

أكاديمية إنفينيتي

التدريس الجامعي

موافق

LECTURE

Biochemistry

SUBJECT

Chapter 2 Questions

LECTURERS

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للتسجيل والإقتراحات

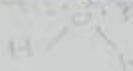
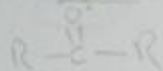
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Q1. The partial positive charge at one end of a water molecule is attracted to the negative charge of an anion. This attraction is called :

- a) a hydrogen shell
- b) a covalent bond
- c) an ion-dipole interaction
- d) a hydrogen bond

Q2. Maximal hydrogen bonding between a Ketone and water involves H₂O donating ____ & accepting ____ :

- a) 2 H-bonds; 1 H-bond
- b) 2 H-bonds; 2 H-bonds
- c) 1 H-bonds; 2 H-bonds
- d) 1 H-bonds; 1 H-bonds



Q3. Which of the following statements is true ?

- a) Hydrogen bonds are stronger than normal covalent bonds
- b) Water can form two hydrogen bonds
- c) Ammonia has lower boiling point than water
- d) A base is molecule that acts as proton donor

Q4. Which of the following HCl solutions has the lowest pH value?

- a) 0.5 M
- b) 0.9 M
- c) 0.3 M
- d) 0.7 M

Q5. The buffering region for any buffer is at :

- a) $pH = pK_a \pm 3$
- b) $pH = pK_a \pm 2$
- c) $pH = pK_a \pm 1$
- d) $pH = pK_a$

Q6. Buffer solutions:

- a) will always have a pH of 7
- b) cause a significant increase in pH when small amounts of strong bases are added to them
- c) are rarely found in living systems
- d) tend to resist changes in pH upon addition of small amounts of strong bases are added to them

Q7. An amphipathic molecule is :

- a) a water-loving molecule
- b) a water-hating molecule
- c) a molecule that has both polar and non-polar portions
- d) a non-polar molecule

Q8. Hydrogen bonds are stronger than :

- a) Covalent bonds
- b) Ionic bonds
- c) Ion-dipole interaction
- d) Hydrophobic interaction

Q9. The equation $\text{pH} = \text{pK}_a + \log \left[\frac{\text{conjugate base}}{\text{acid}} \right]$

- a) Is known as the Henderson-hasselbalch equation
- b) Applies to strong acids
- c) Is incorrect
- d) Assumes that water ionizes

Q10. An amphipathic molecule is :

- a) a water-loving molecule
- b) a water-hating molecule
- c) a molecule that has both hydrophilic and hydrophobic properties
- d) a non-polar molecule

Q11. The partial negative charge at one end of a water molecule is attracted to the positive charge of another water molecule . This attraction is called :

- a) a hydrogen shell
- b) a covalent bond
- c) an ion-dipole interaction
- d) a hydrogen bond

Q12. Which of the following NaOH solutions has the highest pH value?

- a) 0.5 M
- b) 0.8 M
- c) 0.3 M
- d) 0.6 M

Q13. Any buffer will have the maximum buffering capacity when the ratio of [base form]/[acid form] equals:

- a) 1/1000
- b) 1/100
- c) 100/1
- d) 1/1

Q14. Which of the following is the strongest acid ?

- a) Acetic acid ($pK_a = 4.76$)
- b) Formic Acid ($pK_a = 3.75$)
- c) Pyruvic acid ($pK_a = 2.50$)
- d) Carbonic acid ($pK_a = 6.37$)

Q15. The equation $pH = pK_a + \log[\text{acid}] / [\text{conjugate base}]$

- a) Is known as the Henderson-hasselbalch equation
- b) Applies to strong acids
- c) Is incorrect
- d) Assumes that water ionizes

Q16. . Which of the following statements is true?

- a) Hydrogen bonds are stronger than normal covalent bonds
- b) Water can form two hydrogen bonds
- c) Ammonia has higher boiling point than water
- d) An acid is a molecule that acts as proton donor

Q17. Hydrogen bond can be formed between each of the following pairs of groups EXCEPT :

- a) N-H and O-H
- b) N-H and O=C
- c) N-H and N=
- d) N-H and C-H

Q18. The amphipathic molecule is :

- a) a water
- b) a fatty acid salt
- c) an alcohol
- d) cholesterol

Q19. Buffer solutions:

- a) have variable pH ranges
- b) increase the pH of the solution when a small amount of a strong base is added
- c) decrease the pH of the solution when a small amount of a strong base is added
- d) have a relation between pH and pK_a which can be described by Michaelis-Menten equation

Q20. Which of the following acid/conjugate base pairs has the highest buffering capacity at pH 7.4?

- a) lactic acid/lactate ion, $pK_a = 3.86$
- b) Monobasic phosphate /dibasic phosphate, $pK_a = 6.86$
- c) Acetic acid/acetate ion, $pK_a = 4.76$
- d) Bicarbonate ion/carbonate ion, $pK_a = 10.25$

Q21. The enzyme that have maximum activity near pH 5 is:

- a) Trypsin → 6
- b) Lysozyme → 5
- c) Pepsin → 2
- d) Chymotrypsin

Q22. Which of the following statements is correct?

- a) The buffering system in blood is based on the dissociation of carbonic acid
- b) The buffering system in blood is based on the dissociation of phosphoric acid
- c) At pH values below the pK_a , the basic form predominates
- d) The smaller the K_a value, the stronger the acid

Q23. Which of the following acid/conjugate base pairs has the highest buffering capacity at pH 5.0?

- a) lactic acid/lactate ion, $pK_a = 3.86$
- b) Monobasic phosphate /dibasic phosphate, $pK_a = 6.86$
- c) Acetic acid/acetate ion, $pK_a = 4.76$
- d) Bicarbonate ion/carbonate ion, $pK_a = 10.25$

Q24. Which of the following compounds form micelles in water?

- a) Oleic acid
- b) Cholesterol
- c) Acetone
- d) Sodium palmitate

Q25. Blood pH is primarily regulated by :

- a) A Protein buffer system
- b) The carbon dioxide-carbonic acid-bicarbonate buffer system
- c) The phosphate buffering system
- d) Carbonic acid (H_2CO_3)

Q26. The imidazolium ion has a $pK_a = 7.0$. Imidazolium buffers can be prepared for pH values of:

- a) 6.5 to 7.5
- b) 6.1 to 7.1
- c) 5.5 to 8.5
- d) 6.0 to 8.0

Q27. How does the ion-product of water, K_w , relate to the equilibrium constant, K_{eq} , for the dissociation reaction of water

- a) K_w is found by multiplying K_{eq} by the concentration of water
- b) K_w is just another symbol for K_{eq} so they are equal
- c) K_w is found by dividing K_{eq} by the ideal gas constant
- d) K_w is found by multiplying K_{eq} by the concentrations of hydronium ion and hydroxide ion

Q28. The pK_a of a certain weak acid is 4.0. Calculate the ratio of proton acceptor to proton donor at pH 7.0.

- a) 1000:1
- b) 3:1
- c) 20:1
- d) 1:1

$$pH = pK_a + \log \frac{\text{base}}{\text{acid}}$$
$$7 - 4 = 3$$
$$3 = \log A \quad 10^3 = A$$

Q29. Which of the following acid/conjugate base pairs has the highest buffering capacity at pH 9.0?

- a) lactic acid/lactate ion, $pK_a = 3.86$
- b) Monobasic phosphate /dibasic phosphate, $pK_a = 6.86$
- c) Acetic acid/acetate ion, $pK_a = 4.76$
- d) Bicarbonate ion/carbonate ion, $pK_a = 10.25$

Q30. Maximal hydrogen bonding between an amine and water involves H_2O donating _____ & accepting _____:

- a) 2 H-bonds; 1 H-bond
- b) 2 H-bonds; 2 H-bonds
- c) 1 H-bonds; 2 H-bonds
- d) 1 H-bonds; 1 H-bonds

Q31. Which of the following statements is true?

- a) Hydrogen bonds are stronger than normal covalent bonds
- b) Water can form two hydrogen bonds
- c) Ammonia has higher boiling point than water
- d) A base is a molecule that acts as proton acceptor

Q32. Which of the following NaOH solutions has the lowest pH value?

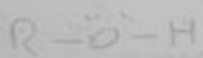
- a) 0.5 M
- b) 0.9 M
- c) 0.3 M
- d) 0.7 M

Q33. Any buffer will have a maximum buffering capacity when :

- a) It contains low amounts of both the acid and the base
- b) It contains low amounts of the acid and high amounts of the base
- c) It contains high amounts of both the acid and the base
- d) It contains high amounts of the acid and low amounts of the base

Q34. Maximal hydrogen bonding between an alcohol and water involves H₂O donating ____ & accepting ____ :

- a) 2 H-bonds; 1 H-bond
- b) 2 H-bonds; 2 H-bonds
- c) 1 H-bonds; 2 H-bonds
- d) 1 H-bonds; 1 H-bonds



Q35. Which of the following NaOH solutions has the highest pH value?

- a) 0.5 M
- b) 0.9 M
- c) 0.3 M
- d) 0.7 M

Q36. Which of the following is a hydrophilic substance ?

- a) Hexane
- b) Ethanol
- c) Fatty acid
- d) Cholesterol

Q.37. The enzyme that have the highest activity at pH around 2 is :

- a) trypsin
- b) lysozyme
- c) Pepsin
- d) Chymotrypsin

Q38. The partial negative charge at one end of a water molecule is attracted to the hydroxyl group of an alcohol. This attraction is called :

- a) a hydrogen shell
- b) a covalent bond
- c) an dipole-dipole interaction
- d) a hydrogen bond

Q39. The ratio of the base form to the acid for good buffering is :

- a) 1/100
- b) 100/1
- c) 1/1
- d) 1000/1

Q40. Which of the following is the weakest acid?

- a) Acetic acid ($pK_a = 4.76$)
- b) Formic Acid ($pK_a = 3.75$)
- c) Pyruvic acid ($pK_a = 2.50$)
- d) Carbonic acid ($pK_a = 6.37$)

Q41. The partial negative charge at one end of a water molecule is attracted to the positive charge of a cation . This attraction is called :

- a) a hydrogen shell
- b) a covalent bond
- c) an ion-dipole interaction
- d) a hydrogen bond

Q42. The suitable buffer range for acetic acid $pK_a = 4.76$ and it's sodium salt is :

- a) cannot be determined without giving the pK_a of sodium acetate
- b) 4.76
- c) 3.76 - 5.76
- d) 4.76 ± 0.5

Question	Answer	Question	Answer
1	C	22	A
2	B	23	C
3	C	24	D
4	B	25	B
5	C	26	D
6	D	27	A
7	C	28	A
8	D	29	D
9	A	30	B
10	C	31	D
11	D	32	C
12	B	33	C
13	D	34	B
14	C	35	B
15	C	36	B
16	D	37	C
17	D	38	C
18	B	39	C
19	A	40	D
20	B	41	C
21	B	42	C