Name _____Per. _____Date _____

Gases Review

Helpful Information:

K = 273 + °C

1 atm = 760 mm Hg = 760 torr = 101.325 kPa = 14.7psi = 29.92 in. Hg

PV=nRT

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

1 mol of gas = 22.4 L of gas

$p_{tot}=p_1+p_2+p_3...p_x$

Graham's Law of Diffusion

$$\frac{v_1}{v_2} = \sqrt{\frac{m_2}{m_1}}$$

Where v is velocity of molecules and m is molecular mass of the molecules.

1. What does temperature measure?
2. How do gas molecules move?
3. 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?
4. What does STP mean and what are its values?
5. 1.5 atm = _____ torr = _____kPa = _____ mmHg
6. Given 300.0 mL of a gas at 17.0 °C. What is its volume at 10.0 °C? (293mL)
7. 2.9L of a gas is held at a pressure of 5.0 atm and a temperature of 50.0 °C. What will be the temperature of the gas if its volume is decreased to 2.4L and its pressure is decreased to 3.0 atm? (160K)
8. Calculate the volume occupied by 12.0 g of CO_2 gas at 245 mm Hg and -35 °C. (16.5L)
9. An unknown gas diffuses 0.50000 times as fast as Argon. Find the molar mass of the this gas. (159.76g/mol)
10. What is the density of acetone, C_3H_6O, vapor at 1.00 atm and 400. K? (1.767 g/L)
11. $NH_3(g) + 2O_2(g) \rightarrow HNO_3(l) + H_2O(l)$ What is the minimum volume of oxygen gas at 22.4 °C and 271 kPa that would react completely with 875 L NH_3 at the same temperature and pressure? (1750L)

Solutions

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. Remember how to calculate all SIX concentration units!
15. What is the parts per million concentration of an air sample containing 68.0 mg of smog dissolved in 23,000.0 g of air? (2.96 ppm)
16. How many grams of NaCl would you need to add to 125 mL of water to make a 45g/L solution? (5.6 g)
17. What is the mole fraction of ethanol in a solution that contains 69.105 g of ethanol and 380 g of water. (0.066)

Thermodynamics

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

18. Molecules tend to move towards areas of (higher or lower) temperature.
19. What is the definition of heat?
20. Define exothermic and endothermic. Is energy a product or a reactant for exothermic reaction?
21. Define specific heat. What does "q" stand for? What does "c" stand for?
22. Define vaporization and fusion.
23. Label the following as endothermic or exothermic.
    a. Condensation
    b. Evaporation
    c. Sublimation
    d. Crystallization
    e. Freezing
    f. Melting
    g. Making Bonds
    h. Breaking Bonds
24. What is the change in energy (in J) when 35.0 g of water boils at 100.0 °C? (79100J)
25. How many Joules of heat are required to change 25.0 grams of water at 83.2 °C to 103 °C (<u>be careful!</u>) (c_{steam}=2.01J/g°C) (58400J)
26. What is the change in energy (in cal) when 35 g of water freezes at 0.00 °C? (-2800cal)
27. What will be the change in energy when 43 J of energy is transferred into 34 g of water? (0.30°C)
28. How much heat is required to raise the temperature of 200. g of aluminum by 23°C? (c_{Al} = 0.21 cal/g °C) (970cal)
29. A 505g piece of copper is heated to 99.9°C and placed in an insulated vessel containing 59.8g of water at 24.8°C. What is the final temperature of the system. (c_{Cu} = 0.387 J/g.K)? (57.8°C)