

CH 123

General Chemistry

Exam 2

July 17, 2002

KEY

Name: _____
(please print)

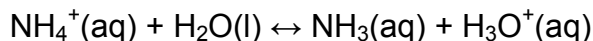
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(last 4 digits)

Each question is worth 1 point.

Circle your answer clearly, otherwise no credit will be given.

Circle only one answer. If you circle two or more, you will receive no credit.

1. In the following reaction

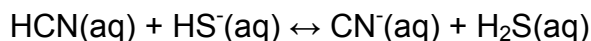


a. NH_4^+ is an acid and NH_3 is its conjugate base.

2. Which of the following acids has the strongest conjugate base?

b. Benzoic acid, $K_a = 6.5 \times 10^{-5}$

3. Knowing that H_2S is a stronger acid than HCN , determine, if possible, in which direction the following equilibrium lies.



a. equilibrium lies to the left

4. What is the pH of a 0.054 M NaOH solution at 25 °C?

d. 12.73

5. We dilute 1.00 mL of 1.00 M HCl solution to 100.0 mL. What is $[\text{OH}^-]$ in this solution at 25 °C?

e. 1.00×10^{-12} M

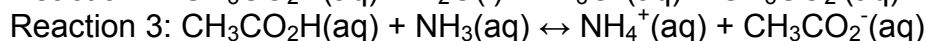
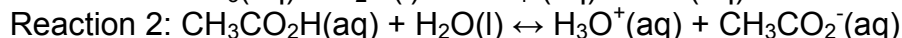
6. At 25 °C, what is the pH of a 1.75 M solution of sodium cyanide NaCN? ($K_b = 2.5 \times 10^{-5}$)

a. 11.82

7. At 25 °C, what is the pH of a 3.25 M solution of ammonium chloride, NH_4Cl ?

b. 4.37

8. Which of the following acid-base reactions will lie predominantly toward the products?



c. 3 only

9. If you mix 250. mL of 0.24 M HF with 75.0 mL of 0.80 M NaOH, what is the pH of the resulting solution? For F^- , $K_b = 1.4 \times 10^{-11}$

e. 8.21

10. 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_3COOH , $K_a = 1.8 \times 10^{-5}$

c. 7.14

11. If you mix equal molar quantities of NaOH and $\text{CH}_3\text{CO}_2\text{H}$, what are the principal species present in the resulting solution?

b. Na^+ , CH_3CO_2^- , $\text{CH}_3\text{CO}_2\text{H}$, OH^- , and H_2O

12. If you mix equal molar quantities of NH_3 ($K_b = 1.8 \times 10^{-5}$) and $\text{CH}_3\text{CO}_2\text{H}$ ($K_a = 1.8 \times 10^{-5}$), the resulting solution will be
 e. neutral because K_a of NH_4^+ equals K_b of CH_3CO_2^- .
13. At the neutralization point of the titration of an acid with base, what condition is met?
 c. Moles of base added from the buret equals moles of acid in the reaction flask.
14. The salt produced by the reaction of an equal number of moles of KOH and HNO_3 will react with water to give a solution which is
 c. neutral.
15. The solubility of FeCO_3 is 5.9×10^{-6} mol/L. What is K_{sp} for FeCO_3 ?
 c. 3.5×10^{-11}
16. What is the concentration of CrO_4^{2-} in a saturated solution of PbCrO_4 if $K_{sp} = 1.8 \times 10^{-14}$?
 a. 1.3×10^{-7} M
17. Which of the following has the highest molar solubility?
 c. PbI_2 ; $K_{sp} = 8.7 \times 10^{-9}$
18. Calculate the equilibrium constant for the reaction:

$$\text{CdS(s)} + \text{Zn}^{2+}(\text{aq}) \leftrightarrow \text{ZnS(s)} + \text{Cd}^{2+}(\text{aq})$$

$$\text{CdS}; K_{sp} = 3.6 \times 10^{-29} \quad \text{ZnS}; K_{sp} = 1.1 \times 10^{-21}$$
 a. 3.3×10^{-8}
19. For Ag_2SO_4 , $K_{sp} = 1.7 \times 10^{-5}$. How many grams of Na_2SO_4 (MM = 142.0 g/mol) must be added to 100. mL of 0.022 M AgNO_3 to just initiate precipitation?
 d. 0.50 g
20. For thallium bromide, TlBr , $K_{sp} = 3.4 \times 10^{-6}$. How many grams of KBr (MM = 119.0 g/mol) must be added to 100. mL of 5.5×10^{-4} M TlNO_3 to just initiate precipitation?
 b. 0.074 g