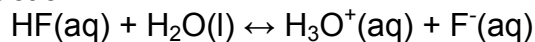


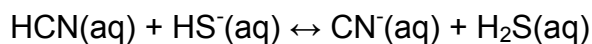
Practice Exam 2

1. In the following reaction



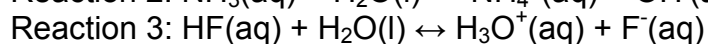
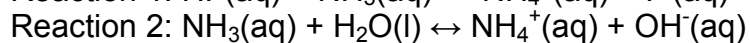
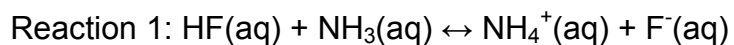
- HF is an acid and H_3O^+ is its conjugate base.
 - H_2O is an acid and H_3O^+ is its conjugate base.
 - HF is an acid and F^- is its conjugate base.
 - H_2O is an acid and H_3O^+ is its conjugate base.
 - HF is an acid and H_2O is its conjugate base.
2. What is the pH of a 4.2×10^{-4} M HBr solution at 25 °C?

- 2.80
 - 3.38
 - 3.80
 - 4.20
 - 4.62
3. Which is the strongest acid?
- Ascorbic acid, $K_a = 8.0 \times 10^{-5}$
 - Benzoic acid, $K_a = 6.5 \times 10^{-5}$
 - 3-chlorobenzoic acid, $K_a = 1.5 \times 10^{-4}$
 - 2-hydroxybenzoic acid, $K_a = 1.1 \times 10^{-3}$
 - Chloroacetic acid, $K_a = 1.4 \times 10^{-3}$
4. Knowing that H_2S is a stronger acid than HCN, determine, if possible, in which direction the following equilibrium lies.



- equilibrium lies to the left
- equilibrium lies to the right
- equilibrium is perfectly balanced left and right
- can be determined if the relative acidity of HS^- is given
- cannot be determined

5. We have a 4.63×10^{-4} M solution of HCl. What is the pH of this solution at 25 °C?
- 3.33
 - 4.00
 - 4.63
 - 8.37
 - 9.25
6. What is the pH of a 3.18 M CH_3COOH solution at 25 °C? $K_a = 1.8 \times 10^{-5}$?
- 2.12
 - 2.75
 - 1.40
 - 4.24
 - 4.74
7. What is the % ionization of a 3.14 M $\text{CH}_3\text{CO}_2\text{H}$ solution at 25 °C? For $\text{CH}_3\text{CO}_2\text{H}$, $K_a = 1.8 \times 10^{-5}$.
- 0.24%
 - 0.57%
 - 1.8%
 - 3.2%
 - 7.5%
8. Which of the following acid-base reactions will lie predominantly toward the products?



- 1 only
- 2 only
- 1 and 2 only
- 2 and 3 only
- 1, 2, and 3

9. We add 1.00 mL of 10.0 M HNO_3 to 100. mL of 0.10 M NaHCOO . What is the pH of the resulting solution? $K_a(\text{HCOOH}) = 1.8 \times 10^{-4}$
- 2.37
 - 3.45
 - 4.27
 - 4.35
 - 11.60
10. If you mix 100. mL of 0.11 M HCl with 50.0 mL of 0.22 M NH_3 , what is the pH of the resulting solution? For NH_4^+ , $K_a = 5.6 \times 10^{-10}$
- 4.63
 - 5.19
 - 6.02
 - 8.37
 - 9.37
11. If you mix 125. mL of 0.50 M $\text{CH}_3\text{CO}_2\text{H}$ with 75.0 mL of 0.83 M NaOH , what is the pH of the resulting solution? For CH_3COO^- , $K_b = 5.6 \times 10^{-10}$
- 4.88
 - 5.01
 - 8.99
 - 9.12
 - 9.76
12. What effect will the addition of the reagent in each of the following have on the pH of the $\text{CH}_3\text{CO}_2\text{H}$ solution respectively?
- Flask 1: Addition of NaCH_3CO_2 to $\text{CH}_3\text{CO}_2\text{H}(\text{aq})$
Flask 2: Addition of $\text{Ca}(\text{CH}_3\text{CO}_2)_2$ to $\text{CH}_3\text{CO}_2\text{H}(\text{aq})$
- no change, increase
 - no change, decrease
 - decrease, no change
 - decrease, decrease
 - increase, increase

13. If you add 20.0 mL of 2.30 M NH_3 to 100. mL of a 1.17 M NH_4Cl solution, what is the pH of the resulting solution? For NH_3 , $K_b = 1.8 \times 10^{-5}$
- 5.15
 - 6.35
 - 7.10
 - 7.65
 - 8.85
14. We have 250. mL of a 0.56 M solution of NaCH_3COO . How many milliliters of a 0.50 M CH_3COOH solution should be added to make a buffer of pH = 4.40? $K_a(\text{CH}_3\text{COOH}) = 1.8 \times 10^{-5}$
- 200
 - 230
 - 620
 - 710
 - 750
15. Which of the following is the solubility product constant for $\text{Mn}(\text{OH})_2$?
- $K_{\text{sp}} = [\text{Mn}^{2+}][\text{OH}^-]^2$
 - $K_{\text{sp}} = [\text{Mn}^{2+}][2\text{OH}^-]^2$
 - $K_{\text{sp}} = [\text{Mn}^{2+}]^2[\text{OH}^-]^2$
 - $K_{\text{sp}} = [\text{Mn}^{2+}]^2[\text{OH}^-]$
 - $K_{\text{sp}} = [\text{Mn}^{2+}]^2[\text{OH}^-]^2$
16. Rank the compounds from lowest to highest molar solubility.
 FeCO_3 ; $K_{\text{sp}} = 3.5 \times 10^{-11}$
 BaSO_4 ; $K_{\text{sp}} = 1.1 \times 10^{-10}$
 ZnCO_3 ; $K_{\text{sp}} = 1.5 \times 10^{-11}$
- $\text{ZnCO}_3 < \text{BaSO}_4 < \text{FeCO}_3$
 - $\text{FeCO}_3 < \text{ZnCO}_3 < \text{BaSO}_4$
 - $\text{ZnCO}_3 < \text{FeCO}_3 < \text{BaSO}_4$
 - $\text{BaSO}_4 < \text{ZnCO}_3 < \text{FeCO}_3$
 - $\text{BaSO}_4 < \text{FeCO}_3 < \text{ZnCO}_3$

17. What is the concentration of SO_4^{2-} in a saturated solution of BaSO_4 if $K_{\text{Sp}} = 1.1 \times 10^{-10}$?
- $1.1 \times 10^{-10} \text{ M}$
 - $5.5 \times 10^{-11} \text{ M}$
 - $5.0 \times 10^{-5} \text{ M}$
 - $1.0 \times 10^{-5} \text{ M}$
 - $9.5 \times 10^{-4} \text{ M}$
18. Which of the following has the highest molar solubility?
- PbCO_3 ; $K_{\text{Sp}} = 1.5 \times 10^{-13}$
 - PbS ; $K_{\text{Sp}} = 8.4 \times 10^{-28}$
 - PbI_2 ; $K_{\text{Sp}} = 8.7 \times 10^{-9}$
 - PbSO_4 ; $K_{\text{Sp}} = 1.8 \times 10^{-8}$
 - $\text{Pb}_3(\text{PO}_4)_2$; $K_{\text{Sp}} = 3.0 \times 10^{-44}$
19. For MgF_2 , $K_{\text{Sp}} = 6.4 \times 10^{-9}$. If you mix 400. mL of $1 \times 10^{-4} \text{ M}$ $\text{Mg}(\text{NO}_3)_2$ and 500. mL of $1.00 \times 10^{-4} \text{ M}$ NaF , what will be observed?
- A precipitate forms because $Q_{\text{Sp}} > K_{\text{Sp}}$.
 - A precipitate forms because $Q_{\text{Sp}} < K_{\text{Sp}}$.
 - No precipitate forms because $Q_{\text{Sp}} = K_{\text{Sp}}$.
 - No precipitate forms because $Q_{\text{Sp}} < K_{\text{Sp}}$.
 - No precipitate forms because $Q_{\text{Sp}} > K_{\text{Sp}}$.
20. For AgI , $K_{\text{Sp}} = 8.3 \times 10^{-17}$. What is the molar solubility of AgI in a solution which is $5.1 \times 10^{-4} \text{ M}$ in AgNO_3 ?
- $5.1 \times 10^{-2} \text{ mol/L}$
 - $1.1 \times 10^{-5} \text{ mol/L}$
 - $8.3 \times 10^{-11} \text{ mol/L}$
 - $1.6 \times 10^{-13} \text{ mol/L}$
 - $4.2 \times 10^{-20} \text{ mol/L}$