Key.

Chemistry 12 Acid-Base #1 Review

1. At 30°C, $K_w = 3.0 \times 10^{-14}$. Therefore, a solution at 30 °C in which the $[OH^-] = 1.732 \times 10^{-7}$ M is best described as
   A. acidic
   B. basic
   C. neutral
   D. amphoteric
   E. amphiprotic

2. What is the pH of a neutral solution at 10°C when $k_w = 3.0 \times 10^{-15}$?
   A. 3.0
   B. 7.0
   C. 7.3
   D. 12
   E. 14.5

3. The equation: pH + pOH = 14.00 is true
   A. for all solvents
   B. at all temperatures
   C. at 20°C
   D. at 25 °C
   E. for all solvents and at all temperatures

4. A 0.03 M borax solution has a pH of about 9.2. Which statement about this solution is true?
   A. $[H^+] = 6.3 \times 10^{-10}$ M
   B. $[H^+] = 1.6 \times 10^{-5}$ M
   C. $[H^+] = 2.0 \times 10^{-2}$ M
   D. $[H^+] = 9.2$ M
   E. the solution is basic

5. The concentration of hydroxide ion in an aqueous solution is 3.3×10^{-6} M. What is the pH of the solution?
   A. 3.03×10^{-9}
   B. 3.3
   C. 5.48
   D. 8.52
   E. -5.48

6. The pH of a soft drink is 5.67. What is the concentration of the OH^- ?
   A. 4.7×10^{-9} M
   B. 2.1×10^{-6} M
   C. 6.7×10^{-5} M
   D. 5.67 M
   E. 8.33 M

7. A solution was made by dissolving 0.0788 g $Ca(OH)_2$, a strong base, in 100 mL water. The pH of this solution was

A. 1.67
B. 1.97
C. 9.33
D. 12.03
E. 12.33

8. The pH of a solution of hydrochloric acid was found to be 2.55. What was the concentration of the acid?

A. 3.6×10^{-12} M
B. 2.8×10^{-3} M
C. 5.5×10^{-2} M
D. 2.6 M
E. 11 M

9. Nitrous acid is a weak acid that ionizes in water according to the following equilibrium:

$$HNO_2 + H_2O \text{ <----> } H_3O^+ + NO_2^-$$

The expression for the acid ionization constant, K_a , is

A. $K_a = \dfrac{[H_3O^+]\,[NO_2^-]}{[H_2O]\,[HNO_2]}$

B. $K_a = \dfrac{[H^+]\,[NO_2^-]}{[HNO_2]}$

C. $K_a = [H^+]\,[NO_2^-]$

D. $K_a = \dfrac{[HNO_2]}{[H^+]\,[NO_2^-]}$

E. $K_a = \dfrac{[H_2O]\,[HNO_2]}{[H_3O^+]\,[NO_2^-]}$

10. The pH of a 0.10 M lactic acid solution at 25°C is 2.43. What is the value of K_a for this acid?

A. 1.3×10^{-4}
B. 1.4×10^{-4}
C. 3.7×10^{-3}
D. 7.4×10^{-3}
E. 0.24

11. The K_a of glycollic acid at 25°C is 1.5×10^{-4} . Calculate the pH of a 0.14 M solution of this acid.

A. 1.06
B. 1.49
C. 2.34
D. 2.96
E. 4.68

12. The K_b of strychnine at 25°C is 1.8×10^{-6} . What is the pH of a 0.15 M solution of this base?

A. 3.28
B. 5.74
C. 8.26
D. 10.72
E. 11.54

13. At 25°C, the pH of a 0.12 M solution of morphine, a base, is 10.64. What is the value of the K_b for morphine?

A. 4.6×10^{-21}
B. 2.3×10^{-8}
C. 1.9×10^{-7}
D. 1.6×10^{-6}
E. 1.5×10^{-4}

14. The cyanide ion, CN^-, is a Bronsted base. In a dilute solution of this ion together with the sodium ion, which of the following relationships is true where K_b refers to the base ionization constant for the cyanide ion?

A. $[OH^-] = \dfrac{[CN^-]}{[HCN]} \times K_b$

B. $[HCN] = \dfrac{[OH^-]}{[CN^-]} \times K_b$

C. $K_b = \dfrac{[H_2O]\,[CN^-]}{[HCN]\,[OH^-]}$

D. $[CN^-] = \dfrac{[HCN]}{[OH^-]} \times K_b$

E. $K_b = \dfrac{[HCN]\,[OH^-]}{[H_2O]\,[CN^-]}$

15. Calculate the % ionization of the acid in 0.075 M acetic acid solution at 25°C.

A. 0.018 %
B. 0.075 %
C. 0.12 %
D. 1.6 %
E. 100 %

16. An acid that is a weaker acid than acetic acid might have a pK_a of
A. 1.78×10^{-6}
B. 8.5×10^{-4}
C. 4.65
D. 4.85
E. -4.74

17. Considering the data in the following table, which species is the strongest base?

compound	pK_a
acetic acid	4.74
barbituric acid	4.01
tyrosine	8.40
phenol	9.89

A. phenol
B. acetate ion
C. anion of barbituric acid
D. conjugate base of phenol
E. conjugate base of tyrosine

18. An acid with a K_a of 1.5×10^{-9} has a pK_a equal to
A. 1.59
B. 5.18
C. 8.82
D. 9.15
E. 9.18

19. If an acid has a pK_a equal to 6.63, its K_a value is
A. 4.3×10^{-8}
B. 2.3×10^{-7}
C. 5.8×10^{-7}
D. 6.3×10^{-6}
E. 7.37

20. The K_a of a monoprotic acid is 3.6×10^{-6} at 25°C. What is the pK_b of its conjugate base?
A. 2.79×10^{-9}
B. 5.24
C. 5.44
D. 7.66
E. 8.56