Structure, Function and Identification of Macromolecules

The foods we eat are a combination of the major groups of nutrients our cells require.

1. [SP 1] Identify the 4 main categories of macromolecules and state why each is important for cells
2. [SP 1] Describe how carbohydrates are stored in your body and how they are removed from storage when needed.
3. [SP 1, SP 3, SP 6] Some students are using the Lugol's iodine test and Benedict's test to detect the presence of certain macromolecules in foods. Predict their results by completing the data table below:

Table 1: Lugol's and Benedict's test results for a variety of foods

Food tested	Lugol's iodine test result	Benedict's test result
	purple	blue
Table sugar		
	yellow	red precipitate
Untreated starch		
Starch exposed to amylase		
Distilled water		

4. [SP 1, SP 6] Another student predicts that her lollipop will give a positive Benedict's test. Provide reasoning to support or reject her prediction.
5. [SP 1, SP 3] One group of students gets a positive Lugol's test for their distilled water. Suggest an explanation for this.

Students are trying to investigate the effects of amylase on starch. They set up a series of test tubes as outlined below and then subject the contents of each tube to the Benedict's test. After adding amylase, they wait 10 minutes before doing the tests.

Table 2: Preparation of test tubes for Lugol's and Benedict's tests

Test tube	amylase	starch	HCl	Lugol's test	Benedict's test
1	-	10 mL	-	purple	blue
2	2 mL	10 mL	-	yellow	red
3	2 mL	10 mL	1 drop	purple	blue
4	distilled water			yellow	blue

6. [SP 3] State the purpose of each tube.
7. [SP 3, SP 6] a) Identify the molecule no longer present in the starch/amylase mixture after 10 minutes. Justify your response.
   [SP 3, SP 6] b) Identify the new molecule present in the starch/amylase mixture after 10 minutes. Justify your response.
   [SP 3, SP 6] c) Use the data to make a statement about the effect of amylase on starch.
8. [SP 3] Tube 3 contained amylase yet showed a positive Lugol test and negative Benedict test. Provide an explanation.
9. [SP 3] Design a simple experiment to determine if the amylase is used up during starch digestion.

10. [SP 6] a) Predict the amount of salivary amylase you would expect to find in the saliva of carnivores compared to that of herbivores and omnivores. Justify your prediction.
    [SP 6] b) Predict whether you would expect plants to produce amylase. Justify your answer.

Peptide bonds can be detected using the biuret test. In the presence of peptides bonds, the reagent changes from blue to pink or lavender. Because there is one peptide bond between each pair of amino acids, the intensity of the color change is directly proportional to the concentration of proteins in a sample.

11. [SP 1, SP 3] Predict the results to complete the data table.

Table 3: Biuret results for treated and untreated egg white

Treatment group	Biuret result
Egg white	
Egg white treated with proteases	

12. [SP 3] Design a procedure to allow you to rank a series of solutions from highest protein concentration to lowest.