Biochemistry

مبادره

اثر الجميل يحمل بصمة

First Questions

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10 pages

—Chapter 2—

1) In a water molecule, hydrogens are partially _____; oxygens are partially _____.

- A) negative; negative
- B) negative; positive
- C) positive; positive
- D) positive; negative
- E) none of the above

Answer: D

2) At any given moment, a single water molecule participates in _____ strong hydrogen bond(s). The role played by the water molecule is best characterized as _____.

- A) two ; one H-bond donor, one H-bond acceptor
- B) two ; two H-bond donor
- C) two ; two H-bond acceptor
- D) one; H-bond donor
- E) one; H-bond acceptor

Answer: A

3) Which of the following is a physical property of water that results from hydrogen bonding?

- A) high boiling point relative to molecular weight
- B) a solid state that is less dense than the liquid state
- C) high surface tension
- D) ability to solubilize polar molecules
- E) all of the above

Answer: E

4) In a hydrogen bond between a water molecule and another biomolecule, _____.

- A) a hydrogen ion on the water molecule forms an ionic bond with a hydride ion on the other molecule
- B) the hydrogen bond will typically form between a hydrogen atom and either a nitrogen, sulfur, or oxygen atom
- C) the partial charge on a hydrogen of the water interacts with the partial charge on a hydrogen of the other molecule
- D) a hydrogen on the water molecule forms a covalent bond to an oxygen or nitrogen atom on the other molecule
- E) the hydrogen atom is located between an oxygen atom of the water and a carbon atom of the other molecule

Answer: B

5) The strongest non-covalent interactions are _____.

- A) van der Waals interactions
- B) London dispersion forces
- C) hydrogen bonds
- D) dipole-dipole interactions
- E) ionic interactions

Answer: E

6) Hydrogen bonds are approximately _____% of the bond strength of covalent C-C or C-H bonds.

- A) 1
- B) 5
- C) 20
- D) 50
- E) 95

Answer: B

7) Due to the formation of hydrogen bonds, _____ is highly soluble in water.

- A) carbon dioxide
- B) sodium chloride
- C) methanol
- D) octane
- E) cholesterol

Answer: C

8) Which of the following explains the interactions that occur between the atoms of water molecules and the ions that form when sodium chloride dissolves in water?

- A) hydrogens interact with the sodium ion, oxygens interact with the chloride ion
- B) hydrogens interact with the chloride ion, oxygens interact with the sodium ion
- C) hydrogens interact with the sodium ion and the chloride ion
- D) oxygens interact with the sodium ion and the chloride ion
- E) none of the above

Answer: B

9) Which of the following functional groups has two hydrogen bond donors and one hydrogen bond acceptor?

- A) alcohol
- B) ester
- C) thiol
- D) amine
- E) amide

Answer: D

10) Hydrogen bonds within liquid water are _____.

- A) attractions between the protons of the oxygen nuclei
- B) ion-induced dipole interactions
- C) dipole-dipole interactions
- D) attractions between two oxygen atoms
- E) attractions between the H^+ and ^-OH ions of the liquid

Answer: C

11) When a non-polar substance is added to water, how do the molecules of water behave?

- A) the regular hydrogen bond pattern is disrupted resulting in a decrease of entropy
- B) the regular hydrogen bond pattern is disrupted resulting in an increase of entropy
- C) the regular hydrogen bond pattern is disrupted resulting in a decrease of enthalpy
- D) the regular hydrogen bond pattern is disrupted resulting in an increase of enthalpy
- E) none of the above

Answer: A

12) What term is used to describe the exclusion of nonpolar substances from an aqueous solution?

- A) nonpolar effect
- B) lipid effect
- C) hydrophobic effect
- D) oil droplet effect
- E) amphiphilic effect

Answer: C

13) Which of the following is an example of the hydrophobic effect?

- A) the lipid membrane of cells and organelles
- B) protein folding that places hydrophobic amino acids in the interior of the protein
- C) the separation of salad dressing
- D) oil sheens seen on the ocean following an oil spill
- E) all of the above

Answer: E

14) Which of the following explains the attractive forces between hydrophobic molecules in an aqueous solution?

- A) in an aqueous environment, London dispersion forces between hydrophobic molecules become stronger
- B) in an aqueous environment, London dispersion forces between hydrophobic molecules and water become stronger
- C) since nonpolar molecules do not form hydrogen bonds with hydrogen bonds with water, they can form hydrogen bonds with other nonpolar molecules
- D) there is no increase in attractive forces between nonpolar molecules in an aqueous environment
- E) none of the above

Answer: D

15) Considering the energetics of transferring nonpolar molecules from water to a nonpolar solvent, the factor *TDS* is generally _____, causing *DG* to be _____.

- A) positive; negative
- B) negative; negative
- C) positive; positive
- D) positive; positive
- E) negligible; either positive or negative

Answer: A

16) A molecule that has both a polar and nonpolar region is called _____.

- A) micelleic
- B) amphiphilic
- C) endergonic
- D) a membrane
- E) none of the above

Answer: B

17) Which of the following is an example of an amphipathic molecule?

- A) adenine, a base found in nucleic acids

- B) glucose, a monosaccharide
- C) serine, an amino acid
- D) palmitic acid, a fatty acid
- E) none of the above

Answer: D

18) In aqueous solution, globules of up to several thousand amphiphilic molecules arranged with the hydrophilic groups on the surface and the hydrophobic groups buried in the center are called _____.

- A) micelles
- B) vacuoles
- C) liposomes
- D) bilayers
- E) none of the above

Answer: A

19) Fatty acid anions most commonly assemble into _____ in aqueous solution.

- A) lipid bilayers
- B) solvent-filled vesicles
- C) micelles
- D) liposomes
- E) none of the above

Answer: C

20) Which of the following molecules would be prevented from readily crossing a lipid bilayer?

- A) glucose
- B) sodium ions
- C) potassium ions
- D) water
- E) all of the above

Answer: E

21) Which of the following is true regarding hydrophobic interactions between nonpolar molecules or groups?

- A) they result from the tendency to maximize water's contact with nonpolar molecules

- B) they require the presence of surrounding water molecules
- C) they are the result of strong attractions between nonpolar regions
- D) they are the result of strong repulsion between water and nonpolar regions
- E) they depend on strong permanent dipoles in the nonpolar molecules

Answer: B

22) In an aqueous solution, if the $[OH^-]$ is 3.0×10^{-5} M, what is the $[H^+]$?

- A) 7.0×10^{-9}
- B) 7.0×10^{-2}
- C) 3.3×10^{-3}
- D) 3.3×10^{-10}
- E) none of the above

Answer: D

23) What is the $[H^+]$ of an aqueous solution with a pH of 6.2?

- A) 6.2×10^{-6}
- B) 1.6×10^{-8}
- C) 6.3×10^{-7}
- D) $3.\ 3 \times 10^{-5}$
- E) none of the above

Answer: C

24) What would be the resulting pH if one drop (0.05 ml) of 1.0 M HCl was added to one liter of pure water (assume pH 7.0)?

- A) 2.7
- B) 4.3
- C) 5.0
- D) 0 (there would be no significant change)
- E) 9.7

Answer: B

25) What would be the resulting pH if one ml of 1.0 M NaOH was added to one liter of pure water (assume pH 7.0)?

- A) 1
- B) 3
- C) 7.3
- D) 11

- E) 13

Answer: D

26) Which of the following would be the strongest acid?

- A) formic acid, p*K*=3.75
- B) succinic acid, a diprotic acid with p*K*=4.21 and 5.64
- C) acetic acid, p*K*=4.76
- D) ammonium ion, p*K*=9.25
- E) cannot be determined from the given information

Answer: A

27) What is the pH of a solution that contains three parts of acetic acid and one part sodium acetate? The p*K* for acetic acid is 4.76.

- A) 5.24
- B) 5.06
- C) 4.46
- D) 4.28
- E) cannot be determined from the given information

Answer: D

28) If the p*K* values for phosphoric acid are 2.15, 6.82 and 12.38, at what pH would one observe equal amounts of $H_2PO_4^-$ and HPO_4^{2-}?

- A) 2.15
- B) 4.49
- C) 6.82
- D) 9.60
- E) 12.38

Answer: C

29) If 1.0 mL of 1.0 M acetic acid (p*K* = 4.76, *K* = 1.74 x 10^{-5}) was added to one liter of pure water, what is the resulting pH?

- A) 1.0
- B) 1.3
- C) 3.0
- D) 3.9
- E) 10.1

Answer: D

30) If the p*K* values for phosphoric acid are 2.15, 6.82 and 12.38, _____ would predominate at pH 5 while _____ would predominate at pH 10.

- A) H_3PO_4; $H_2PO_4^-$
- B) H_3PO_4; HPO_4^{2-}
- C) H_3PO_4; PO_4^{3-}
- D) $H_2PO_4^-$; PO_4^{3-}
- E) $H_2PO_4^-$; HPO_4^{2-}

Answer: E

31) What is the conjugate acid of $H_2PO_4^-$?

- A) HPO_4^{2-}
- B) H_2PO_4
- C) H_3PO_4
- D) PO_4^{3-}
- E) none of the above

Answer: C

32) Considering a 0.1 M formic acid buffer, what is the concentration of formic acid present in a solution of pH 4.25 if the p*K* of formic acid is 3.75?

- A) 0.024 M
- B) 0.033 M
- C) 0.067 M
- D) 0.076 M
- E) none of the above

Answer: A

33) Which of the following shows the buffer that is found in the blood stream?

- A) H_3PO_4 $H_2PO_4^{2-} + H^+$
- B) $H_2PO_4^-$ $HPO_4^{2-} + H^+$
- C) HPO_4^{2-} $PO_4^{3-} + H^+$
- D) H_2CO_3 $HCO_3^- + H^+$
- E) HCO_3^- $CO_3^{2-} + H^+$

Answer: D

34) Which of the following shows the intracellular buffer?

- A) H_3PO_4 $H_2PO_4^{2-} + H^+$
- B) $H_2PO_4^-$ $HPO_4^{2-} + H^+$
- C) HPO_4^{2-} $PO_4^{3-} + H^+$
- D) H_2CO_3 $HCO_3^- + H^+$
- E) HCO_3^- $CO_3^{2-} + H^+$

Answer: B

35) If a phosphate buffer (p*K*=6.82) was formulated such that its pH was 7.3, it would be best suited to buffer against _____. If instead, it was formulated such that its pH was 6.3, it would be best suited to buffer against _____.

- A) acid; base
- B) acid; acid
- C) base; acid
- D) base; base
- E) a buffer with a pH that far from the p*K* would not be an effective buffer

Answer: A

36) Which of the following could be used to formulate 100 mls of a 0.10 M acetate buffer (p*K*=4.76) at pH 5 if you start with 64 mls of 0.10 M sodium acetate?

- A) 3.6 mls of 1 M HCl
- B) 3.6 mls of 1 M NaOH
- C) 34 mls of 0.10 M HCl
- D) 34 mls of 0.10 M NaOH
- E) 34 mls of 0.10 M acetic acid

Answer: E

37) Which of the following could be used to formulate 100 mls of a 0.10 M phosphate buffer (pK=6.82) at pH 7.2?

- A) 2.9 mmoles of Na_2HPO_4 and 7.1 mmoles of $NaHPO_4$
- B) 10 mmoles of Na_2HPO_4 and 7.1 mmoles of NaOH
- C) 10 mmoles of $NaHPO_4$ and 7.1 mmoles of HCl
- D) 10 mmoles of H_3PO_4 and 17.1 mmoles of NaOH
- E) all of the above

Answer: E

38) Metabolic acidosis often causes increased respiratory rates. What portion of the bloodstream buffer is lost through increased respiration?

- A) H^+
- B) HCO_3^-
- C) H_2CO_3
- D) CO_2
- E) H_2O

Answer: D

39) What is the resulting pH if 10 millimoles of HCl is added to 1 liter of a 0.1 M phosphate buffer at pH 7.00 (p*K*=6.82)?

- A) 6.82
- B) 6.98
- C) 7.01
- D) 7.19
- E) cannot be determined

Answer: A

40) During vigorous exercise, hydrogen ions are produced within cells as a result of increased metabolism. What component of the intracellular buffer would increase as a result of the increased H^+ production?

- A) H_3PO_4
- B) $H_2PO_4^-$
- C) HPO_4^{2-}
- D) PO_4^{3-}
- E) none of the above

Answer: B