

Biology Chapter 2 Self Quiz Questions and Answers PDF

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Which subatomic particle is negatively charged?

- Proton
- Neutron
- Electron ✓
- Nucleus

The negatively charged subatomic particle is the electron, which orbits the nucleus of an atom. Electrons play a crucial role in chemical bonding and electricity.

What is the primary role of DNA in cells?

- Energy production
- Protein synthesis
- Genetic information storage ✓
- Cell membrane structure

DNA serves as the genetic blueprint for all living organisms, encoding the instructions necessary for the development, functioning, and reproduction of cells.

Which macromolecule is primarily responsible for catalyzing biochemical reactions?

- Carbohydrates
- Lipids
- Proteins ✓
- Nucleic acids

Enzymes, which are a type of protein, are the macromolecules primarily responsible for catalyzing biochemical reactions in living organisms. They lower the activation energy required for reactions, thus speeding up the process.

What type of bond involves the sharing of electron pairs between atoms?

- Ionic bond
- Covalent bond ✓**
- Hydrogen bond
- Metallic bond

A covalent bond is formed when two atoms share one or more pairs of electrons, allowing them to achieve greater stability. This type of bonding is fundamental in the formation of molecules and compounds.

Which property of water allows it to dissolve many substances?

- Cohesion
- Adhesión
- Polarity ✓**
- High specific heat

Water's polarity allows it to interact with and dissolve various ionic and polar substances, making it an excellent solvent.

What is the monomer unit of proteins?

- Monosaccharide
- Amino acid ✓**
- Nucleotide
- Fatty acid

Proteins are made up of smaller units called amino acids, which are the monomers that link together to form polypeptide chains. Each protein has a unique sequence of amino acids that determines its structure and function.

What is the primary function of carbohydrates in cells?

- Genetic information storage
- Energy storage and supply ✓**
- Structural support
- Catalyzing reactions

Carbohydrates primarily serve as a source of energy for cells, providing fuel for metabolic processes. They also play a role in structural functions and cell signaling.

Which of the following is a property of water that helps regulate temperature in organisms?

- Low density
- High specific heat ✓
- High pH
- Low surface tension

Water has a high specific heat capacity, which allows it to absorb and retain heat without experiencing significant temperature changes. This property is crucial for maintaining stable temperatures in organisms and their environments.

Explain the significance of hydrogen bonds in the properties of water and the structure of DNA.

Hydrogen bonds in water lead to its cohesive and adhesive properties, allowing for phenomena like surface tension and capillary action, while in DNA, they hold the two strands together, ensuring the stability and integrity of genetic information.

Compare and contrast the structure and function of DNA and RNA.

DNA (deoxyribonucleic acid) is a double-stranded molecule that contains the genetic blueprint for an organism, while RNA (ribonucleic acid) is typically single-stranded and plays a key role in translating that genetic information into proteins.

Which of the following are properties of water that are essential for life? (Select all that apply)

- Cohesion ✓
- High specific heat ✓
- Low boiling point

Solvent properties ✓

Water has several unique properties that are essential for life, including its ability to dissolve many substances, its high specific heat capacity, and its cohesion and adhesion properties. These characteristics enable vital biological processes and support ecosystems.

Which of the following are types of carbohydrates? (Select all that apply)

- Monosaccharides ✓**
- Amino acids
- Disaccharides ✓**
- Polysaccharides ✓**

Carbohydrates are classified into three main types: sugars, starches, and fiber. Each type plays a different role in nutrition and energy supply for the body.

Explain how the structure of water contributes to its role as a universal solvent.

The structure of water, characterized by its polar covalent bonds and bent shape, creates a partial positive charge on the hydrogen atoms and a partial negative charge on the oxygen atom. This polarity enables water to surround and interact with various solutes, effectively dissolving them and allowing water to act as a universal solvent.

How do buffer systems help maintain pH balance in biological systems? Provide an example.

Buffer systems help maintain pH balance by absorbing excess hydrogen ions (H⁺) or hydroxide ions (OH⁻), thus preventing significant changes in pH. An example is the bicarbonate buffer

system in blood, which regulates pH by converting bicarbonate (HCO_3^-) and carbonic acid (H_2CO_3) to neutralize acids and bases.

Which macromolecules are involved in genetic information storage and transfer? (Select all that apply)

- Carbohydrates
- Proteins
- DNA ✓
- RNA ✓

Nucleic acids, specifically DNA and RNA, are the primary macromolecules involved in the storage and transfer of genetic information. Proteins also play a role in the expression of this genetic information, but they are not directly involved in its storage or transfer.

What are the characteristics of enzymes? (Select all that apply)

- They are proteins ✓
- They increase the activation energy of reactions
- They are reusable ✓
- They are specific to substrates ✓

Enzymes are biological catalysts that speed up chemical reactions, are specific to substrates, and can be regulated by various factors. They are not consumed in the reaction and can be reused multiple times.

Which of the following are functions of lipids in biological systems? (Select all that apply)

- Energy storage ✓
- Catalyzing reactions
- Cell membrane structure ✓
- Genetic information storage

Lipids serve several essential functions in biological systems, including energy storage, forming cell membranes, and acting as signaling molecules. They also play roles in insulation and protection of organs.

Describe the role of enzymes in biological reactions and how they affect activation energy.

Enzymes facilitate biological reactions by lowering the activation energy, which increases the rate of the reaction without being consumed in the process.

Which elements are most commonly found in organic molecules? (Select all that apply)

- Hydrogen ✓**
- Helium
- Carbon ✓**
- Oxygen ✓**

Organic molecules are primarily composed of carbon, hydrogen, oxygen, nitrogen, sulfur, and phosphorus. These elements are essential for the structure and function of biological molecules such as proteins, nucleic acids, carbohydrates, and lipids.

Discuss the importance of carbon in forming the backbone of biological molecules.

Carbon serves as the backbone of biological molecules because it can form four stable covalent bonds, allowing for the creation of complex and diverse organic compounds essential for life.