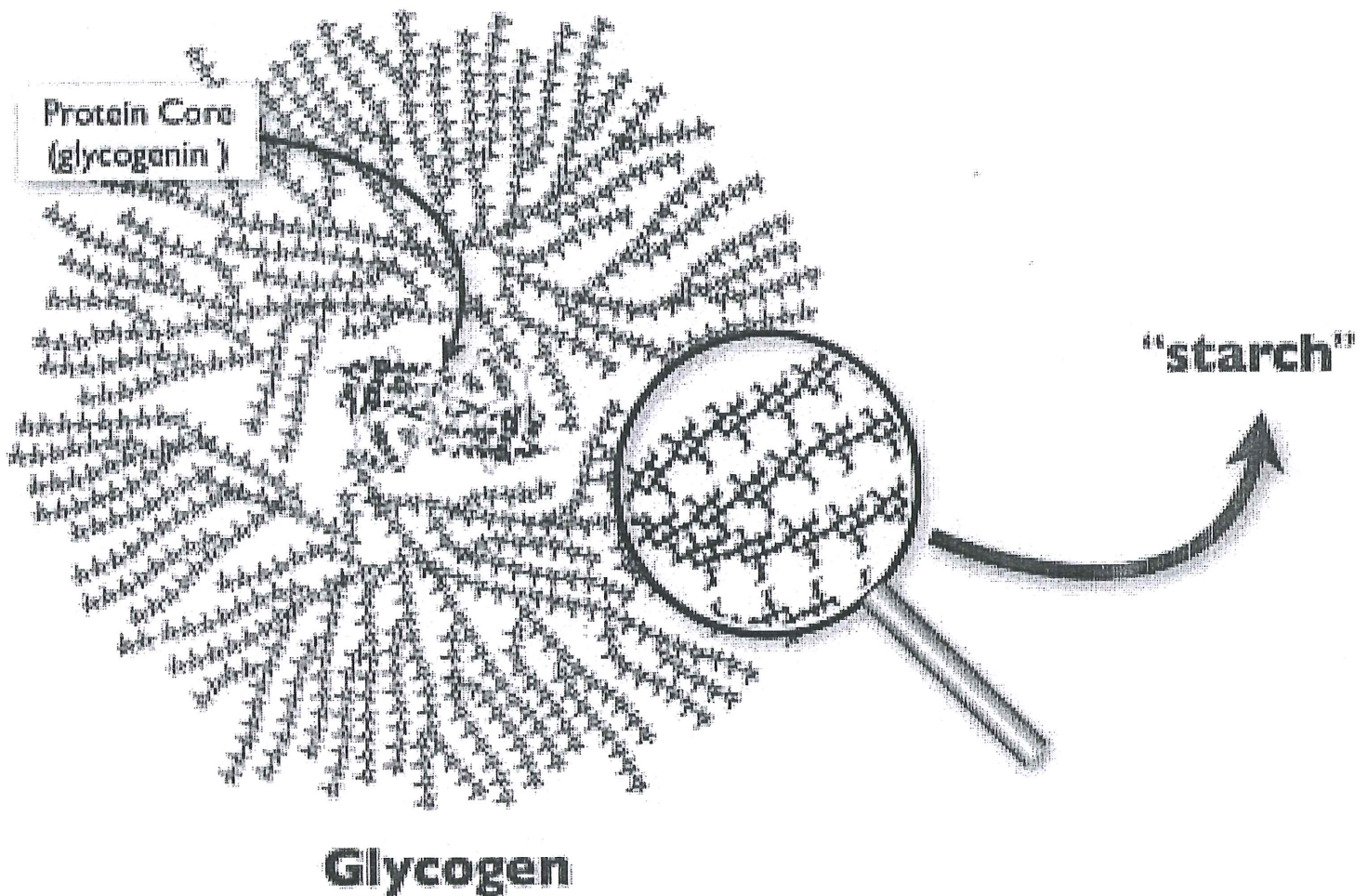
1. Explain with the assistance of diagrams the difference between a monosaccharide and disaccharide. (4 marks)

Monosaccharide - can not be broken down into 2 simple sugars. - (1)
Disaccharide - contains 2 monosaccharides - (1).
→ diagram - (1)
→ diagram - (1).

2. The formation of sucrose can be considered a type of polymerisation reaction. Explain why it can be considered as this type. Make sure you use diagrams and name the specific type of reaction. (4 marks)

Type. - condensation. - (1)
- joining of H^+ & OH^- to form H_2O - (1).
Diagrams → (2) — neatness
— correctness.

3. Consider the following diagram.



Explain with reference to the above the difference in solubility in water between starch and glycogen. (2 marks)

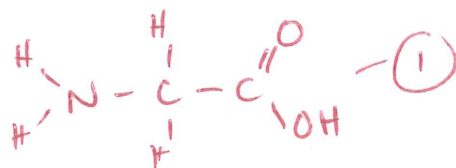
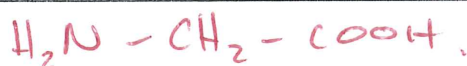
Glycogen has a large/high density of hydrogen bonding sites available for H_2O bonding with H_2O , compared to starch which has a lower density.

4. Name the simplest amino acid and draw its molecule.

(2 marks)

glycine.

(1)

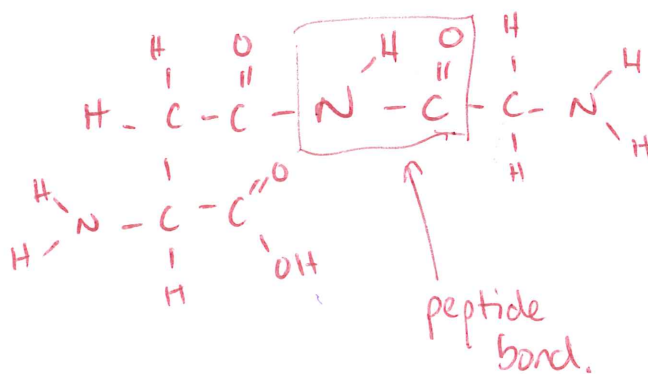
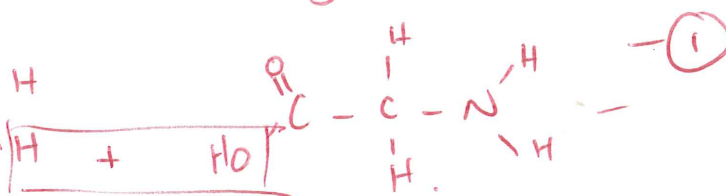
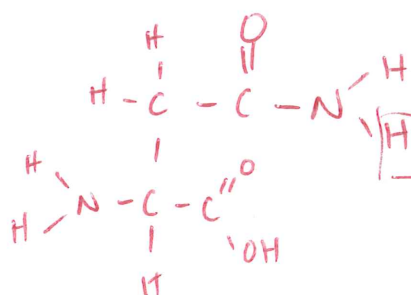


5. Forming a peptide bond can occur between two amino acids. Draw the molecular reaction between asparagine and glycine. Indicate clearly where the peptide bond is located.

(3 marks)

Asparagine (ASN)

Glycine (Gly).



peptide bond.

(1)

Consider the "Biuret Test for Proteins" booklet and answer the following questions.

6. What are a "negative control" and a "positive control"? Why do you use them in an experiment?

(2 marks)

Negative control - a control test that clearly shows a negative result ie - no protein. (colour) - (1)

Positive control - a control test that clearly show a positive result ie - protein present.

Direct comparison between data + inferences. - (1)

7. Explain why the following step is in the procedure.

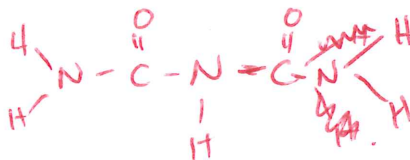
(1 mark)

- Shake well and allow the mixture to stand for 5 minutes

Shake well (agitation) allows a greater probability of reactants coming in contact.
5 minutes may be due to a slower reaction rate due to nature of reactants. - (1)

8. Draw the biuret molecule.

(1 Mark)



9. ^{why} What does the biuret solution change colour?

(1 mark)

The Cu^{2+} in the copper sulfate which starts off blue combined with 4 peptide bonds which form a chelate complex which is violet. More peptides → pink

10. As the biuret solution is added to a protein a colour change occurs. With reference to stoichiometry, explain why the degree of colour changes is dependent upon the amount of protein present. (2 marks)

As there is a chelated complex formed between 4 nitrogens in 4 peptide bonds per Cu^{2+} , the molar ratio between Cu^{2+} and peptides is

$$\text{Cu}^{2+} : \text{Peptides} = 1 : 4. \quad (1)$$

As the number of peptides increase, the amount of Cu^{2+} consumed is 4:1 ratio, hence the degree of blue Cu^{2+} will decrease more. (1)
LE → peptides in solution.

11. In the Biuret Test for proteins using the Biuret Reagent, identify the:

(3 marks)

- a) The independent variable: type of food. (1)
b) The dependent variable: colour change. (1)
c) 3 controlled variables: volume of food sample.
standing time
concentration of biuret sol. (1)

12. What is a chelate complex? - Not specific to this context.

(1 mark)

A ring of atoms surrounding a metal ion (and including the metal itself). (2 or more atoms attached to the metal ion).

13. Is the Biuret Test a qualitative test or quantitative test? Why?

(2 marks)

Qualitative (1)
Qualitative - Examining differences in colour. Small sample size.
Quantitative - measured data (numbers) - use a spectroscope (1)

