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Concept and application-based

MCQs

for LIFE SCIENCES | BIOTECH

PRACTICE BOOK FOR

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PRANAV KUMAR

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MCQs

Life Sciences | Biotechnology

Seventh edition

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Chemistry in Biology

Chapter 1

Biomolecules and Metabolism

Unit I Amino acids and Proteins

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 hydropathy 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