Topical test chemicals of life

1. Lack of iodine in the diet causes cretinism because iodine
   A. Controls metabolism
   B. Is essential in the formation of metabolic enzymes
   C. Influence growth of bones
   D. Is required for synthesis of thyroxine

2. In the body, proteins combine with acids or bases depending on the
   A. Temperature of the medium
   B. Hydrogen ion concentration in the medium
   C. Number of solvent molecules present in the medium
   D. Number of amino acid molecules in the protein

3. Starch, glycogen and cellulose are all composed of
   A. α-glucose
   B. β-glucose
   C. monosaccharides
   D. polysaccharides

4. Some amino acids are known as essential because they are
   A. more important in the body metabolism than other
   B. not made by the body
   C. contained in first class proteins
   D. required in larger amounts than others.

5. Which of the following sugars is not reducing?
   A. Maltose
   B. Fructose
   C. Galactose
   D. Sucrose

6. Among the following compounds, one cannot be hydrolyzed is
   A. Glycogen
   B. Galactose
   C. Lactose
   D. Maltose

7. Which one of the following is the correct formula of a polysaccharide?
   A. (C6H10O5)n
   B. $(CH_2O)_n$
   C. (C6H12O6)n
   D. C12H22O11)n

8. Which one of the following statements is true of essential fatty acids? They
   A. They are the most required lipids in the body
   B. Are required in the body in large quantities
   C. Cannot be synthesized in the body
   D. Are most abundant in animal tissues

9. Which one of the following properties of water facilitates its efficient transportation of glucose?
   A. Forms hydrogen bonds with other molecules
   B. Has high surface tension
   C. Has low freezing points
   D. Has high boiling point

10. Which of the following vitamins is water soluble?
   A. A
   B. K
   C. D
   D. C

11. A property of water that makes it suitable component of a hydrostatic skeleton is it
   A. High density
   B. High surface tension
   C. Low viscosity
   D. Incompressibility

12. Aquatic organism survives under solidified water body because
   A. Water solidifies from bottom to top of lakes
   B. Ice is less dense than water at 4^0C
   C. Cold water is more dense than hot water and falls to the bottom
   D. Warm water floats on top of cold water

13. Which one of the following is not a fibrous protein?
   A. Keratin
   B. Globulin
   C. Elastin
   D. Collagen

14. Sucrose is a non-reducing sugar because it
   A. It is not fully digested
   B. It lacks reducing groups
   C. Is a disaccharide molecule
   D. Is a ketose sugar

15. green plant develops yellow leaves as a result of being deficient in
   A. Magnesium
   B. Manganese
   C. Phosphorous
   D. Calcium

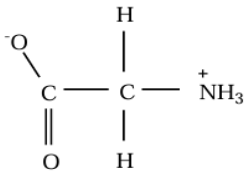
16. Which of the following elements is **not** required by plants?
   A. copper
   B. iodine
   C. iron
   D. zinc

17. In the blood plasma, proteins can act as bases or acids depending on the
    A. Temperature of the medium
    B. Hydrogen ion concentration of the medium
    C. Nature of the protein
    D. Concentration of the solute in the plasma
18. Which of the following is the function of manganese in the human body?
    A. Essential for formation of erythrocytes
    B. Activate enzymes
    C. Acts as growth factor in bone development
    D. Utilized as a component of bone and teeth

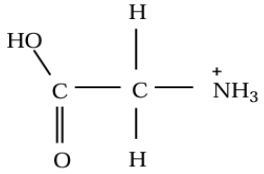
19. Which of the following substances consists of globular proteins?
    A. Enzymes
    B. Keratin
    C. Elastin
    D. collagen
20. Which one of the following symptoms is likely to be caused by magnesium deficiency in plants?
    A. green leaves and stunted growth
    B. Poor root growth
    C. Weak stems
    D. Yellow spotted leaves

21. Which one of the following is not a function of globular proteins in the body?
    A. Acts as buffers in blood plasma
    B. Form structural proteins
    C. Are vital constituents of plasma membrane
    D. Form enzymes

22. The following structural formula is for an amino acid in solution



    A substance was added to this solution and the structure of the amino acid molecule changed to



    What substance was added and what effect would this have had on the final pH of the solution?
    A. Salt added, pH unchanged
    B. Acid added, pH lowered
    C. Acid added, pH unchanged
    D. Base added, pH higher

23. We need to eat iodized salt in order to
    A. Prevent obesity
    B. Get a balanced diet
    C. Improve vision
    D. Avoid goiter

24. Water has comparatively high surface tension and boiling point in relation to other substances of similar sized molecules because its molecules are
    A. doubly bonded
    B. polar
    C. ionic
    D. covalent

25. Evaporation of water from the body surface causes cooling because water has a high
    A. Latent heat of vaporization
    B. Latent heat of fusion
    C. Boiling point
    D. Specific heat capacity

26. The complexity and variety of organic molecules is due to the ability of the carbon atom to
    A. form covalent and ionic bond
    B. form covalent bonds in three dimensions
    C. form strong chemical bonds
    D. bonds with very many other elements

27. When a lipid is combined with a phosphate group, it becomes
    A. saturated
    B. a complex molecule
    C. water soluble
    D. amphoteric

28. When a lipid is combined with a phosphate group, it becomes
    A. saturated.
    B. a complex molecule.
    C. water soluble.
    D. amphoteric.

29. Starch and glycogen are suitable storage molecules because they
    A. are large in size which makes them less soluble in water
    B. are chemistry reactive in the cell
    C. can easily be hydrolyzed
    D. exert an osmotic pressure in the cell

30. The high heat capacity of water has biological importance of
    A. minimizing temperature changes in animal fluids
    B. cooling animals
    C. Preventing freezing of cell contents
    D. controlling heat loss in animals

Section B: structured questions

31. Fat and glycogen are energy storage compounds in animals

(a) Compare the suitability of the two substances as storage compounds. (04 marks)

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(b) State advantage of storing fat over glycogen. (03 marks)

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(c) Why is glycogen more suitable energy compound in muscle than fat? (03 marks)

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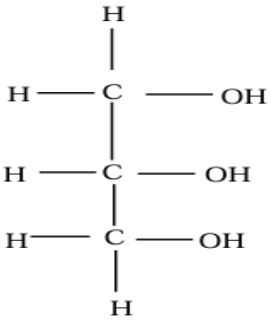
32. (a) Using the structural formula



For glycerol, and molecular formula $CH_3(CH_2)_nCOOH$ for a fatty acid show the formation of triglyceride from fatty acids and glycerol. (02 marks)

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(b) What properties do lipids possess as storage food substances? (02 marks)

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(c) Outline the structural and physiological functions of lipids in living organisms.

(i) Structural. (03 marks)

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(ii) Physiological. (02 marks)

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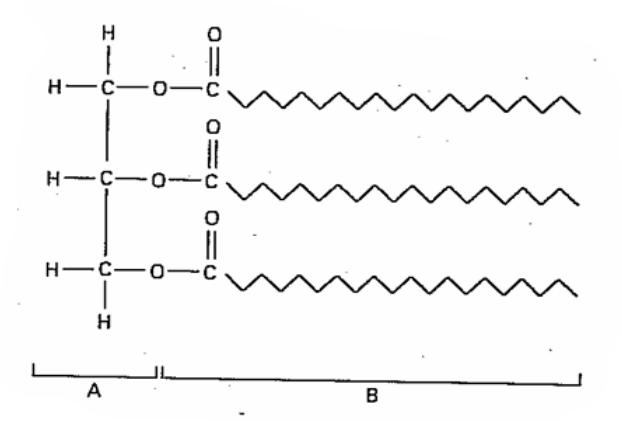
33. The diagram below shows the structure of a lipid molecule.



(a) (i) Name the parts labelled A and B. (02 marks)

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(ii) Name this type of lipid. (01 mark)

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(iii) Name the chemical reaction used to form the bonds between A and B. (01 mark)

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(b) (i) state one function of these type of lipid in living organism. (01 mark)

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(iii) State one feature of the molecules of this type of type which makes them suitable for the function have named. (01 mark)

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34. (a) state three ways in which water has similar functions in both plants and animals.
(03 marks)

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(b) Give two ways, in which flowering plants minimize water loss through
(i) behavioral means. (04 marks)

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(ii) physiological means. (04 marks)

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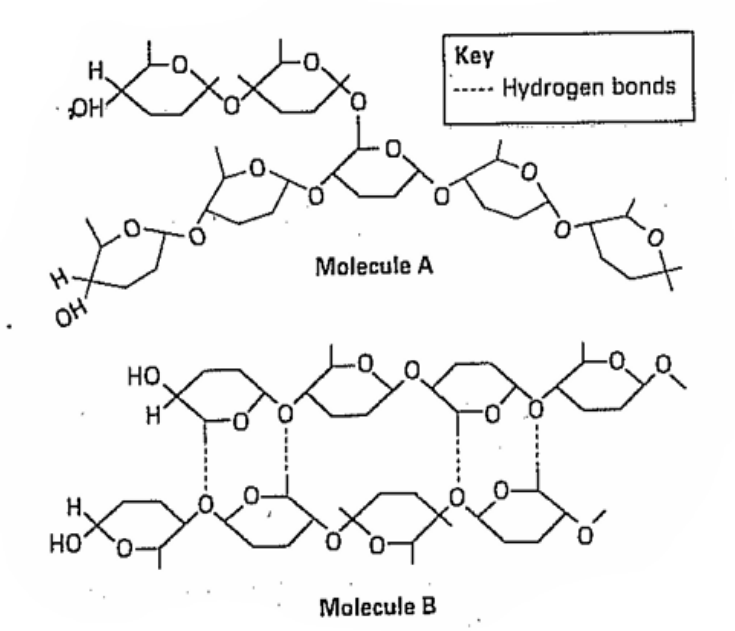
35. The diagram below shows part of the molecular structures of two polysaccharides. The hexagonal shapes represent hexose sugars.



(a) Give the name of molecule **A.** (01 marks)

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(b) Give three difference between hexose sugars in molecule A and B. (03 marks)

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(c) Both polysaccharides contain hexose sugars joined by 1-4 glycosidic bonds.

(i) Explain, using an annotated diagram, how these bonds in molecule A are hydrolyzed in the process of the human digestion. (02 marks)

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(ii) Using information in the diagram of molecule **B**, suggest one reason why it cannot be digested by humans. (02 marks)

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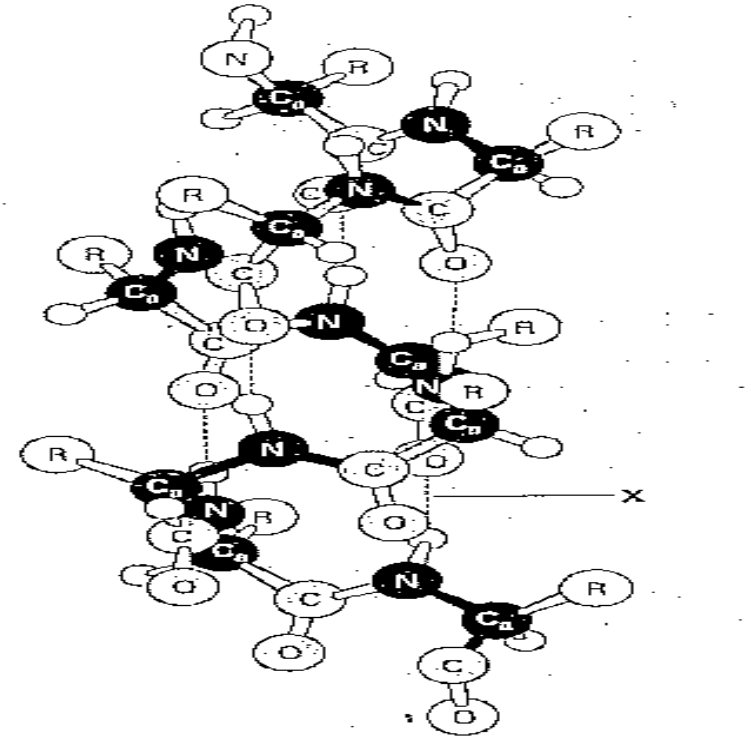
36. The figure above right shows a diagram of part of a polysaccharides chain. This type of twisted structure is commonly found in proteins of many different types.



(a) (i) name the repeating unit of a polysaccharides chain. (01 marks)

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(ii) State the name given to the twisted structures shown in the figure. (01 mark)

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(iii) Identify the type of bond in the structure shown in the figure. (01 mark)

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(iv) Explain briefly what happen to the polysaccharide chain if it is heated to 70^0C. (03 marks)

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(v) The twisted arrangement seen in the figure above is referred to as a secondary structure. Explain what is meant by a secondary structure. (02 marks)

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(b) Another common secondary structure is known as the beta sheet. state one difference between the beta sheet and the structure shown in in the figure in part (a). (01 mark)

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(c) (i) proteins can be classified as fibrous or globular. Name one example of each type of the protein. (01 mark)

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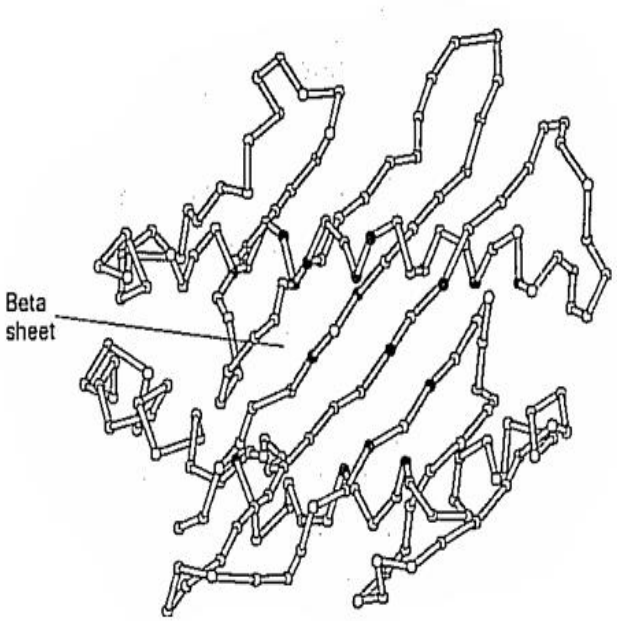
Globular proteins such as that shown in the figure below are often described as tertiary structures. However, as indicated in the diagram, any globular proteins may also have sections of secondary structures



(ii) Explain what is meant by the term tertiary structure. (02 marks)

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(d) Monosaccharides can also be linked to form long chain molecules called polysaccharides. Give three difference between a polypeptides and polysaccharides chain. (03 marks)

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37. Distinguish between the following

(a) Monosaccharide and polysaccharide. (05 marks)

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(b) Starch and cellulose. (04 marks)

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(c) Saturated and unsaturated fats. (05 marks)

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(d) Globular and fibrous proteins. (06 marks)

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END