

Chemistry 1 Exam Review
Part 4 – Chapters 14-19, 20, 22

49. How do you convert degrees Celsius to Kelvin? (pg 424)
50. The pressure of a sample of helium in a 1.00 L container is 0.975 atm. What is the new pressure if the sample is placed in a 2.00 L container? (pg 421-422)
51. A gas at 80°C occupies a volume of 0.75 L. At what Celsius temperature will the volume increase to 1.05 L? (pg 423-425)
52. A helium-filled balloon at sea level has a volume of 2.0 L at 0.998 atm and 37°C. If it is released and rises to an elevation at which the pressure is 0.992 atm and the temperature is 29°C, what will be the new volume of the balloon? (pg 428-429)
53. Use the ideal gas law to calculate the number of moles of oxygen gas present in a 2.5 L container at 298 K and at 2.0 atm of pressure. (Note: $R = 0.0821 \text{ atm} \cdot \text{L} / \text{mol} \cdot \text{K}$) (pg 434-437)
54. Define the following terms. (pg 67, 292, 453)
- solution
 - solute
 - solvent
 - aqueous solution
55. Which of the following are examples of solutions? (pg 454)
- | | | | | |
|--------|---------|-------------|------------|------------------|
| steel | air | ocean water | gold | sodium |
| oxygen | vinegar | soda pop | pure water | carbonated water |

56. Define the terms below. (pg 453-459)

soluble

insoluble

miscible

immiscible

solvation

saturated

unsaturated

supersaturated

58. Explain how the solubility of a gas in a liquid is affected by pressure.
Give a real-world example of this relationship. (pg 460)

59. What are colligative properties? (pg 471-474)

60. Explain how the presence of a solute affects each of the following. (pg.472-473)

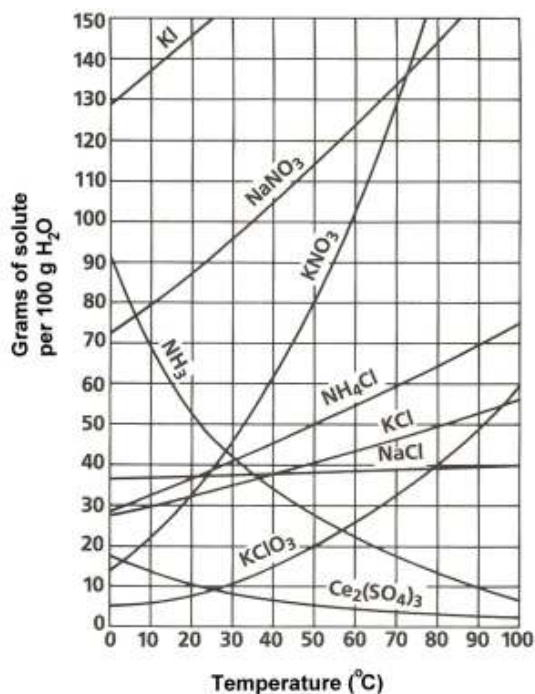
Vapor Pressure

Boiling Point

Freezing Point

61. Use this graph of solubility curves to answer the following. (pg 458)

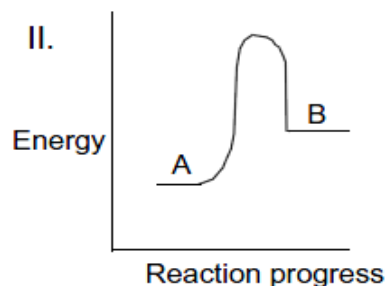
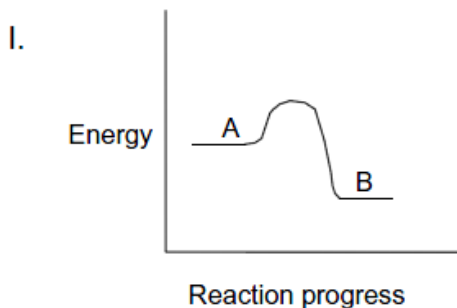
- How much KNO_3 will dissolve in 100 g of water at 40°C ?
- If 80g of NaNO_3 is dissolved at 40°C , is the solution saturated, unsaturated, or supersaturated?
- If you heat a saturated solution of NH_4Cl in 100 g of water from 50°C to 90°C , how many more grams of KNO_3 could go into solution (dissolve)?



62. How many grams of potassium chloride are needed to make 475.0 mL of a 1.50 M solution?
63. How many grams of sodium bromide are needed to make 955 mL of a 2.20 M solution?
64. Given this balanced equation: $\text{HCl} + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KCl}$
How many grams of potassium chloride are produced if 15 mL of a 0.10 M HCl solution completely reacts with an excess of potassium hydroxide?
65. Given this balanced equation: $\text{HCl} + \text{NH}_3 \rightarrow \text{NH}_4\text{Cl}$
How many grams of ammonium chloride are produced if 15 mL of a 0.10 M HCl solution completely reacts with an excess of ammonia?
66. Silver has a specific heat of $0.235 \text{ J/g} \cdot ^\circ\text{C}$. How much energy is needed to raise the temperature of a 430 g silver block from $25.5 ^\circ\text{C}$ to $75.0 ^\circ\text{C}$? (pg 492-495)
67. Classify each process as endothermic or exothermic. (pg 496-500)
- $2 \text{ Mg} + \text{O}_2 \rightarrow 2 \text{ MgO} + \text{heat}$
 - $\text{heat} + \text{NH}_4\text{NO}_3(\text{s}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{NO}_3^-(\text{aq})$
 - $198 \text{ kJ} + 2\text{SO}_3 \rightarrow 2\text{SO}_2 + \text{O}_2$
 - $4\text{Fe}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Fe}_2\text{O}_3(\text{s}) \quad \Delta\text{H} = -1625 \text{ kJ}$
 - $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{g}) \quad \Delta\text{H}_{\text{vap}} = 40.7 \text{ kJ}$

68. Explain collision theory. Include an explanation of the activated complex (transition state) and activation energy. (pg 532-534)

69. Label each energy diagram as exothermic or endothermic. Which has the largest activation energy?



70. What is a catalyst? How does a catalyst affect reaction rate? (pg 539-540)

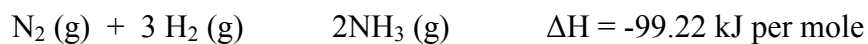
71. What is a *reversible reaction*? (pg 560-563)

What is *chemical equilibrium*? Explain in terms of the reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$

72. Write the equilibrium constant expressions (K_{eq}) for each chemical reaction shown below.



73. Use Le Chatelier's principle to predict | \rightleftharpoons | each change would affect the equilibrium system.



adding hydrogen to the system

removing ammonia

increasing the pressure on the system

increasing the temperature

74. List the characteristics of an acid and of a base. (pg 595-596)

Acid

Base

75. How do the concentrations of hydrogen ions (H^+) and hydroxide ions (OH^-) determine whether a solution is acidic, basic, or neutral? (pg597)

76. Define the following according to the Arrhenius model of acids and bases. (pg 597-598)

acid

base

What are the shortcomings of the Arrhenius model in terms of bases? (pg 598)

77. Define the following according to the Bronsted-Lowry model of acids and bases. (pg 598-599)

acid

base

78. Using the Bronsted-Lowry model of acids and bases, which of the following would be considered an *acid* (hydrogen ion donor)?

$HC_2H_3O_2$ $Ca(OH)_2$ H_2SO_4 HI NH_3 H_3PO_4 H_2O

79. In each equation, identify the conjugate acid-base pairs in the following equations.



80. What is the difference between a strong acid and a weak acid? (pg 602-603)
List some examples of each by name and chemical formula.

81. What is the difference between a strong base and a weak base? (pg 606-607)
List some examples of each type by name and chemical formula.

82. What is the ion product constant for water, K_w at 25° (298K)? (pg 608)

Complete the following equation. $K_w = [\] [\]$

83. Calculate the $[OH^-]$ in an aqueous solution having $[H^+] = 1.0 \times 10^{-12}$ M. (pg 608-611)

What is the pH of this solution? Is this solution acidic, basic, or neutral?

84. Calculate the $[H^+]$ in an aqueous solution having $[OH^-] = 1.0 \times 10^{-8}$ M. (pg 608-611)

What is the pH of this solution? Is this solution acidic, basic, or neutral?

85. What is a neutralization reaction? Give an example. (pg 617)

86. Explain how the procedure of titration is used to determine the concentrations of acidic and basic solutions. (pg 618-619)

87. Given the reaction: $2\text{Al}(s) + 6\text{HCl}(aq) \rightarrow 2\text{AlCl}_3(aq) + 3\text{H}_2(g)$ (pg 641-643)

Which element is oxidized?

Which element is reduced?

88. Identify the name of each alkane (hydrocarbon compound having only single bonds) (pg698-699)

