

# Non Sibi High School

## Andover's Chem 550/580: Advanced Chemistry

### Chapter 5, Review Quiz 1

**1**

A sample of  $F_2$  gas occupies a volume of 608 mL at  $33^\circ C$  and 723 torr. How many milligrams of  $F_2$  are in the sample?

**2**

Given the unbalanced decomposition equation  $PH_3(g) \rightarrow P_4(g) + H_2(g)$ , how many kilograms of  $PH_3$  must decompose to produce 96 liters of hydrogen gas at  $715^\circ C$  and 794 mmHg?

**3**

Given the unbalanced equation  $NH_3(g) + O_2(g) \rightarrow NO(g) + H_2O(g)$ , if 27.5 grams of  $NH_3$  is mixed with 57.5 grams of  $O_2$ :

- Which is the limiting reagent and what maximum volume of  $NO$  can form at STP?
- What mass of the excess reagent remains when the reaction is complete?

**4**

Given the unbalanced equation  $K(s) + N_2(g) \rightarrow K_3N(s)$ , if 382 mL of nitrogen gas at  $27^\circ C$  and 704 torr react with an excess of solid potassium and then 1.63 grams of  $K_3N$  are actually collected, what is the percent yield of the reaction?

**5**

a. An unknown compound was found to be 24.3% carbon and 71.7% chlorine by mass, with the remainder being hydrogen. Determine the empirical formula of the compound.

b. In a separate experiment, 2.8 grams of the vaporized compound was found to occupy 1.1 liters at 225°C and 786 mmHg. Determine the molar mass and molecular formula of the compound.

## 6

What is the density of SO<sub>2</sub> gas at 38°C and 713 torr?

## 7

A gas sample occupies 448 mL at 615°C. If the volume is decreased to 112 mL, what will be the new temperature of the gas in °C?

## 8

A gaseous mixture of 0.140 mol krypton and 0.280 mol xenon has a total pressure of 777 torr. Calculate the partial pressure of each gas in mmHg.

## 9

When a barometer containing liquid dichloromethane was used to measure the barometric pressure, the height in the tube was found to be 7.35 meters. Given that the density of liquid dichloromethane is 1.33 g/mL and the density of liquid mercury is 13.6 g/mL, calculate the barometric pressure in atm.

## 10

On a day when the barometric pressure was 0.932 atm, the pressure of a gas sample was measured using an open-end manometer. If the mercury level in the arm attached to the gas was 3.3 centimeters lower than the mercury level in the arm open to the atmosphere, calculate the pressure of the gas in torr.

## 11

On a day when the barometric pressure was 754 mmHg, hydrogen gas was produced in the unbalanced reaction  $\text{CaH}_2(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca}(\text{OH})_2(\text{aq}) + \text{H}_2(\text{g})$ . The hydrogen gas was collected over water at 28°C (water vapor pressure at 28°C = 28 mmHg). If 0.0767 grams of CaH<sub>2</sub> reacted, how many milliliters of hydrogen gas was collected?

## 12

A 2.61 gram sample of a solid mixture contains  $\text{NaClO}_3$  as well as unreactive material. When heated, only the  $\text{NaClO}_3$  in the mixture decomposes to produce 992 milliliters of  $\text{O}_2$  gas at  $225^\circ\text{C}$  and 772 mmHg according to the unbalanced equation  $\text{NaClO}_3(\text{s}) \rightarrow \text{NaCl}(\text{s}) + \text{O}_2(\text{g})$ . What is the percent by mass of  $\text{NaClO}_3$  in the mixture?

## 13

If 0.165 mol of  $\text{C}_2\text{H}_6$  gas effuses from a container in a certain time period, how many moles of  $\text{F}_2$  gas would effuse under identical conditions?

## 14

Calculate the root-mean-square speed of  $\text{O}_2$  gas at  $45^\circ\text{C}$ .



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