

**Chem 101B Study Questions**  
**Chapters 12,13,14**

Name: \_\_\_\_\_

Review Tuesday 2/26/2019

Due on Exam Thursday 2/28/2019 (Exam 2 Date)

*This is a homework assignment. Please show your work for full credit. If you do work on separate paper, attach the work to these.*

**Exam 2 Sections Covered:**

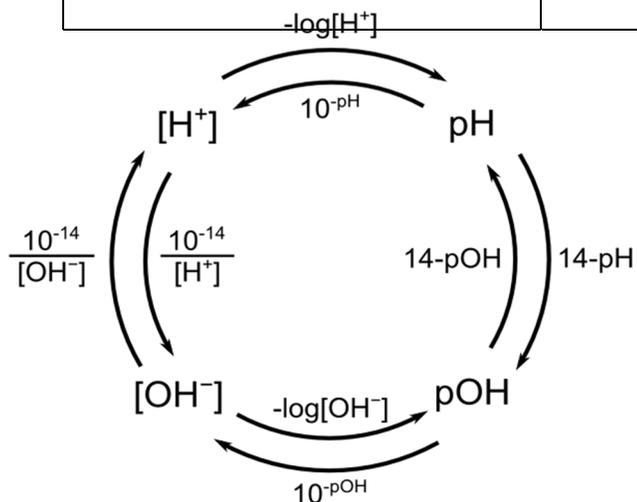
12.4 – 12.7

13.1 – 13.7

14.1 – 14.7, 14.12 (the missing Ch14 sections will be on Exam 3)

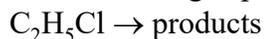
**Useful Information Provided on Exam 2:**

Integrated Rate Laws:		
<b>0 Order:</b> $[A] = -kt + [A]_0$	$t_{1/2} = \frac{[A]_0}{2k}$	
<b>1<sup>st</sup> Order:</b> $\ln[A] = -kt + \ln[A]_0$	$t_{1/2} = \frac{\ln 2}{k}$	
<b>2<sup>nd</sup> Order:</b> $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$	$t_{1/2} = \frac{1}{k[A]_0}$	
$R = 8.3145 \text{ J/K} \cdot \text{mol}$ $R = 0.082057 \text{ L} \cdot \text{atm} / \text{K} \cdot \text{mol}$	$k = Ae^{\frac{E_a}{RT}}$ $K_p = K_c (RT)^{\Delta n}$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\% \text{diss} = \frac{[H^+]_{\text{eq}}}{[HA]_0} \times 100\%$	$y = a^x$ $\log_a y = x$
		$y = e^x$ $\ln y = x$
		$\log A + \log B = \log(AB)$ $\log A - \log B = \log(A/B)$ $\log A^2 = 2 \log A$



Use the following to answer questions 1-4:

The following questions refer to the gas-phase decomposition of ethylene chloride.



Experiment shows that the decomposition is first order.

The following data show kinetics information for this reaction:

Time (s)	$\ln[\text{C}_2\text{H}_5\text{Cl}]$
1.0	-1.625
2.0	-1.735
3.0	-1.835
4.0	-1.945

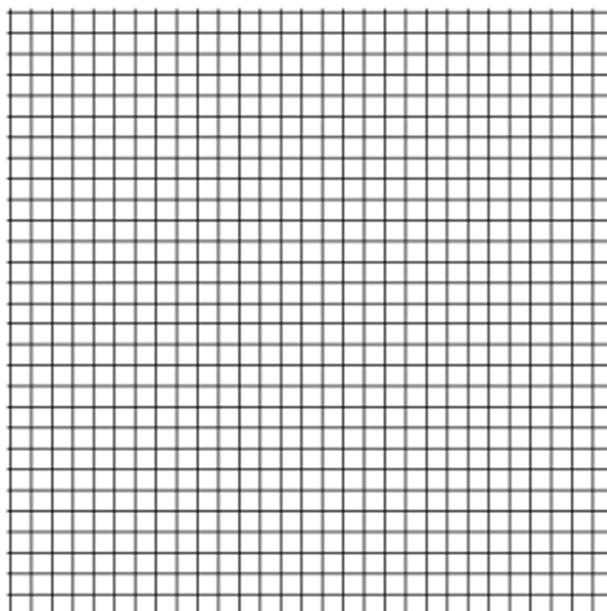
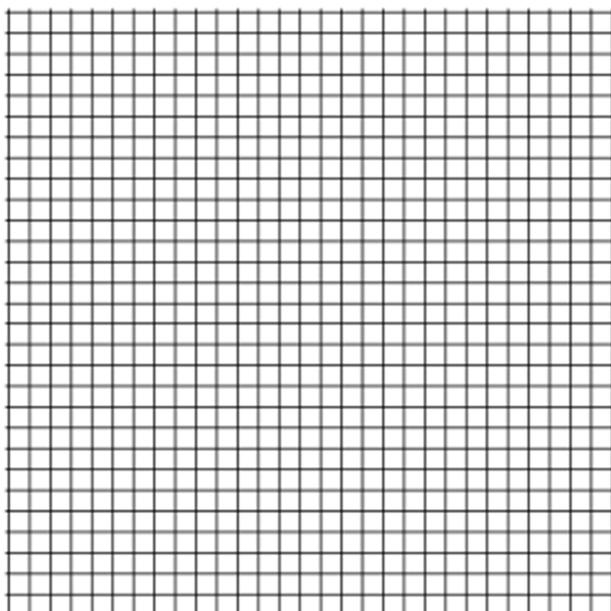
1. What is the rate constant for this decomposition?  
A) 0.29/s  
B) 0.35/s  
C) 0.11/s  
D) 0.02/s  
E) 0.22/s
2. What was the initial concentration of the ethylene chloride?  
A) 0.29 M  
B) 0.35 M  
C) 0.11 M  
D) 0.02 M  
E) 0.22 M
3. What would the concentration be after 5.0 seconds?  
A) 0.13 M  
B) 0.08 M  
C) 0.02 M  
D) 0.19 M  
E) 0.12 M
4. What is the half-life time for this reaction?  
A) 0.7 s  
B) 1.3 s  
C) 8.9 s  
D) 6.3 s  
E) 2.2 s

Use the following to answer questions 5-7:

For the reaction  $2\text{N}_2\text{O}_5(\text{g}) \rightarrow 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$ , the following data were collected:

$t$ (minutes)	$[\text{N}_2\text{O}_5]$ (mol/L)
0	$1.24 \times 10^{-2}$
10.	$0.92 \times 10^{-2}$
20.	$0.68 \times 10^{-2}$
30.	$0.50 \times 10^{-2}$
40.	$0.37 \times 10^{-2}$
50.	$0.28 \times 10^{-2}$
70.	$0.15 \times 10^{-2}$

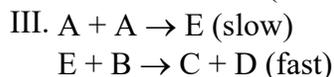
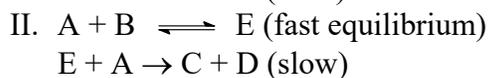
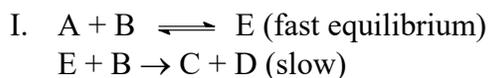
Plot the data to determine the rate order in  $\text{N}_2\text{O}_5$ .



5. The order of this reaction in  $\text{N}_2\text{O}_5$  is
- A) 0
  - B) 1
  - C) 2
  - D) 3
  - E) none of these
6. The half-life of this reaction is approximately
- A) 15 minutes
  - B) 18 minutes
  - C) 23 minutes
  - D) 36 minutes
  - E) 45 minutes

7. The concentration  $\text{N}_2\text{O}_5$  at 100 minutes will be
- A)  $0.03 \times 10^{-2} \text{ mol/L}$
  - B)  $0.06 \times 10^{-2} \text{ mol/L}$
  - C)  $0.10 \times 10^{-2} \text{ mol/L}$
  - D)  $0.01 \times 10^{-2} \text{ mol/L}$
  - E) none of these
8. A particular first-order reaction has a rate constant of  $0.0128 \text{ s}^{-1}$ . What is the half-life for this reaction?
- A) 1.00 s
  - B) 54.0 s
  - C) 77.9 s
  - D) 0.0185 s
  - E) 0.0128 s
9.  $^{63}\text{Ni}$  decays by a first-order process via the emission of a beta particle. The  $^{63}\text{Ni}$  isotope has a half-life of 100. years. How long will it take for 71% of the nickel to undergo decay?
- A) 49 years
  - B) 0.86 years
  - C) 78 years
  - D) 21 years
  - E) 180 years
10. What is the molecularity of the following elementary reaction:  $\text{O}_3 \rightarrow \text{O}_2 + \text{O}$ .
- A) unimolecular
  - B) bimolecular
  - C) termolecular
  - D) quadmolecular
  - E) molecularity cannot be determined

11. The rate law for a reaction is found to be  $\text{Rate} = k[\text{A}]^2[\text{B}]$ . Which of the following mechanisms gives this rate law?



- A) I  
B) II  
C) III  
D) two of these  
E) none of these

Use the following to answer questions 12-14:

The following questions refer to the reaction  $2\text{A}_2 + \text{B}_2 \rightarrow 2\text{C}$ . The following mechanism has been proposed:



12. What is the molecularity of step 2?

- A) unimolecular  
B) bimolecular  
C) termolecular  
D) quadmolecular  
E) molecularity cannot be determined

13. Which step is rate determining?

- A) both steps  
B) step 1  
C) step 2  
D) a step that is intermediate to step 1 and step 2  
E) none of these

14. According to the proposed mechanism, what should the overall rate law be?

- A)  $\text{rate} = k[\text{A}_2]^2$   
B)  $\text{rate} = k[\text{A}_2]$   
C)  $\text{rate} = k[\text{A}_2][\text{B}_2]$   
D)  $\text{rate} = k[\text{A}_2][\text{R}]$   
E)  $\text{rate} = k[\text{R}]^2$

15. The reaction



is second order in A. When  $[A]_0 = 0.100 \text{ M}$ , the reaction is 20.0% complete in 49.1 minutes. Calculate the half-life for the reaction.

- A)  $1.96 \times 10^2 \text{ min}$
- B) 12.3 min
- C)  $2.45 \times 10^4 \text{ min}$
- D) 8.73 min
- E) none of these

Use the following to answer question 16:

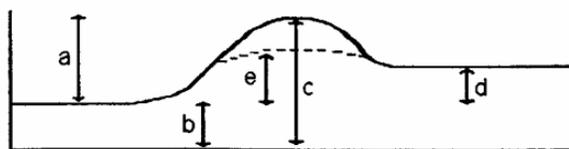
For the reaction  $A \rightarrow \text{Products}$ , successive half-lives are observed to be 10.0 min and 20.0 min.

16. The reaction follows the integrated rate law

- A)  $[A] = -kt + [A]_0$
- B)  $\ln [A] = -kt + \ln [A]_0$
- C)  $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$
- D)  $\frac{1}{[A]^2} = kt + \frac{1}{[A]_0^2}$
- E) none of these

Use the following to answer questions 17-18:

Use the potential energy diagram shown to answer the following:



17. Which letter shows the activation energy (without use of a catalyst)?

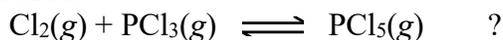
- A) a
- B) b
- C) c
- D) d
- E) e

18. Which letter shows the change in energy for the overall reaction?
- A) a
  - B) b
  - C) c
  - D) d
  - E) e
19. Which of the following statements best describes the condition(s) needed for a successful formation of a product according to the collision model?
- A) The collision must involve a sufficient amount of energy, provided from the motion of the particles, to overcome the activation energy.
  - B) The relative orientation of the particles has little or no effect on the formation of the product.
  - C) The relative orientation of the particles has an effect only if the kinetic energy of the particles is below some minimum value.
  - D) The relative orientation of the particles must allow for formation of the new bonds in the product.
  - E) The energy of the incoming particles must be above a certain minimum value, and the relative orientation of the particles must allow for formation of new bonds in the product.
20. Equilibrium is reached in chemical reactions when:
- A) The rates of the forward and reverse reactions become equal.
  - B) The concentrations of reactants and products become equal.
  - C) The temperature shows a sharp rise.
  - D) All chemical reactions stop.
  - E) The forward reaction stops.
21. If the equilibrium constant for  $A + B \rightleftharpoons C$  is 0.210, then the equilibrium constant for  $2C \rightleftharpoons 2A + 2B$  is
- A) 0.580
  - B) 4.76
  - C) 0.420
  - D) 22.7
  - E) 0.210

22. If, at a given temperature, the equilibrium constant for the reaction  $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{HCl}(\text{g})$  is  $K_p$ , then the equilibrium constant for the reaction  $\text{HCl}(\text{g}) \rightleftharpoons \frac{1}{2} \text{H}_2(\text{g}) + \frac{1}{2} \text{Cl}_2(\text{g})$  can be represented as:
- A)  $\frac{1}{K_p^2}$
  - B)  $K_p^2$
  - C)  $\frac{1}{\sqrt{K_p}}$
  - D)  $\sqrt{K_p}$
  - E) none of these

23. At a given temperature,  $K = 0.030$  for the equilibrium:  
 $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$

What is  $K$  for:



- A) 0.030
- B) 33
- C) 0.00090
- D) 30.
- E) 1100

Use the following to answer questions 24-25:

Consider the chemical system  $\text{CO} + \text{Cl}_2 \rightleftharpoons \text{COCl}_2$ ;  $K = 4.6 \times 10^9 \text{ L/mol}$ .

24. How do the equilibrium concentrations of the reactants compare to the equilibrium concentration of the product?
- A) They are much smaller.
  - B) They are much bigger.
  - C) They are about the same.
  - D) They have to be exactly equal.
  - E) You can't tell from the information given.
25. If the concentration of the product were to double, what would happen to the equilibrium constant?
- A) It would double its value.
  - B) It would become half its current value.
  - C) It would quadruple its value.
  - D) It would not change its value.
  - E) It would depend on the initial conditions of the product.

26. Find the value of the equilibrium constant ( $K_{eq}$ ) (at 500 K) for  $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ . The value for  $K_p$  at 500 K is  $1.5 \times 10^{-5}$ .
- A)  $7.5 \times 10^{-2}$
  - B)  $1.3 \times 10^{-2}$
  - C)  $9.6 \times 10^{-2}$
  - D)  $2.5 \times 10^{-2}$
  - E)  $6.0 \times 10^{-2}$
27. The reaction quotient ( $Q$ ) for a system is 720. If the equilibrium constant for the system is 36, what will happen as equilibrium is approached?
- A) There will be a net gain in product.
  - B) There will be a net gain in reactant.
  - C) There will be a net gain in both product and reactant.
  - D) There will be no net gain in either product or reactant.
  - E) The equilibrium constant will decrease until it equals the reaction quotient.
28. The following reaction is investigated (assume an ideal gas mixture):
- $$2N_2O(g) + N_2H_4(g) \rightleftharpoons 3N_2(g) + 2H_2O(g)$$
- Initially there are 0.10 moles of  $N_2O$  and 0.25 moles of  $N_2H_4$ , in a 10.0-L container. If there are 0.052 moles of  $N_2O$  at equilibrium, how many moles of  $N_2$  are present at equilibrium?
- A)  $2.4 \times 10^{-2}$
  - B)  $4.8 \times 10^{-2}$
  - C)  $7.2 \times 10^{-2}$
  - D)  $1.4 \times 10^{-1}$
  - E) none of these
29. A 3.00-liter flask initially contains 3.00 mol of gas A and 1.50 mol of gas B. Gas A decomposes according to the following reaction:
- $$3A \rightleftharpoons 2B + C$$
- The equilibrium concentration of gas C is 0.148 M. Determine the equilibrium concentration of gas B.
- A) 0.148 M
  - B) 0.648 M
  - C) 0.796 M
  - D) 0.204 M
  - E) 0.296 M

30. Consider the following equilibrium:  $2\text{NOCl}(g) \rightleftharpoons 2\text{NO}(g) + \text{Cl}_2(g)$  with  $K = 1.6 \times 10^{-5}$ . In an experiment, 1.00 mole of pure NOCl and 1.00 mole of pure  $\text{Cl}_2$  are placed in a 1.00-L container. Suppose  $m$  moles of NOCl react. What is the equilibrium concentration of  $\text{Cl}_2$ ?
- A)  $m$
  - B)  $\frac{1}{2}m$
  - C)  $1 + m$
  - D)  $1 + \frac{1}{2}m$
  - E)  $1 + 2m$

31. For the reaction below,  $K_p = 1.16$  at  $800.^\circ\text{C}$ .



If a 47.1-gram sample of  $\text{CaCO}_3$  is put into a 10.0-L container and heated to  $800.^\circ\text{C}$ , what percent of the  $\text{CaCO}_3$  will react to reach equilibrium?

(*hint: solids are not included in the equilibrium equation, i.e.  $K_p = P_{\text{CO}_2}$* )

- A) 14.5%
- B) 28.0%
- C) 37.5%
- D) 100.0%
- E) none of these

Use the following to answer questions 32-33:

Consider the following equilibrium:  $2\text{H}_2(g) + \text{X}_2(g) \rightleftharpoons 2\text{H}_2\text{X}(g)$   $\Delta H^\circ = -96.5 \text{ kJ/mol}$

32. Addition of  $\text{X}_2$  to a system described by the above equilibrium

- A) will cause  $[\text{H}_2]$  to decrease
- B) will cause  $[\text{X}_2]$  to decrease
- C) will cause  $[\text{H}_2\text{X}]$  to decrease
- D) will cause both  $[\text{H}_2]$  and  $[\text{X}_2]$  to decrease
- E) will have no effect

33. Addition of argon to the above equilibrium

- A) will cause  $[\text{H}_2]$  to decrease
- B) will cause  $[\text{X}_2]$  to increase
- C) will cause  $[\text{H}_2\text{X}]$  to increase
- D) will have no effect
- E) cannot possibly be carried out

34. Consider the following system at equilibrium:  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$   $\Delta H^\circ = +92.94 \text{ kJ}$

Which of the following changes will shift the equilibrium to the right?

- I. increasing the temperature
  - II. decreasing the temperature
  - III. increasing the volume
  - IV. decreasing the volume
  - V. removing some  $\text{NH}_3$
  - VI. adding some  $\text{NH}_3$
  - VII. removing some  $\text{N}_2$
  - VIII. adding some  $\text{N}_2$
- A) I, IV, VI, VII  
 B) II, III, V, VIII  
 C) I, VI, VIII  
 D) I, III, V, VII  
 E) I, IV, V, VIII

35. The hydrogen sulfate or bisulfate ion  $\text{HSO}_4^-$  can act as either an acid or a base in water solution. In which of the following equations does  $\text{HSO}_4^-$  act as a base

- A)  $\text{HSO}_4^- + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 + \text{OH}^-$
- B)  $\text{HSO}_4^- + \text{H}_3\text{O}^+ \rightarrow \text{SO}_3 + 2\text{H}_2\text{O}$
- C)  $\text{HSO}_4^- + \text{OH}^- \rightarrow \text{H}_2\text{SO}_4 + \text{O}^{2-}$
- D)  $\text{HSO}_4^- + \text{H}_2\text{O} \rightarrow \text{SO}_4^{2-} + \text{H}_3\text{O}^+$
- E) none of these

36. Consider the reaction  $\text{HNO}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}_3\text{O}^+(\text{aq}) + \text{NO}_2^-(\text{aq})$ . Which product is a conjugate base?

- A)  $\text{NO}_2^-(\text{aq})$
- B)  $\text{H}_3\text{O}^+(\text{aq})$
- C) both of these
- D) none of these
- E) unable to determine from information provided

37. Given the following acids and  $K_a$  values:

$\text{HClO}_4$	$\text{HOAc}$	$\text{HCN}$	$\text{HF}$
$1 \times 10^7$	$1.76 \times 10^{-5}$	$4.93 \times 10^{-10}$	$3.53 \times 10^{-4}$

What is the order of increasing base strength?

- A)  $\text{CN}^-$ ,  $\text{F}^-$ ,  $\text{OAc}^-$ ,  $\text{ClO}_4^-$
- B)  $\text{CN}^-$ ,  $\text{OAc}^-$ ,  $\text{F}^-$ ,  $\text{ClO}_4^-$
- C)  $\text{CN}^-$ ,  $\text{ClO}_4^-$ ,  $\text{F}^-$ ,  $\text{OAc}^-$
- D)  $\text{ClO}_4^-$ ,  $\text{OAc}^-$ ,  $\text{CN}^-$ ,  $\text{F}^-$
- E)  $\text{ClO}_4^-$ ,  $\text{F}^-$ ,  $\text{OAc}^-$ ,  $\text{CN}^-$

38. At 5°C, the autoionization constant of water,  $K_w$ , is  $1.87 \times 10^{-15}$ . The pH of pure water at 5°C is:
- A) 7.000
  - B) 7.464
  - C) 6.784
  - D) 7.364
  - E) none of these
39. The autoionization of water, as represented by the below equation, is known to be endothermic. Which of the following correctly states what occurs as the temperature of water is raised?  $\text{H}_2\text{O}(l) + \text{H}_2\text{O}(l) \rightleftharpoons \text{H}_3\text{O}^+(aq) + \text{OH}^-(aq)$
- A) The pH of the water does not change, and the water remains neutral.
  - B) The pH of the water decreases, and the water becomes more acidic.
  - C) The pH of the water decreases, and the water remains neutral.
  - D) The pH of the water increases, and the water becomes more acidic.
  - E) The pH of the water increases and the water remains neutral.
40. Calculate the  $[\text{H}^+]$  in a solution that has a pH of 11.79.
- A) 2.2 M
  - B) 11.8 M
  - C)  $6.2 \times 10^{-3}$  M
  - D)  $1.6 \times 10^{-12}$  M
  - E) none of these
41. In deciding which of two acids is the stronger, one must know:
- A) the concentration of each acid solution
  - B) the pH of each acid solution
  - C) the equilibrium constant of each acid
  - D) all of the above
  - E) both A and C must be known
42. Calculate the pOH of a 5.1 M solution of HCl.
- A) -0.71
  - B) 13.29
  - C) 14.71
  - D) 0.71
  - E) -0.95

43. For nitrous acid,  $\text{HNO}_2$ ,  $K_a = 4.0 \times 10^{-4}$ . Calculate the pH of 0.53 M  $\text{HNO}_2$ .
- A) 1.84
  - B) 0.28
  - C) 3.67
  - D) 12.16
  - E) none of these
44. For weak acid,  $\text{HX}$ ,  $K_a = 5.1 \times 10^{-6}$ . Calculate the pH of a 0.39 M solution of  $\text{HX}$ .
- A) 0.41
  - B) 2.85
  - C) 5.70
  - D) 11.15
  - E) none of these
45. Calculate the pOH of a 0.76 M solution of acetic acid ( $K_a = 1.8 \times 10^{-5}$ ).
- A) 2.43
  - B) 9.14
  - C) 4.86
  - D) 11.57
  - E) 2.31
46. How many moles of benzoic acid, a monoprotic acid with  $K_a = 6.4 \times 10^{-5}$ , must be dissolved in 250. mL of  $\text{H}_2\text{O}$  to produce a solution with pH = 2.08?
- A) 1.1
  - B) 0.00208
  - C) 0.27
  - D) 32
  - E) none of these
47. Saccharin is a monoprotic acid. If the pH of a  $4.55 \times 10^{-3}$  M solution of this acid is 2.53, what is the  $K_a$  of saccharin?
- A)  $8.7 \times 10^{-6}$
  - B)  $1.9 \times 10^{-3}$
  - C)  $5.4 \times 10^{-3}$
  - D)  $2.9 \times 10^{-3}$
  - E) none of these

48. A monoprotic weak acid when dissolved in water is 0.40% dissociated and produces a solution with a pH of 3.75. Calculate the  $K_a$  of the acid.
- A)  $4.0 \times 10^{-3}$
  - B)  $4.4 \times 10^{-2}$
  - C)  $7.1 \times 10^{-7}$
  - D) Need to know the initial concentration of the acid.
  - E) None of these.
49. If an acid, HA, is 17.8% dissociated in a 1.0 M solution, what is the  $K_a$  for this acid?
- A)  $2.2 \times 10^{-1}$
  - B)  $3.9 \times 10^{-2}$
  - C)  $1.8 \times 10^{-1}$
  - D)  $2.6 \times 10^1$
  - E) none of these
50. The following question refers to a solution that contains 1.24 M hydrofluoric acid, HF ( $K_a = 7.2 \times 10^{-4}$ ), and 3.00 M hydrocyanic acid, HCN ( $K_a = 6.2 \times 10^{-10}$ ). What is the pH of this mixture of weak acids?
- A) 1.52
  - B) 3.05
  - C) 4.56
  - D) 9.11
  - E) 12.48
51. Which of the following reactions is associated with the definition of  $K_b$ ?
- A)  $\text{Zn}(\text{OH}_2)_6^{2+} \rightleftharpoons [\text{Zn}(\text{OH}_2)_5\text{OH}]^+ + \text{H}^+$
  - B)  $\text{CN}^- + \text{H}^+ \rightleftharpoons \text{HCN}$
  - C)  $\text{F}^- + \text{H}_2\text{O} \rightleftharpoons \text{HF} + \text{OH}^-$
  - D)  $\text{Cr}^{3+} + 6\text{H}_2\text{O} \rightleftharpoons \text{Cr}(\text{OH}_2)_6^{3+}$
  - E) none of these
52. Calculate the pH of a 0.79 M solution of KOH.
- A) 14.00
  - B) 13.90
  - C) 0.10
  - D) 0.79
  - E) none of these

53. Calculate the pH of the following aqueous solution:  $0.50\text{ M H}_2\text{CO}_3$  ( $K_a = 4.3 \times 10^{-7}$ ;  $K_{a2} = 5.6 \times 10^{-11}$ ). Choose your answer from the following pH ranges:
- A) pH 0.00–2.99
  - B) pH 3.00–5.99
  - C) pH 6.00–8.99
  - D) pH 9.00–10.99
  - E) pH 11.00–14.00
54. Calculate the pH of a  $0.05\text{ M}$  solution of ascorbic acid ( $K_{a1} = 7.9 \times 10^{-5}$ ;  $K_{a2}$  is  $1.6 \times 10^{-12}$ ).
- A) 11.3
  - B) 2.7
  - C) 5.4
  - D) 8.6
  - E) 11.8
55. What is the equilibrium concentration of  $\text{H}_2\text{PO}_4^-$  in a  $0.197\text{ M}$  solution of  $\text{H}_3\text{PO}_4(aq)$ ? ( $K_{a1} = 7.5 \times 10^{-3}$ ,  $K_{a2} = 6.2 \times 10^{-8}$ ,  $K_{a3} = 4.8 \times 10^{-13}$ )
- A)  $1.1 \times 10^{-4}\text{ M}$
  - B)  $3.5 \times 10^{-2}\text{ M}$
  - C)  $3.8 \times 10^{-2}\text{ M}$
  - D)  $7.5 \times 10^{-3}\text{ M}$
  - E)  $6.2 \times 10^{-8}\text{ M}$
56. Calculate the pH of the following aqueous solution:  
 $0.28\text{ M}$  aniline ( $K_b = 3.8 \times 10^{-10}$ )
- A) 4.99
  - B) 4.03
  - C) 9.97
  - D) 9.01
  - E) none of these
57. Calculate the pH of a  $0.88\text{ M NH}_3$  ( $K_b = 1.8 \times 10^{-5}$ ) solution.
- A) 2.40
  - B) 9.20
  - C) 4.80
  - D) 0.88
  - E) 11.60

## Answer Key

1.	C	Chapter/Section: 12.4
2.	E	Chapter/Section: 12.4
3.	A	Chapter/Section: 12.4
4.	D	Chapter/Section: 12.4
5.	B	Chapter/Section: 12.4
6.	C	Chapter/Section: 12.4
7.	B	Chapter/Section: 12.4
8.	B	Chapter/Section: 12.4
9.	E	Chapter/Section: 12.4
10.	A	Chapter/Section: 12.5
11.	B	Chapter/Section: 12.5
12.	B	Chapter/Section: 12.5
13.	B	Chapter/Section: 12.5
14.	C	Chapter/Section: 12.5
15.	A	Chapter/Section: 12.4
16.	C	Chapter/Section: 12.4
17.	A	Chapter/Section: 12.6
18.	D	Chapter/Section: 12.6
19.	E	Chapter/Section: 12.6

20.	A	Chapter/Section: 13.1
21.	D	Chapter/Section: 13.2
22.	C	Chapter/Section: 13.2
23.	B	Chapter/Section: 13.2
24.	A	Chapter/Section: 13.2
25.	D	Chapter/Section: 13.2
26.	D	Chapter/Section: 13.3
27.	B	Chapter/Section: 13.5
28.	C	Chapter/Section: 13.5
29.	C	Chapter/Section: 13.5
30.	D	Chapter/Section: 13.6
31.	B	Chapter/Section: 13.6
32.	D	Chapter/Section: 13.7
33.	D	Chapter/Section: 13.7
34.	E	Chapter/Section: 13.7
35.	A	Chapter/Section: 14.1
36.	A	Chapter/Section: 14.1
37.	E	Chapter/Section: 14.2
38.	D	Chapter/Section: 14.3

39.	C	Chapter/Section: 14.2
40.	D	Chapter/Section: 14.3
41.	C	Chapter/Section: 14.3
42.	C	Chapter/Section: 14.4
43.	A	Chapter/Section: 14.5
44.	B	Chapter/Section: 14.5
45.	D	Chapter/Section: 14.5
46.	C	Chapter/Section: 14.5
47.	C	Chapter/Section: 14.5
48.	C	Chapter/Section: 14.5
49.	B	Chapter/Section: 14.5
50.	A	Chapter/Section: 14.5
51.	C	Chapter/Section: 14.6
52.	B	Chapter/Section: 14.6
53.	B	Chapter/Section: 14.7
54.	B	Chapter/Section: 14.7
55.	B	Chapter/Section: 14.7
56.	D	Chapter/Section: 14.6
57.	E	Chapter/Section: 14.6