Chemistry 115 Name

Dr. Cary Willard

Quiz 9A (20 points) April 20, 2009

PV=nRT, 760 torr = 760 mmHg = 1 atm = 101 kPa = 14.7 psi = 30 in Hg,

R=0.0821 L atm/mol K=62.4 L torr/mol K

1. (3 points) Explain why it is necessary to add air to a car’s tires during the winter?

The volume decreases when the temperature decreases. Since there is less volume at lower temperature you need to add air to keep the same volume of air in the tires.

1. (3 points) The pressure of a sample of neon gas is 578 torr. What is the pressure in atmospheres?

$$?atm=578 torr×\frac{1 atm}{760 torr}=0.761 atm$$

1. (3 points) A sample of nitrogen gas occupies a volume of 362 mL at 15oC. What is the volume of the nitrogen gas if the temperature is increased to 55oC?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T}\_{2}\rightarrow \rightarrow V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=362 mL\left(\frac{328 K}{288 K}\right)=$$

1. (4 points) A 3.48 L sample of methane gas contains methane at 2.94 atm pressure and 25.0oC. What is the mass of the gas? (Hint: Calculate the number of moles first.)

$$PV=nRT\rightarrow \rightarrow n=\frac{PV}{RT}=\frac{\left(2.94 atm\right)\left(3.48 L\right)mol K}{\left(0.0821 L atm\right)\left(298 K\right)}=$$

$$0.418 mol CH\_{4}×\frac{16.04 g CH\_{4}}{1 mol CH\_{4}}=6.71 g CH\_{4}$$

1. (3 points) The atmosphere of a newly discovered planet is composed of nitrogen (364 mm Hg), methane gas (632 mm Hg), and bromine gas (499 mm Hg). What is the atmospheric pressure on this planet?

Total pressure = 364 mm Hg + 632 mm Hg + 499 mm Hg = 1495 mm Hg

1. (4 points) Given the reaction 4 NH3(g) + 5 O2(g) 🡪 4 NO(g) + 6 H2O(g). How many L of water will be produced by the reaction of 16.8 L of ammonia (NH3) in excess oxygen at 25oC and 1.14 atm pressure?

$$?L H\_{2}O=16.8 L NH\_{3}×\frac{6 L H\_{2}O}{4 L NH\_{3}}=25.2 L H\_{2}O$$

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Quiz 9B (20 points) April 20, 2009

PV=nRT, 760 torr = 760 mmHg = 1 atm = 101 kPa = 14.7 psi = 30 in Hg,

R=0.0821 L atm/mol K=62.4 L torr/mol K

1. (3 points) Explain why it is necessary to add air to a car’s tires during the winter?

The volume decreases when the temperature decreases. Since there is less volume at lower temperature you need to add air to keep the same volume of air in the tires.

1. (3 points) The pressure of a sample of neon gas is 866 torr. What is the pressure in atmospheres?

$$?atm=866 torr×\frac{1 atm}{760 torr}=1.14 atm$$

1. (3 points) A sample of nitrogen gas occupies a volume of 875 mL at 15oC. What is the volume of the nitrogen gas if the temperature is increased to 55oC?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T}\_{2}\rightarrow \rightarrow V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=875 mL\left(\frac{328 K}{288 K}\right)=$$

1. (4 points) A 6.87 L sample of methane gas contains methane at 2.94 atm pressure and 25.0oC. What is the mass of the gas? (Hint: Calculate the number of moles first.)

$$PV=nRT\rightarrow \rightarrow n=\frac{PV}{RT}=\frac{\left(2.94 atm\right)\left(6.87 L\right)mol K}{\left(0.0821 L atm\right)\left(298 K\right)}=$$

$$0.826 mol CH\_{4}×\frac{16.04 g CH\_{4}}{1 mol CH\_{4}}=13.2 g CH\_{4}$$

1. (3 points) The atmosphere of a newly discovered planet is composed of nitrogen (678 mm Hg), methane gas (387 mm Hg), and bromine gas (125 mm Hg). What is the atmospheric pressure on this planet?

Total pressure = 678 mm Hg + 387 mm Hg + 125 mm Hg = 1190 mm Hg

1. (4 points) Given the reaction 4 NH3(g) + 5 O2(g) 🡪 4 NO(g) + 6 H2O(g). How many L of water will be produced by the reaction of 38.7 L of ammonia (NH3) in excess oxygen at 25oC and 1.14 atm pressure?

$$?L H\_{2}O=38.7 L NH\_{3}×\frac{6 L H\_{2}O}{4 L NH\_{3}}=58.1 L H\_{2}O$$