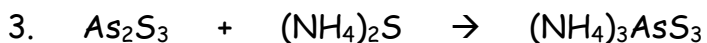
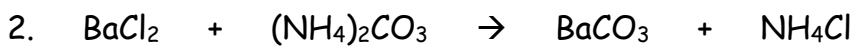
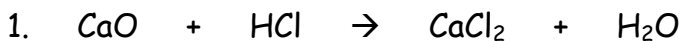
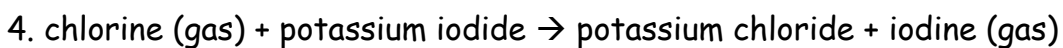


## CHAPTER 11: Station 1 - Balancing Equations

What are the missing coefficients for the following unbalanced equations?

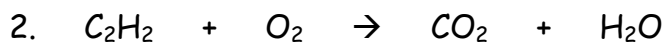
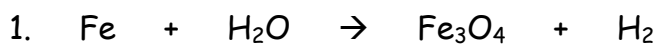


Rewrite the following word equation as a balanced chemical equation:



## CHAPTER 11: Station 2 - Reaction Types & Predicting Products

What type of reaction is:

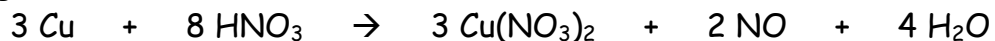


What is the product in the combination reaction between:

4. hydrogen and oxygen

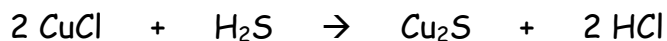
## CHAPTER 12: Station 3 - Stoichiometry

The reaction of copper with nitric acid produces copper (II) nitrate, nitrogen monoxide and water.



1. If you have 7.4 mol  $\text{HNO}_3$ , how many moles of  $\text{NO}$  are produced?
2. How many grams of  $\text{Cu}$  are required to produce 7.75g  $\text{H}_2\text{O}$ ?
3. How many liters of  $\text{NO}$  can be produced from 65 L of  $\text{HNO}_3$ ?

Copper (I) chloride reacts with hydrosulfuric acid to form Copper (I) sulfide and hydrochloric acid.



4. What mass of hydrosulfuric acid is needed to react with 109 g  $\text{CuCl}$ ?
5. How many grams of  $\text{HCl}$  is produced when 8 moles of  $\text{CuCl}$  is reacted with an excess of  $\text{H}_2\text{S}$ ?

## CHAPTER 12: Station 4 - Limiting Reagent & Percent Yield

Given the equation:  $\text{P}_4 + 5 \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$

1. What is the maximum number of grams of  $\text{P}_4\text{O}_{10}$  that can be formed when 22.7 g of  $\text{P}_4$  reacts with 176 g of  $\text{O}_2$  gas?

Given the reaction at STP:  $4 \text{NH}_3 + 5 \text{O}_2 \rightarrow 4 \text{NO} + 6 \text{H}_2\text{O}$

2. When 17.0 g of  $\text{NH}_3$  reacts with an excess of  $\text{O}_2$ , 6.71 g NO is produced. What is the percent yield of this reaction?

## CHAPTER 14: Station 5 - Gas Conversions & Gas Pressure

1. A gas has a pressure of 800.0 mmHg. What is the pressure of this gas sample in atmospheres?
2. A tank of oxygen is under a pressure of about  $4.00 \times 10^3$  kPa. Express this pressure in millimeters of Mercury.
3. a. Convert  $-50^\circ\text{C}$  to Kelvin.  
b. Convert  $350^\circ\text{K}$  to Celsius.
4. Blast furnaces give off many unpleasant and unhealthy gases. If the total air pressure is 0.99 atm, the partial pressure of carbon dioxide is 0.05 atm, and the partial pressure of hydrogen sulfide is 0.02 atm, what is the partial pressure of the remaining air?
5. A metal tank contains three gases: oxygen, helium, and nitrogen. If the partial pressures of the three gases in the tank are 35 atm of  $\text{O}_2$ , 5 atm of  $\text{N}_2$ , and 25 atm of He, what is the total pressure inside of the tank?

## CHAPTER 14: Station 6 - Gas Laws

1. Divers get "the bends" if they come up too fast because gas in their blood expands, forming bubbles in their blood. If a diver has 0.08 L of gas in his blood under a pressure of 5.2 atm, then rises instantaneously to a depth where his blood has a pressure of 1.0 atm, what will the volume of gas in his blood be?
2. On hot days, you may have noticed that potato chip bags seem to "inflate" even though they have not been opened. If I have a 52 mL bag at a temperature of 19°C, and I leave it in my car, which has a temperature of 60°C, what will the new volume of the bag be?
3. If four moles of gas at a pressure of 5.4 atm have a volume of 120 L, what is the temperature?
4. A small research submarine with a volume of  $1.2 \times 10^5$  L has an internal pressure of 1.0 atm and an internal temperature of 288 K. If the submarine descends to a depth where the pressure is 150 atm and the temperature 276 K, what will the volume of the gas inside be if the hull of the submarine breaks?
5. Compare the rates of effusion between helium gas and bromine gas.

## CHAPTER 16: Station 7 - Molarity & Dilutions

1. How many liters of a 0.5 M  $\text{CaCl}_2$  solution would contain 3.5 moles of  $\text{CaCl}_2$ ?
2. Calculate the molarity when 3 moles of  $\text{NaOH}$  are dissolved in 0.25 liters of solution.
3. How many grams of  $\text{NH}_3$  are dissolved in 85 mL of a 0.75 M solution?
4. 25 mL of 5.6 M  $\text{HCl}$  are placed in a volumetric flask. The flask is filled to 250 mL with water. What is the molarity of the new solution?
5. When a chemist adds 1.0 L of water to 3.0 L of a 0.8 M  $\text{HF}$  solution, what is the new concentration of the total  $\text{HF}$  solution?

CHAPTER 16: Station 8 - Molality & Freezing Point Depression/Boiling Point Elevation

1. What is the molality of a solution that contains 63.0 g  $\text{HNO}_3$  in 0.500 kg  $\text{H}_2\text{O}$ ?
2. How many kilograms of water must be added to 15.0 g of oxalic acid,  $\text{H}_2\text{C}_2\text{O}_4$ , to prepare a 0.025 m solution?
3. What is the molality of a solution that contains 0.500 mol  $\text{HC}_2\text{H}_3\text{O}_2$  in 0.125 kg  $\text{H}_2\text{O}$ ?
4. When 200.5 g of sucrose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) is dissolved into 100.0 grams of water, what is the freezing point?
5. If I add 45 grams of sodium chloride to 500 grams of water, what will the boiling point be of the resulting solution?  $K_b (\text{H}_2\text{O}) = 0.52\text{ }^\circ\text{C/m}$  and  $K_f (\text{H}_2\text{O}) = 1.86\text{ }^\circ\text{C/m}$ .