Chemistry 141 Name KEY

Dr. Cary Willard

Quiz 3A (20 points) October 2, 2008

All work must be shown to receive credit.

760 torr = 1 atm = 101.3 kPa, PV = nRT, R = 0.0821 L atm/mol K = 62.4 L torr/mol K

1. (4 points) Convert 752 mmHg to atm and kPa.

$$?atm=752 torr×\frac{1 atm}{760 torr}=0.989 atm$$

$$?kPa=752 torr×\frac{101.3 kPa}{760 torr}=100.kPa$$

1. (4 points) Which sample contains the most molecules: 1.00 L of O2 at STP, 1.00 L of air at STP, or 1.00 L of H2 at STP?

They both contain the same number of molecules. (PV=nRT, n=PV/RT = constant)

1. (4 points) What is the density of krypton gas at 863 torr and 35.0 oC?

$$PV=nRT$$

$$V\_{1 mol gas}=\frac{nRT}{P}=\frac{\left(1 mol\right)\left(62.4 L torr\right)\left(308 K\right)}{\left(863 torr\right) mol K}=22.3 L$$

$$density= \frac{mass 1 mol}{volume 1 mol}=\frac{83.80 g}{22.3 L}=3.75 g/L$$

1. (8 points) Magnesium metal reacts with aqueous HCl to yield H2 gas:

Mg(s) + 2 HCl(aq) 🡪 MgCl2(s) + H2(g)

The gas that forms is found to have a volume of 2.731 L at 25oC and a pressure of 747 mm Hg. Assuming that the gas is saturated with water vapor at a partial pressure of 23.8 mm Hg, what is the partial pressure (mmHg) of the H2?

$$? pressure\_{H\_{2}}= pressure\_{total}-pressure\_{H\_{2}O}=747 torr-23.8 torr=723 torr$$

How many moles of H2 were produced in the reaction?

$$PV=nRT$$

$$n\_{H\_{2}}=\frac{PV}{RT}=\frac{\left(723 torr\right)\left(2.731 L\right) mol K}{\left(62.4 L torr\right)\left(298 K\right)}=0.106 mol H\_{2}$$

 How many grams of magnesium were used in the reaction?

$?g Mg=0.106 mol H\_{2}×\frac{1 mol Mg}{1 mol H\_{2}}×\frac{24.3 g Mg}{1 mol Mg}=2.58 g Mg$Chemistry 141 Name KEY

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Quiz 3B (20 points) October 2, 2008

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1. rr = 1 atm = 101.3 kPa, PV = nRT, R = 0.0821 L atm/mol K = 62.4 L torr/mol K
2. (4 points) Convert 572 mmHg to atm and kPa.

$$?atm=572 torr×\frac{1 atm}{760 torr}=0.753 atm$$

$$?kPa=572 torr×\frac{101.3 kPa}{760 torr}=76.2 kPa$$

1. (4 points) Which sample contains the most molecules: 1.00 L of O2 at STP, 1.00 L of air at STP, or 1.00 L of H2 at STP?

They both contain the same number of molecules. (PV=nRT, n=PV/RT = constant)

1. (4 points) What is the density of krypton gas at 633 torr and 35.0 oC?

$$PV=nRT$$

$$V\_{1 mol gas}=\frac{nRT}{P}=\frac{\left(1 mol\right)\left(62.4 L torr\right)\left(308 K\right)}{\left(633 torr\right) mol K}=30.4 L$$

$$density= \frac{mass 1 mol}{volume 1 mol}=\frac{83.80 g}{30.4 L}=2.76 g/L$$

1. (8 points) Magnesium metal reacts with aqueous HCl to yield H2 gas:

Mg(s) + 2 HCl(aq) 🡪 MgCl2(s) + H2(g)

The gas that forms is found to have a volume of 6.007 L at 25oC and a pressure of 747 mm Hg. Assuming that the gas is saturated with water vapor at a partial pressure of 23.8 mm Hg, what is the partial pressure (mmHg) of the H2?

$$? pressure\_{H\_{2}}= pressure\_{total}-pressure\_{H\_{2}O}=747 torr-23.8 torr=723 torr$$

How many moles of H2 were produced in the reaction?

$$PV=nRT$$

$$n\_{H\_{2}}=\frac{PV}{RT}=\frac{\left(273 torr\right)\left(6.007 L\right) mol K}{\left(62.4 L torr\right)\left(298 K\right)}=0.234 mol H\_{2}$$

 How many grams of magnesium were used in the reaction?

$$?g Mg=0.234 mol H\_{2}×\frac{1 mol Mg}{1 mol H\_{2}}×\frac{24.3 g Mg}{1 mol Mg}=5.69 g Mg$$