Chemistry 141 Name

Dr. Cary Willard

Quiz 5A (20 points) March 4, 2014

760 torr=760 mm Hg=1 atm=14.7 psi=101.3 KPa, PV=nRT, $R=\frac{0.0821 L atm}{mol K}=\frac{62.4 L torr}{mol K}$, K=oC + 273.16

1. (4 points) The barometric pressure in Taos, NM is 692 torr. Calculate the barometric pressure in atm and psi.

$$?atm=692 torr×\frac{1 atm}{760 torr}=0.910 atm$$

$$?psi=692 torr×\frac{14.7 psi}{760 torr}=13.4 psi$$

1. (4 points) A syringe containing 8.55 mL of oxygen gas is cooled from 95.3oC to 24.5oC. What is the new volume of oxygen gas in the syringe?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T\_{2}} V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=8.55 mL\left(\frac{297.7 K}{368.5 K}\right)=6.91 mL$$

1. (6 points) A piece of dry ice (solid carbon dioxide) with a mass of 38.2 g sublimes into a large balloon. Assuming that all of the carbon dioxide ends up in the balloon, what is the volume of the balloon at a temperature of 25oC and a pressure of 729 torr?

$$38.2 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}=0.868 mol CO\_{2}$$

$$PV=nRT V=\frac{nRT}{P}=\frac{\left(0.868 mol\right)\left(62.4 L torr\right)\left(298 K\right)}{\left(729 torr\right)mol K}=22.1 L$$

1. (6 points) A 261 mL gas sample has a mass of 2.81 g at a pressure of 2.75 atm and a temperature of 12oC. What is the molar mass of the gas?

$$?\frac{g gas}{mol}=\left(\frac{2.81 g gas}{261 mL}\right)\left(\frac{1000 mL}{1 L}\right)\left(\frac{8.51 L}{mol}\right)=\frac{91.6 g}{mol}$$

$$PV=nRT \frac{V}{n}=\frac{RT}{P}=\frac{\left(0.0821 L atm\right)\left(285 K\right)}{\left(2.75 atm\right)mol K}=\frac{8.51 L}{mol}$$

Chemistry 141 Name

Dr. Cary Willard

Quiz 5B (20 points) March 4, 2014

760 torr=760 mm Hg=1 atm=14.7 psi=101.3 KPa, PV=nRT, R=0.0821 L atm/mol K=62.4 L torr/mol K, oC + 273.16 = K

1. (4 points) The barometric pressure in Taos, NM is 657 torr. Calculate the barometric pressure in atm and psi.

$$?atm=657 torr×\frac{1 atm}{760 torr}=0.864 atm$$

$$?psi=657 torr×\frac{14.7 psi}{760 torr}=12.7 psi$$

1. (4 points) A syringe containing 7.34 mL of oxygen gas is cooled from 95.3oC to 24.5oC. What is the new volume of oxygen gas in the syringe?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T\_{2}} V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=7.34 mL\left(\frac{297.7 K}{368.5 K}\right)=5.93 mL$$

1. (6 points) A piece of dry ice (solid carbon dioxide) with a mass of 24.6 g sublimes into a large balloon. Assuming that all of the carbon dioxide ends up in the balloon, what is the volume of the balloon at a temperature of 25oC and a pressure of 729 torr?

$$24.6 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}=0.559 mol CO\_{2}$$

$$PV=nRT V=\frac{nRT}{P}=\frac{\left(0.559 mol\right)\left(62.4 L torr\right)\left(298 K\right)}{\left(729 torr\right)mol K}=14.3 L$$

1. (6 points) A 261 mL gas sample has a mass of 3.27 g at a pressure of 2.75 atm and a temperature of 12oC. What is the molar mass of the gas?

$$?\frac{g gas}{mol}=\left(\frac{3.27 g gas}{261 mL}\right)\left(\frac{1000 mL}{1 L}\right)\left(\frac{8.51 L}{mol}\right)=\frac{107 g}{mol}$$

$$PV=nRT \frac{V}{n}=\frac{RT}{P}=\frac{\left(0.0821 L atm\right)\left(285 K\right)}{\left(2.75 atm\right)mol K}=\frac{8.51 L}{mol}$$