Name
Chemistry
Stoichiometry Review

(#6-1) For the following determine the number of molecules

1. 9.8 moles of O_2 $\frac{6.02\times10^{23}}{1\,mol} = 5.9\times10^{24}$ O_2 molecules
2. 5 moles of H_2O $\frac{6.02\times10^{23}}{1\,mol} = 3.\times10^{24}$ H_2O molecules

(#6-1) For the following determine the amount of moles

3. 2.3 x 10^{12} molecules of H_2 $\frac{1\,mol}{6.02E23} = 3.8\times10^{-12}$ mol H_2
4. 3.2 x 10^{28} molecules of C_2H_4 $\frac{1\,mol}{6.02E23} = 5.3\times10^{4}$ mol C_2H_4 or 53,000 moles C_2H_4

(#6-1) For the following determine the Formula Weight (in grams/mole)

5. H_2 $2\times1 = 2$ g/mol
6. NaOH 23 16 1 40 g/mol

(#6-1) For the following determine the mass (in grams)

7. 5.3 moles of O_2 $\frac{32\,g}{1\,mol} = 170\,g\ O_2$
8. 45.2 moles Fe_2O_3 $\frac{159.6\,g}{1\,mol} = 7,210\,g\ Fe_2O_3$

(#6-1) For the following determine the amount of moles found in each mass

9. 22 grams of O_2 $\frac{1\,mol}{32\,g} = 0.69$ mol O_2
10. 305.6 grams of $C_6H_{12}O_6$ $\frac{1\,mol}{180\,g} = 1.698$ mol $C_6H_{12}O_6$

C 6 x 12 = 72
H 12 x 1 = 12
O 6 x 16 = 96
180

(#6-2) For the following determine the amount of moles using the following equation

$N_2 + 2\ O_2 = 2NO_2$

11. If one used 6 moles of O_2, how many moles of NO_2 would be formed? $6\,mol\ O_2 \left|\frac{2\,mol\ NO_2}{2\,mol\ O_2}\right. = 6\,mol\ NO_2$
12. If one formed 4.2 moles of NO_2, how many moles of N_2 are needed? $4.2\,mol\ NO_2 \left|\frac{1\,mol\ N_2}{2\,mol\ NO_2}\right. = 2.1\,mol\ N_2$

(#6-2) Determine the mass(in grams) using the following equation

$3\ H_2O_2 + 4\ Al \rightarrow 2\ Al_2O_3 + 3H_2$

13. 90.2 grams of Al was added to an excess of hydrogen peroxide, how much aluminum oxide was formed? $90.2\,g\ Al \left|\frac{1\,mol\ Al}{27\,g\ Al}\right. \left|\frac{2\,mol\ Al_2O_3}{4\,mol\ Al}\right. \left|\frac{102\,g\ Al_2O_3}{1\,mol\ Al_2O_3}\right. = 170\,g\ Al_2O_3$

In the beakers above there is a particulate representation of a beaker containing excess zinc and a solution of hydrochloric acid. The zinc and the HCl will react according to the reaction below.

$$2\,HCl(aq) + Zn(s) \rightarrow ZnCl_{2(aq)} + H_{2(g)}$$
$$6 \qquad 3 \qquad 3$$

14. Draw the beaker after the reaction has gone to completion.
15. Why is the HCl not connected to each other in the first beaker? → it is aqueous - dissolved as ions in solution
16. Is there a spectator in this reaction? If so, what? yes Cl^-

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Stoichiometry Practice MC

Multiple Choice
Identify the choice that best completes the statement or answers the question.

b 1. (#6-1) A 0.5 mole sample of Hydrobromic Acid will have a mass of
a. 80.9 grams
b. 40.5 grams
c. 22.4g
d. 6.022 E23

$0.5\,mol\,HBr \left|\frac{80.9}{1\,mol}\right. = 40.5$

1 gram of CH_4 reacts with 1 gram of O_2 via combustion. Answer the following questions relative to the reaction.

d 2. (#1-2) The overall balanced reaction represented below
a. $CH_4 + O \Rightarrow C + H + O$ not combustion
b. $CH_4 + O_2 \Rightarrow CO_2 + H_2O$ combustion but not balanced
c. $CH_4 \Rightarrow C + O_2 + C$ not combustion
d. $CH_4 + 2O_2 \Rightarrow CO_2 + 2H_2O$

$$2C_2H_{2(g)} + 5O_{2(g)} \Rightarrow 2H_2O_{(g)} + 4CO_{2(g)}$$

Acetylene is a common fuel used in welding. Answer the following questions.

b 3. (#6-1) If you have 10 grams of C_2H_2 and 10 grams of O_2, which of the following correctly describes the quantites of particles?
a. The quantities of particles are equal
b. You have more C_2H_2
c. You have more O_2
d. This question would require the number of moles to answer and that was not given.

$26\,g/mol$ $32\,g/mol$

$10\,g\,C_2H_2 \left|\frac{1\,mol}{26\,g}\right. = 0.38\,mol\,C_2H_2$

$10\,g\,O_2 \left|\frac{1\,mol}{32\,g}\right. = 0.31\,mol\,O_2$

c 4. (#6-2) If 1 mole of each reactant were used what would be the limiting reactant?
a. C_2H_2
b. CO_2
c. O_2
d. H_2O

$0.38\,mol\,C_2H_2 \left|\frac{2}{2}\right. = 0.38\,mol\,H_2O$

$0.31\,mol\,O_2 \left|\frac{2}{5}\right. = 0.124\,mol\,O_2$

a 5. (#6-1) A sample of this substance was analyzed as follows: massed to contain 13g and found to contain 0.5 moles. Which substance was being analyzed?
a. C_2H_2 $26\,g/mol$
b. O_2 32
c. CO_2 44
d. H_2O 18

$\frac{13}{0.5\,mol} = 26\,g/mol$

c 6. (#6-2 & #6-1)A sample of 13 grams of C_2H_2 is reacted with excess oxygen. How much H_2O and CO_2 will be produced respectively?
a. .5g and .5g
b. .5g and 1g
c. .5 mol and 1 mol
d. 13g and 26g

$13\,g\,C_2H_2 \left|\frac{1\,mol\,C_2H_2}{26\,g\,C_2H_2}\right. \left|\frac{2\,mol\,H_2O}{2\,mol\,C_2H_2}\right. = 0.5\,mol\,H_2O$

$13\,g\,C_2H_2 \left|\frac{1\,mol\,C_2H_2}{26\,g\,C_2H_2}\right. \left|\frac{2\,mol\,CO_2}{2\,mol\,C_2H_2}\right. = 1\,mol\,CO_2$

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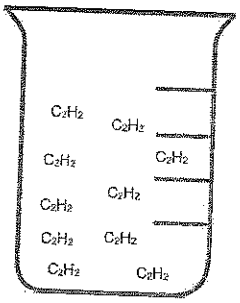
d 7. (#6- 2 & #6-3) A sample of C_2H_2 is going to be burned. How many molecules of O_2 would be needed here?

$$2C_2H_{2(g)} + 5O_{2(g)} \Rightarrow 2H_2O_{(g)} + 4CO_{2(g)}$$

$10 C_2H_2 \left| \frac{5 O_2}{2 C_2H_2} \right. = 25 O_2$

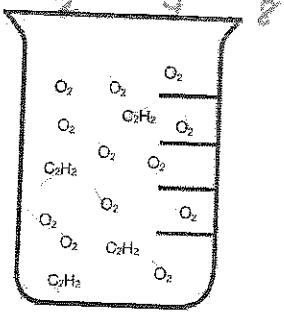


a. 0
b. 5
c. 10
d. 25

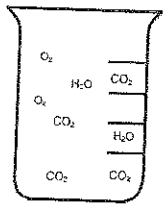
2 8. (#6-2 & #6-3) A sample of C_2H_2 is going to be burned. Which of the following pictures would represent the substance after the reaction has gone to completion?

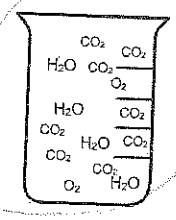
$$2C_2H_2 + 5O_2 \Rightarrow 2H_2O + 4CO_2$$

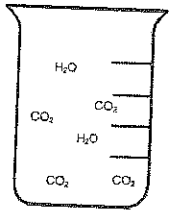
1 4 12 0 0
5 -4 -10 +4 +8
E 0 2 4 8

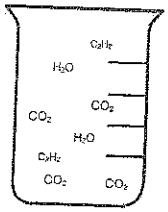


$2O_2$
$4 H_2O$
$8 CO_2$

a. 

b. 

c. 

d. 

c 9. (#6- 1)If the 13g sample of C_2H_2 (prior to burning) were to be stored in a balloon at STP, how large would that balloon be?

a. .5 mol
b. 22.4L
c. 11.2L
d. 3.01 E23 L

$13 g\ C_2H_2 \left| \frac{1 mol}{26 g} \right| \frac{22.4 L}{1 mol} = 11.2 L$

d 10. (#6-1) Which of these substances contains *more* than 1 mole of particles

a. 1 mol C_2H_4 $= 1 mol$
b. 20L O_2 (STP) $22.4 L/mol$
c. 17g H_2O $18 g/mol$
d. 51g CO_2 $51 g \left| \frac{1 mol}{44 g} \right. = 1.16 mol\ CO_2$