

Name KEY
 Date _____
 Due Date _____

Mark _____ / 31

Correct and Hand in Again by _____

Chemistry 11

Hand In Assignment # 10 - Stoichiometry Problems

This Assignment will be marked and you are allowed to do one set of corrections. Show all of your work, including units in your work and answers.

Given the following balanced equation, answer the questions following it:



a. If 2.50 moles of Na are reacted, how many moles of ZnI₂ will be consumed? (1 mark)

$$2.50 \text{ mol Na} \times \frac{4 \text{ mol ZnI}_2}{9 \text{ mol Na}} = 1.11 \text{ mol ZnI}_2$$

Answer 1.11 mol ZnI₂

b. In order to produce 0.350 moles of NaI, how many moles of ZnI₂ would be consumed? (1 mark)

$$0.350 \text{ mol NaI} \times \frac{4 \text{ mol ZnI}_2}{8 \text{ mol NaI}} = 0.175 \text{ mol ZnI}_2$$

Answer 0.175 mol ZnI₂

c. If you needed to produce 35.976 g of NaI, how many moles of Na would you need to start with? (2 marks)

$$35.976 \text{ g NaI} \times \frac{1 \text{ mol NaI}}{149.9 \text{ g NaI}} \times \frac{9 \text{ mol Na}}{8 \text{ mol NaI}} = 0.27 \text{ mol Na}$$

Answer 0.27 mol Na

d. If you completely react 526.68 g of ZnI₂, what mass of NaZn₄ will be produced? (3 marks)

$$526.68 \text{ g ZnI}_2 \times \frac{1 \text{ mol ZnI}_2}{319.2 \text{ g ZnI}_2} \times \frac{1 \text{ mol NaZn}_4}{4 \text{ mol ZnI}_2} \times \frac{284.6 \text{ g NaZn}_4}{1 \text{ mol NaZn}_4} = 117.4 \text{ g}$$

Answer 117.4 g NaZn₄

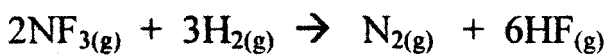
e. In order to produce 692.538 g of NaI, what mass of ZnI₂ is required? (3 marks)

$$692.538 \text{ g NaI} \times \frac{1 \text{ mol NaI}}{149.9 \text{ g NaI}} \times \frac{4 \text{ mol ZnI}_2}{8 \text{ mol NaI}} \times \frac{319.2 \text{ g ZnI}_2}{1 \text{ mol ZnI}_2} = 737.35$$

Answer 737.4 g ZnI₂

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2. Given the following balanced equation, answer the questions following it:



a. If 15.008 L of hydrogen gas are consumed at STP, how many moles of HF would be formed? (3 marks)

$$15.008 \text{ L H}_2 \times \frac{1 \text{ mol H}_2}{22.4 \text{ L H}_2} \times \frac{6 \text{ mol HF}}{3 \text{ mol H}_2} = 1.34 \text{ mol HF}$$

Answer 1.34 mol HF

b. In order to produce 3.50 grams of N_2 , how many Litres of NF_3 at STP would be required? (3 marks)

$$3.5 \text{ g N}_2 \times \frac{1 \text{ mol N}_2}{28.0 \text{ g N}_2} \times \frac{2 \text{ mol NF}_3}{1 \text{ mol N}_2} \times \frac{22.4 \text{ L NF}_3}{1 \text{ mol NF}_3} = 5.60 \text{ L NF}_3$$

Answer 5.6 L of NF_3

c. If 188.608 L of N_2 are formed at STP, how many Litres of HF would be produced at the same time? (3 marks)

$$188.608 \text{ L N}_2 \times \frac{6 \text{ L HF}}{1 \text{ L N}_2} = 1131.648 \text{ L HF}$$

Answer 1131.65 L HF

d. If 482.8 g of NF_3 are consumed, how many molecules of H_2 would be consumed at the same time? (3 marks)

$$482.8 \text{ g NF}_3 \times \frac{1 \text{ mol NF}_3}{71.0 \text{ g NF}_3} \times \frac{3 \text{ mol H}_2}{2 \text{ mol NF}_3} \times \frac{6.02 \times 10^{23} \text{ molec. H}_2}{1 \text{ mol H}_2} =$$

Answer 6.1404×10^{24} molec. H_2

e. If 2.7692×10^{23} molecules of HF are produced, what volume of N_2 would be produced at STP? (3 marks)

$$2.7692 \times 10^{23} \text{ molec. HF} \times \frac{1 \text{ mol HF}}{6.02 \times 10^{23} \text{ molec. HF}} \times \frac{1 \text{ mol N}_2}{6 \text{ mol HF}} \times \frac{22.4 \text{ L N}_2}{1 \text{ mol N}_2} =$$

Answer 1.717 L of N_2

f. What mass of H_2 would be required to produce 282.24 L of HF at STP? (3 marks)

$$282.24 \text{ L HF} \times \frac{1 \text{ mol HF}}{22.4 \text{ L HF}} \times \frac{3 \text{ mol H}_2}{6 \text{ mol HF}} \times \frac{2.0 \text{ g H}_2}{1 \text{ mol H}_2} =$$

Answer 12.6 g H_2

g. The consumption of 1.12 L of H_2 at STP would result in the formation of how many moles of HF? (3 marks)

$$1.12 \text{ L H}_2 \times \frac{1 \text{ mol H}_2}{22.4 \text{ L H}_2} \times \frac{6 \text{ mol HF}}{3 \text{ mol H}_2} = 0.10 \text{ mol HF}$$

Answer 0.10 mol HF