Question Bank Export

1. Approximately how many elements are present in the living body out of the 92 elements found in nature?

- 92
- 50
- 25
- 100

Explanation: The text states that out of the 92 naturally occurring elements, only about 25 are found in the living body. This highlights the selective nature of biological systems in utilizing available elements for constructing and maintaining life.

2. The four most common elements in the living body are _____, _____, _____, and _____.

Word Bank:

Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Phosphorous

Answer: Carbon, Hydrogen, Oxygen, Nitrogen

Explanation: The four most common elements in all living organisms, including humans, are Carbon, Hydrogen, Oxygen, and Nitrogen. These elements form the backbone of all major biological molecules: Carbohydrates (C, H, O), Lipids (C, H, O), Proteins (C, H, O, N, sometimes S), and Nucleic Acids (C, H, O, N, P). Their unique chemical properties, such as carbon's ability to form stable bonds with itself and other elements, make them ideal for building complex organic structures.

3. Compounds that contain the element _____ are known as organic compounds.

Word Bank:

Oxygen, Nitrogen, Carbon, Hydrogen

Answer: Carbon

Explanation: Organic compounds are fundamentally defined by the presence of Carbon atoms, usually bonded to Hydrogen atoms, forming a carbon-hydrogen framework. This distinguishes them from inorganic compounds, which generally lack carbon-hydrogen bonds or contain carbon in simple forms like carbonates or carbon dioxide. The unique bonding capabilities of carbon allow for the formation of large, complex, and diverse molecules essential for life.

4. Which of the following is an inorganic compound essential for the maintenance of life?

- Proteins
- Carbohydrates
- Lipids
- Water

Explanation: Inorganic compounds are generally defined as those that do not contain carbon atoms, or if they do, the carbon is not bonded to hydrogen (e.g., carbon dioxide, carbonates). Water (H_2O) is a classic example of an inorganic compound, despite its critical role in living systems, because it lacks carbon. Other inorganic compounds essential for life include mineral salts and various gases.

5. The four types of biological molecules that build up living matter are _____, _____, _____, and _____.

Word Bank:

Carbohydrates, Water, Proteins, Minerals, Lipids, Nucleic acids

Answer: Carbohydrates, Proteins, Lipids, Nucleic acids

Explanation: Biological molecules, also known as macromolecules, are the large, complex organic molecules that make up living organisms and carry out life processes. These four categories represent the primary classes of organic compounds found in all forms of life, each with distinct structures and crucial functions, such as energy storage, structural support, enzymatic activity, and genetic information transfer.

6. Which element makes up the highest percentage by mass in the human body?

- Carbon
- Hydrogen
- Oxygen
- Nitrogen

Explanation: Oxygen constitutes the highest percentage by mass in the human body (65%). This is primarily because water (H_2O), which makes up about 60-70% of the body's mass, contains a large proportion of oxygen. While carbon is crucial for organic structures, oxygen's presence in water and many organic molecules makes its overall mass contribution the largest.

7. Which element is present in significant amounts in bones, as well as the brain, lungs, kidneys, and muscles?

- Phosphorous
- Potassium
- Sulphur
- Calcium

Explanation: Calcium is a vital mineral in the human body, with 1.5% mass contribution. It is predominantly found in bones and teeth, providing structural rigidity. It also plays crucial roles in muscle contraction, nerve impulse transmission, and blood clotting. The brain, lungs, kidneys, liver, heart, thyroid gland, and muscles also contain calcium, indicating its wide-ranging biological importance.

8. Which element is primarily found in bones and urine?

- Calcium
- Potassium
- Sulphur
- Phosphorous

Explanation: Phosphorous is an essential element, making up 1.0% of the body's mass. It is a major component of bones and teeth, often alongside calcium, contributing to their strength. Additionally, phosphorous is critical for forming nucleic acids (DNA and RNA) and ATP (adenosine triphosphate), the primary energy currency of the cell, and is found in urine as a metabolic waste product.

9. Which element is specifically mentioned as being important for the activity of enzymes?

- Sodium
- Magnesium
- Potassium
- Chlorine

Explanation: Potassium, although present in smaller amounts (0.35%), is essential for enzyme activity, nerve impulse transmission, and maintaining the ionic balance across cell membranes. Many enzymes require specific ions like potassium as cofactors to function optimally in catalyzing biochemical reactions, thus highlighting its importance despite its low percentage.

10. Which of the following is the most abundant organic compound on Earth?

- Proteins
- Lipids
- Nucleic acids
- Carbohydrates

Explanation: Carbohydrates are indeed the most abundant organic compounds on Earth. This is largely due to their central role in plant life: they are produced during photosynthesis, where plants convert light energy into chemical energy stored in glucose (a simple carbohydrate) and then synthesize more complex carbohydrates like starch (for storage) and cellulose (for structural support).

11. The main elemental composition of carbohydrates includes _____, _____, and _____.

Word Bank:

Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur

Answer: Carbon, Hydrogen, Oxygen

Explanation: Carbohydrates are organic molecules primarily composed of three elements: Carbon (C), Hydrogen (H), and Oxygen (O). Their general molecular formula is often represented as $C_x(H_2O)_y$, indicating that hydrogen and oxygen are present in a 2:1 ratio, similar to water. This elemental composition is fundamental to their structure and function as energy sources and structural components.

12. In carbohydrates, hydrogen and oxygen combine in a {0} ratio.

- 1:1
- 2:1
- 1:2
- 3:1

Explanation: In most carbohydrates, the ratio of Hydrogen atoms to Oxygen atoms is 2:1, which is the same ratio as in a water molecule (H_2O). This gives rise to the general empirical formula $C_x(H_2O)_y$, where 'x' and 'y' represent different numbers. This characteristic ratio is a defining feature of carbohydrates, distinguishing them from other organic molecules like lipids.

13. Two _____ molecules join to form a disaccharide, and during this process, a _____ molecule is released.

Word Bank:

Polysaccharides, water, amino acids, glycerol, monosaccharides, fatty acids

Answer: Monosaccharides, water

Explanation: Disaccharides are formed through a condensation reaction (also known as a dehydration reaction) where two monosaccharide molecules join together. In this process, a molecule of water is eliminated (released). Conversely, disaccharides can be broken down into their constituent monosaccharides through hydrolysis, which involves the addition of a water molecule.

14. Hydrolysis of sucrose yields which two monosaccharides?

- Glucose and Glucose
- Glucose and Galactose
- Glucose and Fructose
- Fructose and Galactose

Explanation: Sucrose, commonly known as table sugar, is a disaccharide composed of one molecule of Glucose and one molecule of Fructose. When sucrose is hydrolyzed (broken down, often by enzymes or acid), it yields these two simpler monosaccharides. This process is important in digestion, where enzymes break down sucrose for absorption.

15. Which disaccharide is notable for being absent in plants?

- Maltose
- Sucrose
- Lactose
- Glucose

Explanation: Lactose is explicitly stated as 'the only sugar that is absent in plants'. It is the primary sugar found in milk and dairy products, synthesized in the mammary glands of mammals. Plants synthesize a wide variety of carbohydrates, but lactose is not among them; their structural and storage carbohydrates are typically cellulose and starch, respectively.

16. Maltose is formed by the union of two _____ molecules. Its hydrolysis yields _____ and water.

Word Bank:

Glucose, Fructose, Galactose, water

Answer: Glucose, Glucose

Explanation: Maltose is a disaccharide formed by the glycosidic linkage of two glucose units. It is often referred to as 'malt sugar' and is an intermediate product in the hydrolysis of starch, commonly found in germinating seeds where starch is broken down to provide energy for growth. The union of two glucose molecules releases a water molecule to form maltose.

17. Based on the provided information, which disaccharide is generally considered sweeter than others?

- Maltose
- Sucrose
- Lactose
- Starch

Explanation: The text states that Lactose is 'not sweet as Sucrose'. This implies that Sucrose is considered sweeter among the disaccharides mentioned (Maltose, Sucrose, Lactose). Sucrose is widely used as a sweetener in food and beverages due to its high perceived sweetness.

18. Which disaccharide is found in phloem sap?

- Maltose
- Lactose
- Sucrose
- Glucose

Explanation: Sucrose is found in various plant sources, including white and brown sugar, sugarcane, beet, and some fruits. Crucially, the text explicitly mentions that sucrose is present in 'Phloem sap'. Phloem is the vascular tissue in plants responsible for transporting sugars (primarily sucrose) from leaves (where they are produced) to other parts of the plant.

19. Polymerization of a large number of _____ forms a _____ molecule.

Word Bank:

Disaccharides, Monosaccharides, Polysaccharide, Protein, Lipid

Answer: Monosaccharides, Polysaccharide

Explanation: Polysaccharides are large, complex carbohydrate molecules formed by the polymerization (linking together) of a great number of monosaccharide units. This process involves the formation of many glycosidic bonds, often through dehydration reactions. Conversely, the breakdown of polysaccharides (hydrolysis) yields their constituent monosaccharides.

20. Which polysaccharide serves as the primary storage carbohydrate in plants?

- Cellulose
- Glycogen
- Starch
- Maltose

Explanation: Starch is explicitly described as 'The type of carbohydrate that stores in plants'. Plants synthesize glucose during photosynthesis and then polymerize it into starch for long-term energy storage, typically in roots, tubers, and seeds. When the plant needs energy, starch is broken down back into glucose.

21. Which polysaccharide is the storage form of carbohydrate in the animal body?

- Starch
- Cellulose
- Glycogen
- Lactose

Explanation: Glycogen is described as 'The type of carbohydrate that stores in animal body'. It is the primary storage form of glucose in animals and fungi, analogous to starch in plants. Glycogen is predominantly stored in the liver and muscles, providing a readily available source of glucose for energy when needed.

22. Which polysaccharide, though not digested by humans, is important for avoiding constipation?

- Starch
- Glycogen
- Cellulose
- Sucrose

Explanation: Cellulose is highlighted as having 'no nutritional value, as it is not digested in the human digestive system. Therefore it helps to avoid constipation'. Cellulose is a major component of plant cell walls, providing structural rigidity. While humans lack the enzymes to digest cellulose, its fibrous nature adds bulk to stool, aiding bowel movements and preventing constipation.

23. The structural unit of Cellulose, Starch, and Glycogen is _____.

Word Bank:

Fructose, Galactose, Glucose, Ribose

Answer: Glucose

Explanation: Cellulose, starch, and glycogen are all polysaccharides, meaning they are polymers made up of repeating monosaccharide units. For all three of these important polysaccharides, the fundamental structural unit that is polymerized to form their complex structures is Glucose. The differences in their properties arise from how these glucose units are linked together and arranged in space.

24. Which of the following is a characteristic property of polysaccharides?

- Sweet and water soluble crystals
- Insoluble in normal water and not crystals
- Small and easily digestible
- Only found in animal bodies

Explanation: Polysaccharides are typically very large molecules. Their size and complex branching structures prevent them from readily dissolving in water, unlike simple sugars (monosaccharides and disaccharides). Additionally, their polymeric nature means they do not form crystalline structures but rather amorphous solids or fibers.

25. What is the main significance of carbohydrates for the activities of organisms?

- As a component of enzymes
- As an energy source
- To synthesize hormones
- To form antibodies

Explanation: The primary and most immediate significance of carbohydrates for organisms is their role as an energy source. Monosaccharides, particularly glucose, are readily oxidized through cellular respiration to release ATP, the cell's main energy currency, which powers all metabolic activities. Carbohydrates also serve as storage compounds (e.g., starch, glycogen) and structural components (e.g., cellulose, chitin), but energy provision is their most fundamental role.

26. List three significant roles of carbohydrates in organisms: as an _____, as a _____, and as a _____.

Word Bank:

energy source, hormone, storage compound, antibody, structural component

Answer: energy source, storage compound, structural component

Explanation: Carbohydrates serve multiple vital roles in living organisms. They are the primary source of energy, especially in the form of glucose. They also function as energy storage compounds, such as starch in

plants and glycogen in animals. Furthermore, carbohydrates like cellulose (in plant cell walls) and chitin (in fungi and arthropod exoskeletons) act as crucial structural components, providing support and protection. They are also constituents of nucleic acids.