Name: _____          Due: _____

***Unit 8 Academic Chemistry Study Guide***

<u>**Goals & Standards**</u>

- I can describe kinetic molecular theory.
- I can convert between multiple units of pressure.
- I can compare solids, liquids, and gases and identify their intermolecular forces.
- I can utilize a heating curve and phase diagram to describe substances.
- I can calculate moles of gas using the ideal gas law.
- I can use the various gas laws to calculate unknown information.

<u>**Practice Problems**</u>

1) Compare & contrast solids, liquids, and gases.


2) What are at least 3 characteristics of gases according to Kinetic Molecular Theory (KMT)?


3) Identify the definitions below as the following terms: pressure, volume, temperature, or moles.
    a. The speed of the particles
    b. The size of the container
    c. The number of collisions between the particles and the walls of the container
    d. The number of particles in the container

4) Write the formula for the following equations:
    a. Boyle's Law


    b. Gay-Lussac's Law


    c. Charles' Law


    d. Combined Gas Law


    e. Ideal Gas Law


    f. Avogadro's Law

5) Convert the following:

    a. 40 kPa = _____ mmHg


    b. 298 K = _____ °C


    c. 190 mL = _____ L

6) If the volume of a gas is expanded from 45.0 mL to 105 mL, what is the new temperature if the temperature starts at 15°C and the pressure is held constant?

7) If the pressure on a gas is increased from 750 mm Hg to 900 mm Hg, what is the new volume if it was initially 250 mL and the temperature is held constant?

8) What number of moles of carbon dioxide gas occupies 55.5L at 95 kPa and 20°C?

9) If the pressure on a sample of gas decreases from 1.25 atm to 0.75 atm and the volume expands from 2.44 L to 2.90L, what is the final temperature if the initial temperature of the gas is ⁻40°C?

10) If the temperature on a sample of gas increases from 0°C to 37°C, what is the new pressure if the initial pressure was 1.00 atm?

11) What are the values for standard temperature and pressure?

12) Given the reaction shown here, how many liters of $CO_2$ will be produced from the combustion of 0.750 L of $C_4H_{10}$ if this reaction occurs at STP. $2C_4H_{10\,(g)} + 13\,O_{2\,(g)} \rightarrow 8\,CO_{2\,(g)} + 10\,H_2O_{(g)}$

13) If 25 grams of hydrogen peroxide decompose at STP according to the following reaction, how many liters of oxygen are produced? $2\,H_2O_{2\,(l)} \rightarrow O_{2\,(g)} + 2\,H_2O_{(l)}$

14) Shown to the right is a heating curve for a substance. Describe what is happening in the three parts of the graph as heat is added. Use the words temperature, kinetic energy, and potential energy in your explanation.
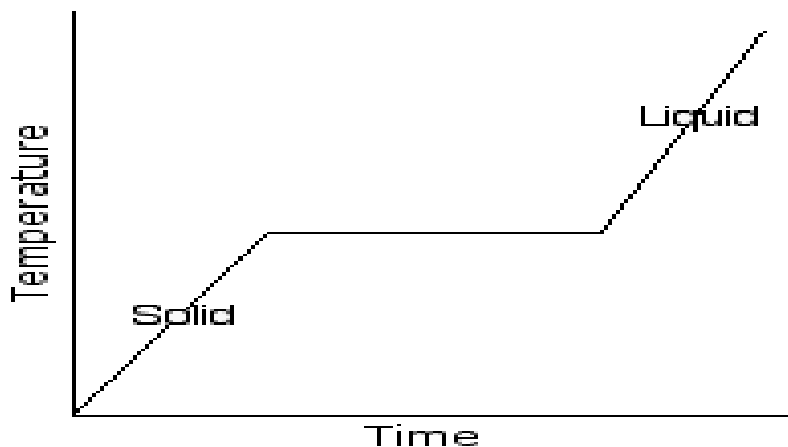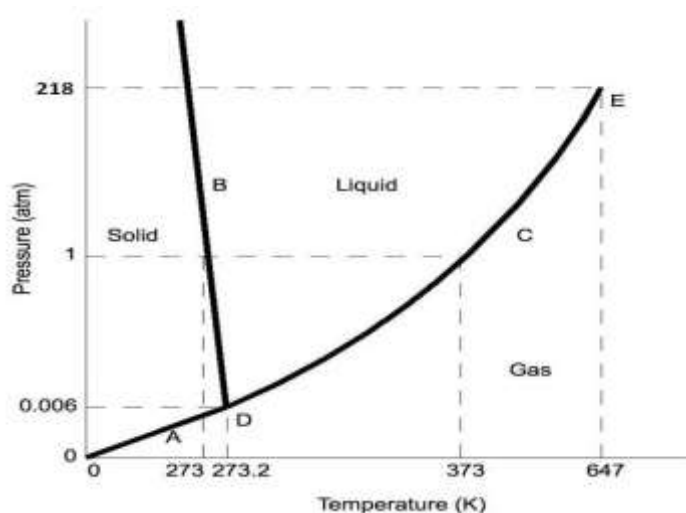


15) Answer the following questions using the phase diagram shown here.
   a) Could this be a phase diagram for water?

   b) What is the approximate value for the critical temperature?

   c) Label the three phases on the diagram.

   d) Along which line does freezing occur?



   e) What is the temperature and pressure at the triple point?

## NCFE Multiple Choice Practice

1) Carbon monoxide reacts with oxygen to produce carbon dioxide. If 1.0 L of carbon monoxide reacts with oxygen at STP, how many liters of oxygen are needed to start the reaction?
   a. 1 L
   b. 2 L
   c. 0.5 L
   d. 4 L

2) What is the volume in liters of 50.0 grams of nitrogen dioxide at STP?
   a. 24.3 L
   b. 16.5 L
   c. 18.8 L
   d. 22.4 L

3) What is the phase change called when a substance goes from its solid state of matter to a gas state of matter directly?
   a. Condensation
   b. Sublimation
   c. Vaporization
   d. Fusion