Chemistry 141 Name KEY

Dr. Cary Willard

Quiz 5A (20 points) March 1, 2011

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

1. (4 points) The pressure of a tire is 2150 torr. Determine the pressure of the tire in atm and psi.

$$?atm=2150 torr ×\frac{1 atm}{760 torr}=2.83 atm$$

$$?psi=2150 torr×\frac{14.7 psi}{760 torr}=41.6 psi$$

1. (6 points) A piece of dry ice (solid carbon dioxide) with a mass of 42.5 g is allowed to sublime (convert from solid to gas) into a large balloon. Assuming that all of the carbon dioxide ends up in the balloon, what will be the volume of the balloon at a temperature of 22oC and a pressure of 751 torr?

$$P=751 torr$$

$$V=?$$

$$n=42.5 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}=0.966 mol CO\_{2}$$

$$T=22℃+273=295 K$$

$$R={62.4 L torr}/{mol K}$$

$$PV=nRT $$

$$ V=\frac{nRT}{P}=\frac{\left(0.966 mol CO\_{2}\right)\left(62.4 L torr\right)\left(295 K\right)}{\left(751 torr\right) mol K}=23.7 L CO\_{2}$$

1. (6 points) What is the density of chlorine gas (Cl2) at a temperature of 63oC and a pressure of 3.65 atm?

$$density=\frac{g Cl\_{2}}{L Cl\_{2}}=\frac{70.90 g Cl\_{2}}{1 mol Cl\_{2}}×\frac{1 mol Cl\_{2}}{7.56 L Cl\_{2}}=\frac{9.38 g Cl\_{2} }{L}$$

$$P=3.65 atm$$

$$T=63℃+273=336 K$$

$$R={0.0821 L atm}/{mol K}$$

$$PV=nRT \rightarrow \frac{V}{n}=\frac{RT}{P}=\frac{\left(0.0821 L atm\right)\left(336 K\right)}{mol K \left(3.65 atm\right)}=\frac{7.56 L}{mol}$$

1. (4 points) Carbon monoxide can be converted to methyl alcohol by the following reaction.

CO(g) + 2 H2(g) 🡪 CH3OH(l)

 Determine the L of hydrogen gas at a pressure of 582 torr and a temperature of 28oC are required to react with 4.25 L of carbon monoxide under the same conditions.

$$?L H\_{2}=4.25 L CO×\frac{2 L H\_{2}}{1 L CO}=8.50 L H\_{2}$$

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Quiz 5B (20 points) March 1, 2011

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

1. (4 points) The pressure of a tire is 1850 torr. Determine the pressure of the tire in atm and psi.

$$?atm=1850 torr ×\frac{1 atm}{760 torr}=2.43 atm$$

$$?psi=1850 torr×\frac{14.7 psi}{760 torr}=35.8 psi$$

1. (6 points) A piece of dry ice (solid carbon dioxide) with a mass of 68.3 g is allowed to sublime (convert from solid to gas) into a large balloon. Assuming that all of the carbon dioxide ends up in the balloon, what will be the volume of the balloon at a temperature of 22oC and a pressure of 751 torr?

$$P=751 torr$$

$$V=?$$

$$n=68.3 g CO\_{2}×\frac{1 mol CO\_{2}}{44.01 g CO\_{2}}=1.55 mol CO\_{2}$$

$$T=22℃+273=295 K$$

$$R={62.4 L torr}/{mol K}$$

$$PV=nRT $$

$$ V=\frac{nRT}{P}=\frac{\left(1.55 mol CO\_{2}\right)\left(62.4 L torr\right)\left(295 K\right)}{\left(751 torr\right) mol K}=38.0 L CO\_{2}$$

1. (6 points) What is the density of chlorine gas (Cl2) at a temperature of 63oC and a pressure of 2.07 atm?

$$density=\frac{g Cl\_{2}}{L Cl\_{2}}=\frac{70.90 g Cl\_{2}}{1 mol Cl\_{2}}×\frac{1 mol Cl\_{2}}{13.3 L Cl\_{2}}=\frac{5.33 g Cl\_{2} }{L}$$

$$P=2.07 atm$$

$$T=63℃+273=336 K$$

$$R={0.0821 L atm}/{mol K}$$

$$PV=nRT \rightarrow \frac{V}{n}=\frac{RT}{P}=\frac{\left(0.0821 L atm\right)\left(336 K\right)}{mol K \left(2.07 atm\right)}=\frac{13.3 L}{mol}$$

1. (4 points) Carbon monoxide can be converted to methyl alcohol by the following reaction.

CO(g) + 2 H2(g) 🡪 CH3OH(l)

 Determine the L of hydrogen gas at a pressure of 582 torr and a temperature of 28oC are required to react with 3.45 L of carbon monoxide under the same conditions.

$$?L H\_{2}=3.45 L CO×\frac{2 L H\_{2}}{1 L CO}=6.90 L H\_{2}$$