Chemistry 115 Name key

Dr. Cary Willard

Quiz 8a (20 points) April 22, 2010

Must show all work to receive credit. Use proper significant figures.

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

1. (5 points) The pressure at the bottom of mission bay is 4.25 atm, what is that pressure in torr?

$$?torr=4.25 atm×\frac{760 torr}{1 atm}=3230 torr$$

1. (5 points) A container is filled with 5.24 L of argon with a pressure of 1.87 atm at 35oC. If the container is heated to 375oC at a constant pressure, what is the new volume of argon in the container?

P1 = 1.87 atm P2 = 1.87 atm

T1 = 35oC = 308 K T2 = 375 oC = 648 K

V1 = 5.24 L V2 = ?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T\_{2}}\rightarrow V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=5.24 L\left(\frac{648 K}{308 K}\right)=11.0 L$$

1. (6 points) An unknown gas has a molar mass of 362 g/mol at 75oC and 1.22 atm. What is the density of the unknown gas?

$$?density=\frac{?g}{L}=\frac{362 g}{mol}×\frac{0.0427mol}{L}= 15.5g/L$$

$$PV=nRT \rightarrow \frac{n}{V}=\frac{P}{RT}=\frac{\left(1.22 atm\right) mol K}{\left(0.0821 L atm\right)\left(348 K\right)}=\frac{0.0427 mol}{L}$$

1. (4 points) Explain why a gas expands to fill its container using kinetic molecular theory.

The molecules are in constant motion. They move in straight lines and when they bump into something else they change direction. If a container expands the gas molecules will continue moving until they hit a surface, thus expanding into the entire volume.

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

1. (5 points) The pressure at the bottom of mission bay is 5.34 atm, what is that pressure in torr?

$$?torr=5.34 atm×\frac{760 torr}{1 atm}=4060 torr$$

1. (5 points) A container is filled with 6.88 L of argon with a pressure of 1.87 atm at 35oC. If the container is heated to 375oC at a constant pressure, what is the new volume of argon in the container?

P1 = 1.87 atm P2 = 1.87 atm

T1 = 35oC = 308 K T2 = 375 oC = 648 K

V1 = 6.88 L V2 = ?

$$\frac{V\_{1}}{T\_{1}}=\frac{V\_{2}}{T\_{2}}\rightarrow V\_{2}=V\_{1}\left(\frac{T\_{2}}{T\_{1}}\right)=6.88 L\left(\frac{648 K}{308 K}\right)=14.5 L$$

1. (6 points) An unknown gas has a molar mass of 218 g/mol at 75oC and 1.31 atm. What is the density of the unknown gas?

$$?density=\frac{?g}{L}=\frac{218 g}{mol}×\frac{0.0459mol}{L}= 10.0 g/L$$

$$PV=nRT \rightarrow \frac{n}{V}=\frac{P}{RT}=\frac{\left(1.31 atm\right) mol K}{\left(0.0821 L atm\right)\left(348 K\right)}=\frac{0.0459 mol}{L}$$

1. (4 points) Explain why a gas expands to fill its container using kinetic molecular theory.

The molecules are in constant motion. They move in straight lines and when they bump into something else they change direction. If a container expands the gas molecules will continue moving until they hit a surface, thus expanding into the entire volume.