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Concept and application-based

MCQs

for LIFE SCIENCES | BIOTECH

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PRANAV KUMAR

Concept and application-based

MCQs

Life Sciences | Biotechnology

Seventh edition

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Life Sciences | Biotechnology

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Chapter 1

Amino acids and Peptides

01. Which of the following statements about standard amino acids are *correct*?
 - P. Lysine has butylammonium side chain.
 - Q. Average mass of an amino acid residue is ~110 Da.
 - R. Universal genetic code specifies only standard amino acids.
 - S. Proline has a secondary amino group.
 - a. P and Q
 - b. Q and S
 - c. P, Q, R and S
 - d. Q and R
02. Which of the following statement is *not* true?
 - a. The pI is the pH value at which a protein has overall charge of +1.
 - b. At a pH value equal to pI, a protein will not move in the electric field.
 - c. An acidic protein will have a pI less than 7.
 - d. A basic protein will have a pI greater than 7.
03. Which of the following statements is *not* true about the amino acids?
 - a. Only 22 amino acids are used in ribosome-mediated protein synthesis.
 - b. All amino acids exist in two stereoisomeric forms.
 - c. Amino acids have an N-terminus, C-terminus, and R groups.
 - d. There are more than 300 different kinds of amino acids present in the cell.
04. Choose the *incorrect* statement about standard amino acids.
 - a. Aspartate has the smallest pI value.
 - b. Arginine has the largest pI value.
 - c. pK_a value of side chain is maximum for aspartate.
 - d. Side chain of isoleucine has maximum hydrophathy value.
05. Which of the following is *not* true about alanine?
 - a. At pH 1, the overall charge is +1.
 - b. At pH 1, it will move towards cathode.
 - c. An equimolar mixture of d and l alanine does not rotate the plane polarized light.
 - d. It contains branched side chain.

Unit 1

Molecules and their interactions relevant to biology

Structure of molecules, chemical bonds and principles of biophysical chemistry.

01. What is the pH of a solution that has a hydrogen ion concentration of 1.75×10^{-5} mol/L?
- a. 2.26
 - b. 1.2
 - c. 4.76
 - d. 5.8
02. A polar molecule
- a. is slightly negative at one end and slightly positive at the other end.
 - b. has an extra electron, giving it a negative charge.
 - c. has an extra neutron, making it weigh more.
 - d. has covalent bonds.
03. When a thermodynamic equilibrium state at a given temperature and pressure is reached, the
- a. free energy of the state at equilibrium is always higher than that of any other state at the same T and P.
 - b. enthalpy of the state at equilibrium is always lower than that of any other state at the same T and P.
 - c. free energy of the state at equilibrium is always lower than that of any other state at the same T and P.
 - d. enthalpy of the state at equilibrium may be higher than that of any other state at the same T and P.
04. Which of the following statements are *correct*?
- P. Polarity of water makes it an excellent solvent.
 - Q. Water has high tensile strength.
 - R. Cohesive property of water is due to H-bonding.
 - S. Water has high dielectric constant.
- a. P and S
 - b. Q and R
 - c. Q, R and S
 - d. P, Q, R and S
05. Which non-covalent bond is responsible for the high melting and boiling points of water?
- a. H-bond
 - b. van der Waals force
 - c. Hydrophobic force
 - d. Covalent bond
06. In which of the following systems is the entropy the greatest?
- a. Water vapour
 - b. Liquid water at pH 7.0 and 37°C
 - c. Supercooled water (liquid water at a temperature less than 0°C)
 - d. Ice

Chemistry in Biology

Chemical context of Life, pH and buffer, Bioenergetics and Thermodynamics

Chemical context of Life

01. Which of the following statements about H_2O are *correct*?
 - P. It is electrically neutral.
 - Q. It is a polar molecule.
 - R. It has a high dielectric constant.
 - S. It acts as an excellent solvent.
 - T. It is amphoteric but not amphiprotic.
 - a. Q and S
 - b. P, Q and T
 - c. P, Q, R and S
 - d. P, Q, R, S and T
02. Which of the following statements accurately describe the chemical composition of cells?
 - P. Composed of fewer than 30 elements.
 - Q. Predominantly consisting of elements with relatively low atomic numbers.
 - R. The most abundant elements found in cells include H, O, N, and C.
 - S. Among the macromolecules present in cells, proteins are the most abundant.
 - a. P and Q
 - b. Q and R
 - c. P, Q and S
 - d. P, Q, R and S
03. Which of the following statements accurately describe covalent bond?
 - P. A covalent bond forms as a result of equal sharing of electron pairs between two atoms.
 - Q. Covalent bonds may be either polar or non-polar.
 - R. Energy of a covalent bond depends on the number of covalent bonds (i.e., bond order).
 - S. Energy of a covalent bond is dependent on the medium.
 - a. P and Q
 - b. Q and R
 - c. P, Q and R
 - d. P, Q, R and S
04. Which of the following statements accurately describe van der Waals forces?
 - P. They are weak electrostatic interactions.
 - Q. They involve intermolecular interactions.
 - R. They occur only between polar molecules.
 - S. They represent the weakest interaction among non-covalent interactions.
 - a. P and Q
 - b. Q and R
 - c. P, Q and S
 - d. P, Q, R and S