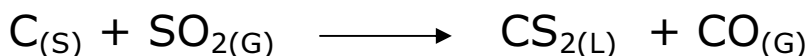


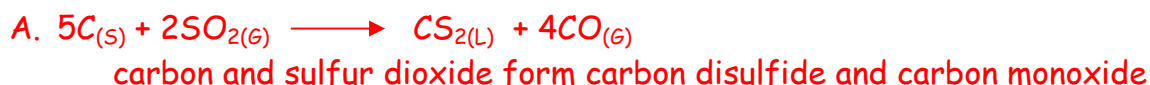
Stoich HW #1

ANSWERS

Carbon disulfide is an important industrial solvent. It is prepared by the reaction of solid carbon and sulfur dioxide gas this way:



- A. Balance this equation, write the word equation for it.
- B. What is the MOLE RATIO for this reaction?
- C. How many moles of carbon disulfide form when 2.7 moles of carbon react?
- D. How many moles of carbon are needed to react are needed to react with 5.44 moles of SO_2 ?
- E. How many moles of carbon monoxide form at the same time 0.246 moles carbon disulfide form?
- F. How many moles of sulfur dioxide are needed to make 118 moles of carbon disulfide?



B. 5:2:1:4

C. $\text{MR} = \frac{\text{CS}_2}{\text{C}} \quad \frac{1}{5} \quad \frac{X}{2.7}$ Cross multiply to solve
 $5x = 2.7$
 $X = 0.54 \text{ moles CS}_2$ (2SF)

D. $\text{MR} = \frac{\text{C}}{\text{SO}_2} \quad \frac{5}{2} \quad \frac{X}{5.44}$ Cross multiply to solve
 $2x = 27.2$
 $X = 13.6 \text{ moles C}$ (3SF)

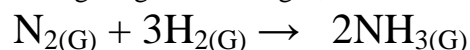
E. $\text{MR} = \frac{\text{CO}}{\text{CS}_2} \quad \frac{4}{1} \quad \frac{X}{0.246}$ Cross multiply to solve
 $X = 0.984 \text{ moles CO}$ (3SF)

F. $\text{MR} = \frac{\text{SO}_2}{\text{CS}_2} \quad \frac{2}{1} \quad \frac{X}{118}$ Cross multiply to solve
 $X = 236 \text{ moles SO}_2$ (3SF)

Stoich HW #2

ANSWERS

Ammonia is formed by combining H_2 gas with N_2 gas, as shown in this balanced chemical equation:



A. How many grams of ammonia form when 512 moles of nitrogen react?

$$A. \quad MR = \frac{NH_3}{N_2} \frac{2}{1} \frac{X}{512} \quad \begin{array}{l} \text{First Cross multiply to solve for moles of ammonia} \\ X = 1024 \text{ moles ammonia} \end{array}$$

Then, convert that many moles of NH_3 into grams of NH_3 with the molar mass of NH_3 .

$$\frac{1024 \text{ moles } NH_3}{1} \times \frac{17 \text{ grams } NH_3}{1 \text{ moles } NH_3} = 17,408 \text{ grams ammonia} \\ = 17,400 \text{ grams } NH_3 \text{ with 3 SF}$$

B. How many liters of N_2 are needed to react with 2.2 moles of H_2 ?

$$B. \quad MR = \frac{N_2}{H_2} \frac{1}{3} \frac{X}{2.2} \quad \begin{array}{l} \text{First Cross multiply to solve for moles of } N_2 \\ 3X = 2.2 \\ X = 0.73 \text{ moles nitrogen with 2 SF} \end{array}$$

Then, convert those moles into liters using the equality of 1 mole of any gas = 22.4 moles of gas at STP

$$\frac{0.73 \text{ moles } N_2}{1} \times \frac{22.4 \text{ L } N_2}{1 \text{ moles } N_2} = 16.352 \text{ liters} = 16 \text{ Liters } N_2 \text{ With 2 SF}$$

C. How many moles of NH_3 form when 8.32×10^{24} molecules H_2 reacts?

First determine how many moles that many molecules of hydrogen is with the equality
1 mole of any substance = 6.02×10^{23} particles (in this case they are molecules)

$$\frac{8.32 \times 10^{24} \text{ molecules } H_2}{1} \times \frac{1 \text{ mole Hydrogen}}{6.02 \times 10^{23} \text{ molecules } H_2} = \frac{8.32}{6.02} \times \frac{10^{24}}{10^{23}} = 1.38 \times 10^1 \text{ moles } H_2 \\ = 13.8 \text{ moles } H_2$$

Then using this number of moles, do the mole ratio with hydrogen and ammonia

$$MR = \frac{NH_3}{H_2} \frac{2}{3} \frac{X}{13.8}$$

$$\begin{array}{l} \text{First Cross multiply to solve for moles of } NH_3 \\ 3X = 27.6 \end{array}$$

$$X = 9.20 \text{ moles } NH_3 \text{ with 3 SF}$$



1. You start with 548 grams of zinc and sufficient acid to completely react all of the zinc. How many formula units of zinc chloride form?

MR $\frac{\text{Zn}}{\text{ZnCl}_2} \quad \frac{1}{1} \quad \frac{8.43}{X}$ $X = 8.43 \text{ moles ZnCl}_2$

$548 \text{ g Zn} \times \frac{1 \text{ mole Zn}}{65 \text{ g Zn}} = 8.43 \text{ moles Zn}$

$8.43 \text{ moles ZnCl}_2 \times \frac{6.02 \times 10^{23} \text{ FU's ZnCl}_2}{1 \text{ mole ZnCl}_2} =$

$50.7486 \times 10^{23} = 50.7 \times 10^{23} = \mathbf{5.07 \times 10^{24} \text{ FU's of ZnCl}_2}$

2. You end with 944 liters of hydrogen. How many grams of zinc are required?

MR $\frac{\text{H}_2}{\text{Zn}} \quad \frac{1}{1} \quad \frac{42.1}{X}$ $X = 42.1 \text{ moles Zn}$

$944 \text{ L H}_2 \times \frac{1 \text{ mole H}_2}{22.4 \text{ L H}_2} = 42.1 \text{ moles H}_2$

$42.1 \text{ moles Zn} \times \frac{65 \text{ grams zinc}}{1 \text{ mole Zn}} =$

$\mathbf{2736.5 = 2740 \text{ g Zn}}$

3. You measure 4.91×10^{24} atoms of zinc completely react. How many liters of hydrogen gas form?

MR $\frac{\text{Zn}}{\text{H}_2} \quad \frac{1}{1} \quad \frac{8.16}{X}$ $X = 8.16 \text{ moles H}_2$

$4.91 \times 10^{24} \text{ atoms Zn} \times \frac{1 \text{ mole Zn}}{6.02 \times 10^{23} \text{ atoms Zn}} =$

$= \frac{4.91}{6.02} \times \frac{10^{24}}{10^{23}} = 0.816 \times 10^1 = 8.16 \text{ moles Zn}$

$8.16 \text{ moles H}_2 \times \frac{22.4 \text{ liters H}_2}{1 \text{ mole H}_2} =$

$\mathbf{183 \text{ liters H}_2}$