Chemistry 141 Name

Dr. Cary Willard

Quiz 5A (20 points) October 2, 2013

Data: R = 0.0821 L atm/mol K = 62.4 L torr/mol K, 1 atm = 760 torr = 760 mm Hg, K = oC+273.16

1. (5 points) A piece of dry ice (solid carbon dioxide) with a mass of 35.2 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 18oC and a pressure of 751 torr?
2. (5 points) What is the density (in g/L) of oxygen gas at 55oC and 6.78 atm?
3. (4points) Explain why scuba divers should never hold their breath as they ascend to the surface.

As a divers ascends to the surface the pressure exerted on their body decreases. Because of a pressure decrease the gases expand. If a scuba diver holds their breath the gas in the lungs will expand and having no room to expand will burst the lungs.

1. (6 points) Hydrogen gas can be formed by the reaction of methane with water according to the equation:

CH4(g) + H2O(g) 🡪 CO(g) + 3 H2(g)

In a particular reaction, 25.4 L of methane gas (measured at a pressure of 742 torr and a temperature of 25oC) mixes with 41.8 L of water vapor under the same conditions. The reaction produces 61.5 L of hydrogen gas under the same conditions. What is the percent yield of the reaction?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | x=25.4L |  | x=25.4L |  |  |  |  |
|  | CH4(g) | + | H2O(g) | 🡪 | CO(g) | + | 3 H2(g) |
| I | 25.4 L |  | 41.8 L |  |  |  |  |
| D | -x |  | -x |  | +x |  | +3x |
| E | 25.4L-x=25.4L-25.4L=0L |  | 41.8L-x=41.8L-25.4L=16.4L |  | =25.4 L |  | =3(25.4L)=76.2 L |

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Quiz 5B (20 points) October 2, 2013

Data: R = 0.0821 L atm/mol K = 62.4 L torr/mol K, 1 atm = 760 torr = 760 mm Hg, K = oC+273.16

1. (5 points) A piece of dry ice (solid carbon dioxide) with a mass of 41.8 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 18oC and a pressure of 751 torr?
2. (5 points) What is the density (in g/L) of oxygen gas at 55oC and 5.22 atm?
3. (4points) Explain why scuba divers should never hold their breath as they ascend to the surface.

As a divers ascends to the surface the pressure exerted on their body decreases. Because of a pressure decrease the gases expand. If a scuba diver holds their breath the gas in the lungs will expand and having no room to expand will burst the lungs.

1. (6 points) Hydrogen gas can be formed by the reaction of methane with water according to the equation:

CH4(g) + H2O(g) 🡪 CO(g) + 3 H2(g)

In a particular reaction, 37.4 L of methane gas (measured at a pressure of 742 torr and a temperature of 25oC) mixes with 41.8 L of water vapor under the same conditions. The reaction produces 89.4 L of hydrogen gas under the same conditions. What is the percent yield of the reaction?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | x=37.4L |  | x=25.4L |  |  |  |  |
|  | CH4(g) | + | H2O(g) | 🡪 | CO(g) | + | 3 H2(g) |
| I | 37.4 L |  | 41.8 L |  |  |  |  |
| D | -x |  | -x |  | +x |  | +3x |
| E | 37.4 L-x=37.4L-37.4L=0L |  | 41.8L-x=41.8L-37.4L=4.4L |  | =37.4 L |  | =3(37.4L)=112.2 L |