Name _____Per. _____Date _____

CST Review Worksheet #4: Gases, Solutions and Thermodynamics Study Guide

Gases Review (Standard 4)

Helpful Information:

K = 273 + °C 1 atm = 760 mm Hg = 760 torr = 101.325 kPa = 14.7psi = 29.92 in. Hg

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ 1 mol of gas = 22.4 L of gas

1. Which state of matter has the strongest intermolecular forces: liquid, gas, solid.
2. Which state of matter holds its shape? _____ ; shape of its container? _____
3. What does temperature measure?
4. How do gas molecules move?
5. Why does it take a long time for someone to smell perfume from a bottle that has just been opened from the other side of the room?
6. What does STP mean?
7. 1.5 atm = _____ torr = _____kPa = _____ mmHg
8. Given 300.0 mL of a gas at 17.0 °C. What is its volume at 10.0 °C? (292.8mL)
9. If a gas in a closed container is pressurized from 15.0 atmospheres to 16.0 atmospheres and its original temperature was 25.0 °C, what would the final temperature of the gas be? (318K)
10. A gas occupies 900.0 mL at a temperature of 27.0 °C. What is the volume at 122.0 °C? (1185mL)
11. A 30.0 L sample of nitrogen at constant volume at 20.0 °C is placed inside an oven whose temperature is 50.0 °C. The pressure inside the container at 20.0 °C was at 3.00 atm. What is the pressure of the nitrogen after its temperature is increased? (3.31atm)

Solutions (Standard 6)

12. Label the solute and the solvent in the following combinations:
    a. 14% salt, 86% water b. 12% Vitamin D, 56% Vegetable Oil
13. How does a salt dissolve in water (describe in terms of the attraction between the water and the salt)?
14. What is the parts per million concentration of an air sample containing 68 mg of smog dissolved in 23,000 g of air? (2.96 ppm)

Thermodynamics (Standard 7)

Calorie-Joule Conversion: 1 cal = 4.184 J

Calorimetric Formulas:

No Phase Change: $Q=m\Delta Tc$ **With Heat of Fusion:** $Q=m\Delta H_{fus}$ **With Heat of Vaporization:** $Q=m\Delta H_{vap}$

Constants for water: **Specific Heat:** c = 1.00 cal/(g°C) = 4.18 J/(g°C)

Heat of Fusion: ΔH_{fus} = 80.0 cal/g = 334 J/g **Heat of Vaporization:** ΔH_{vap} = 540. cal/g = 2260 J/g

15. Molecules tend to move towards areas of (higher or lower) temperature.
16. What is the definition of heat?
17. Define exothermic and endothermic. Is energy a product or a reactant for exothermic reaction?
18. Define specific heat. What does "q" stand for? What does "c" stand for?
19. Define vaporization and fusion.
20. Label the following as endothermic or exothermic.

a. Condensation	c. Sublimation	e. Freezing	g. Making Bonds
b. Evaporation	d. Crystallization	f. Melting	h. Breaking Bonds

21. What is the change in energy (in J) when 35.0 g of water boils at 100.0 °C? (79100 J)
22. How many Joules of heat are required to change 25.0 grams of water at 83.2 °C to 99.0 °C? (1650 J)
23. What is the change in energy (in cal) when 35 g of water freezes at 0.00 °C? (2800 call)
24. What is the change in temperature when 43 J of energy is transferred into 34 g of water? (0.30°C)
25. How much heat is required to raise the temperature of 200.0 g of aluminum by 23°C? (specific heat of aluminum = 0.21 cal/g °C) (970 J)