

## The Ideal Gas Law

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

Date: \_\_\_\_\_ Per: \_\_\_\_\_

**Directions:** Solve each of the following ideal gas law problems. Use the problem solving steps and show your work.

### **Things to Remember**

$$PV=nRT$$

Temperature must be in Kelvin (K)

Volume must be in Liters (L)

Pressure must be in Atmospheres (atm)

n is always in moles

R= 0.0821 Latm/molK

STP= 273K and 1 atm

1. What is the pressure in atmospheres if 1360.0g of  $N_2O$  gas is compressed in a 25.0L cylinder and is stored in an outdoor shed where the temperature can reach  $59.0^\circ C$  in the summer?
2. A large balloon contains 11.7g of helium. What volume will the helium occupy at an altitude of 10,000m where the atmospheric pressure is 0.262 atm and the temperature is  $-50.0^\circ C$ ?
3. A student collects ethane at a temperature of  $15.0^\circ C$  and a total pressure of 100.0kPa. The volume of the collection bottle is 245mL. How many moles of ethane are in the bottle?

4. A student collects 629mL of oxygen at 0.500at, The student collected 0.0337moles. At what temperature did the student collect the oxygen?
  
5. A reaction yields 3.75L of nitrogen monoxide (NO). The volume is measured at 19.0°C and at a pressure of 1.01atm. What mass (gram) of NO was produced by the reaction?
  
6. At STP, 1.00 moles of a gas occupies what volume?
  
7. What is the pressure inside a tank that has a volume of 1200.0 L and contains 12.0kg of HCL gas at a temperature of 18.0°C?

8. A tank with a volume of 658mL contains 1.50g of neon gas. The maximum safe pressure that the tank can withstand is 450kPa. At what temperature will the tank have that pressure?
9. What is the pressure of 3.95 mol of  $\text{Cl}_2$  gas if it is compressed in a cylinder with a volume of 850mL at a temperature of  $15.0^\circ\text{C}$ ?
10. What volume will 8.47 kg of sulfur dioxide gas occupy at a pressure of 89.4kPa and a temperature of  $40.0^\circ\text{C}$ ?

**Challenge-** (you must at least attempt it!)

11. Aluminum chloride sublimes at high temperatures. What density will the vapor have at  $225^\circ\text{C}$  and 0.939 atm of pressure? ( $D=\text{mass}/\text{volume}$ ).