**Quiz 9A**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Are the following statements about the Gas Law experiment true or false (5 points)?

|  |  |  |
| --- | --- | --- |
|  | Potassium chloride is the catalyst.  | False |
|  | Oxygen gas is evolved during the reaction.  | True |
|  | This lab involves making graphs.  | True  |
|  | You will use the Bunsen burner in this experiment.  | True  |
|  | This is a qualitative experiment.  | False  |

1. In an experiment, magnesium and excess hydrochloric acid reacted and 243 mL of hydrogen gas was collected at 25.00 °C. The barometric pressure was 1.002 atm. At a water temperature of 25.00 °C the partial pressure of the water vapor is 3.1690 kPa (15 points).
	1. What is the partial pressure of hydrogen gas in mm Hg?

$$P\_{total}=P\_{H\_{2}O}-P\_{H\_{2}}⇒P\_{H\_{2}}=P\_{total}-P\_{H\_{2}O}$$

$$P\_{H\_{2}}=1.002 atm×\frac{760 mmHg}{1 atm}-3.1690 kPa×\frac{760 mm Hg}{101.325 kPa}$$

$$P\_{H\_{2}}=761.52 mmHg-23.76945472 mmHg=737.7505453 mmHg≈737.8 mmHg$$

* 1. Write the balanced chemical equation.

Mg (s) + 2 HCl (aq) → MgCl2 (aq) + H2 (g)

* 1. How many moles of hydrogen gas evolved?

$$PV=nRT⇒n\_{H\_{2}}=\frac{P\_{H\_{2}}V\_{H\_{2}}}{RT\_{H\_{2}}}$$

$$n\_{H\_{2}}=\frac{(737.8 mmHg)(243 mL)}{\left(0.08206\frac{L atm}{mol K }\right)\left(25.00+273.15\right)K}×\frac{1 L}{1000 mL}×\frac{760 mmHg}{1 atm}$$

$$n\_{H\_{2}}=\frac{(751.4 mmHg)(243 mL)}{\left(0.08206\frac{L atm}{mol K }\right)(298.15 K)}×\frac{1 L}{1000 mL}×\frac{1 atm}{760 mmHg}$$

$$n\_{H\_{2}}=0.009641307 mol H\_{2}≈0.00964 mol H\_{2} $$

* 1. What mass of magnesium reacted with excess hydrochloric acid?

$$m\_{Zn}=0.00964 mol H\_{2}×\frac{1 mol Mg}{1 mol H\_{2}}×\frac{24.305 g Mg}{1 mol Mg}$$

$$m\_{Zn}=0.234331957 g Mg≈0.234 g Mg$$