

Final Exam Review
 CHM 1046, Spring 2000
 Palmer Graves, Instructor

Students should work their first three exams for additional practice.

MULTIPLE CHOICE

Section 12.4 Integrated Rate Law for a First-Order Reaction

- The first-order reaction, $2 \text{N}_2\text{O}(g) \longrightarrow 2 \text{N}_2(g) + \text{O}_2(g)$ has a rate constant equal to 0.76 s^{-1} at 1000 K. How long take for the reaction to be 58% complete?
 - 0.88 s
 - 1.1 s
 - 1.8 s
 - 2.4 s

Section 12.5 Half-Life of a First-Order Reaction

- The rate constant, k , for a first-order reaction is equal to $4.2 \times 10^{-1} \text{ s}^{-1}$. What is the half-life of the reaction?
 - $2.9 \times 10^{-1} \text{ s}$
 - 1.5 s
 - $7.2 \times 10^2 \text{ s}$
 - $1.7 \times 10^3 \text{ s}$

Section 13.3 The Equilibrium Constant K_p

- The decomposition of ammonia is: $2 \text{NH}_3(g) \rightleftharpoons \text{N}_2(g) + 3 \text{H}_2(g)$. If K_p is 1.5×10^3 at 400°C , what is the partial pressure of ammonia at equilibrium when N_2 is 0.10 atm and H_2 is 0.15 atm?
 - $2.2 \times 10^{-7} \text{ atm}$
 - $4.7 \times 10^{-1} \text{ atm}$
 - $3.2 \times 10^{-3} \text{ atm}$
 - $4.4 \times 10^6 \text{ atm}$

Section 13.6 Factors That Alter the Composition of an Equilibrium Mixture

- The pink and blue species below form a violet colored mixture at equilibrium:

$$[\text{Co}(\text{H}_2\text{O})_6]^{2+}(\text{aq}) + 4 \text{Cl}^-(\text{aq}) \rightleftharpoons [\text{CoCl}_4]^{2-}(\text{aq}) + 6 \text{H}_2\text{O}(l)$$

(pink) (blue)

 As the concentration of $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ is increased, what happens to the solution?
 - The concentration of $[\text{CoCl}_4]^{2-}$ increases.
 - The concentration of $[\text{CoCl}_4]^{2-}$ decreases.
 - The solution becomes colorless.
 - No color change is observed.

Section 15.2 Acid Strength and Base Strength

5. Which Brønsted-Lowry acid is **not** considered to be a strong acid in water?
- HBr
 - HCl
 - HNO_2
 - HClO_4

Section 15.9 Calculating Equilibrium Concentrations in Solutions of Weak Acids

6. A tablet containing 500.0 mg of aspirin (acetylsalicylic acid or $\text{HC}_9\text{H}_7\text{O}_4$) was dissolved in enough water to make 100 mL of solution. Given that $K_a = 3.0 \times 10^{-4}$ for aspirin, what is the pH of the solution?
- 1.57
 - 2.54
 - 3.52
 - 5.08

Section 15.13 Relation Between K_a and K_b

7. Methylamine CH_3NH_2 , has a base dissociation constant of 3.7×10^{-4} . What is the conjugate acid of methylamine and what is its acid dissociation constant?
- CH_3NH_3^+ , 2.7×10^3
 - CH_3NH_3^+ , 3.7×10^{-4}
 - CH_3NH_3^+ , 2.7×10^{-11}
 - CH_3NH_2^- , 2.7×10^{-11}

Section 15.16 Lewis Acids and Bases

8. Which one of the following is least able to behave as a Lewis base?
- CH_3NH_2
 - $(\text{CH}_3)_2\text{NH}$
 - $(\text{CH}_3)_3\text{N}$
 - $(\text{CH}_3)_3\text{NH}^+$

Section 16.6 - 8 Titrations of Strong and Weak Acids and Bases

9. What volume of 0.500 M HNO_3 is needed to titrate 100.00 mL of 0.500 M $\text{Ca}(\text{OH})_2$ to the equivalence point?
- 25.0 mL
 - 50.0 mL
 100. mL
 200. mL

10. What is the pH at the equivalence point of a weak acid-strong base titration if 25.00 mL of aqueous hydrofluoric acid required 300.00 mL of 0.400 M NaOH? The K_a of HF is 6.76×10^{-4} .
- 5.63
 - 8.37
 - 10.83
 - 12.63

Section 18.2 Shorthand Notation for Galvanic Cells

11. For the galvanic cell given below, which reaction occurs at the cathode?
- $$\text{Zn}(s) \mid \text{Zn}^{2+}(\text{aq}) \parallel \text{Ni}^{2+}(\text{aq}) \mid \text{Ni}(s)$$
- $\text{Zn}(s) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2 e^-$
 - $\text{Zn}^{2+}(\text{aq}) + 2 e^- \rightarrow \text{Zn}(s)$
 - $\text{Ni}(s) \rightarrow \text{Ni}^{2+}(\text{aq}) + 2 e^-$
 - $\text{Ni}^{2+}(\text{aq}) + 2 e^- \rightarrow \text{Ni}(s)$

Section 18.3 Cell Potentials and Free Energy Changes for Cell Reactions

12. For the reaction $2 \text{Al}(s) + 3 \text{Co}^{2+}(\text{aq}) \rightarrow 2 \text{Al}^{3+}(\text{aq}) + 3 \text{Co}(s)$, ΔG° is -799 kJ. What is E° for a standard cell based on this reaction?
- +1.38 V
 - +2.76 V
 - +4.14 V
 - +8.28 V

Section 18.13 Quantitative Aspects of Electrolysis

13. How many grams of nickel can be produced by passing a current of 15.0 A through aqueous NiCl_2 for 80.0 minutes?
- 14.7 g
 - 21.9 g
 - 43.8 g
 - 48.4 g
14. How long must a 50.0 A current be passed through an electrolytic cell for refining copper to produce 3.00 moles of copper?
- 1.50 hours
 - 1.61 hours
 - 2.50 hours
 - 3.22 hours

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1. b)	Chapter: 12	QUESTION: 34
2. d)	Chapter: 12	QUESTION: 38
3. b)	Chapter: 13	QUESTION: 22
4. a)	Chapter: 13	QUESTION: 65
5. c)	Chapter: 15	QUESTION: 15
6. b)	Chapter: 15	QUESTION: 63
7. c)	Chapter: 15	QUESTION: 84
8. d)	Chapter: 15	QUESTION: 112
9. d)	Chapter: 16	QUESTION: 42
10. b)	Chapter: 16	QUESTION: 47
11. d)	Chapter: 18	QUESTION: 17
12. a)	Chapter: 18	QUESTION: 26
13. b)	Chapter: 18	QUESTION: 88
14. d)	Chapter: 18	QUESTION: 89