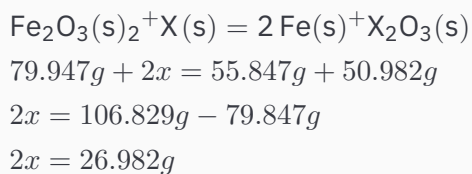


# Ap Chem Summer Assignment #3

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September 1, 2021

## 1 The following reaction was performed, Identify element X.

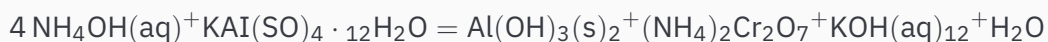


Since the atomic weight of 2 Fe is the same as the given weight (55.847g), the atomic weight of 2x is 26.982g or Aluminium (Al)

## 2 Fill in the blanks to balance the following chemical equations:

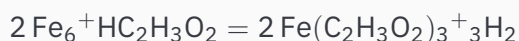
1.  $2\text{AgI} + \text{Na}_2\text{S} \rightarrow 2\text{Ag}_2\text{S} + \text{NaI}$
2.  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \rightarrow \text{Cr}_2\text{O}_3 + \text{N}_2 + \text{H}_2\text{O}$
3.  $\text{Na}_3\text{PO}_4 + \text{HCl} \rightarrow 3\text{NaCl} + \text{H}_3\text{PO}_4$
4.  $\text{TiCl}_4 + \text{H}_2\text{O} \rightarrow \text{TiO}_2 + \text{HCl}$
5.  $\text{Ba}_3\text{N}_2 + \text{H}_2\text{O} \rightarrow 3\text{Ba}(\text{OH})_2 + \text{NH}_3$
6.  $3\text{HNO}_2 + \text{HNO}_3 \rightarrow 2\text{NO} + \text{H}_2\text{O}$

### 3 Balance the following equation:



We can multiple  $\text{NH}_4\text{OH}$  by 4, and increase  $\text{NH}_4$  and  $\text{H}_2\text{O}$  on the product side to compensate

### 4 Balance the following equation



### 5 How many grams of water vapor can be generated from the combustion of 18.74 g of ethanol (C 2 H 6 O)?

### 6 How many grams of potassium iodide are necessary to completely react with 20.61g of Mercury (II) chloride

First we balance the equation  $\text{HgCl}_2 + 2\text{KI} = \text{HgI}_2 + 2\text{KCl}$  Next we to find the total atomic weight.  $200.59 + 2(35.45) + 2(39.10 + 126.90)$  Afterwards, we calculate the ratio needed  $\frac{332}{271.49} = 1.22$  Finally we multiply  $20.61 * 1.22 = 25.203$

### 7 A reaction combines 113.484 g of lead (II) nitrate with 45.010 g of sodium hydroxide (NaOH[aq]).

$\text{Pb}(\text{NO}_3)_2 + 2\text{NaOH} \rightarrow \text{Pb}(\text{OH})_2 + 2\text{NaNO}_3$  83.4 grams of  $\text{Pb}(\text{OH})_2$  The limiting reactant is lead (II) nitrate (0.345837 mols) and the excess reactant left over is sodium hydroxide (1.7773 mols). 1.431463 There is 57.256 grams of the excess reactant left over. The percent yield is 95.9%.

**8 A reaction combines 64.81 grams of silver nitrate with 92.67 grams of potassium bromide**

1. 72g
2.  $\text{AgNO}_3$  is the limiting reactant
3. 47.3g
4. 20.5%

**9 The molecular weight of an insecticide, dibromoethane, is 187.9. Its molecular formula is  $\text{C}_2\text{H}_4\text{Br}_2$ , What percent by mass of bromine does dibromoethane contain?**

First we have the following variables

$$\text{C} = 12.011$$

$$\text{H} = 1.008$$

$$\text{Br} = 79.90$$

Since the formula is  $\text{C}_2\text{H}_4\text{Br}_2$ , we can substitute and do the following:

$$= 24.022 + 4.032 + 159.8$$

$$= 187.9$$

$$= 159.8/187.9$$

$$= .8505$$

Therefore, dibromoethane contains 85.05 percent by mass of bromine.

**10 A given sample of xenon fluoride contains molecules of a single type of XeF<sub>n</sub>, where n is some whole number.**

First, we need to calculate how many moles of xenon fluoride there are, and calculate its weight.

$$\begin{aligned} \text{moles} &= 9.03 \times 10^{20} / 6.022 \times 10^{23} \\ &= 1.5 \times 10^{-3} \\ &= 0.31g \end{aligned}$$

Now, we can calculate for  $n$

$$\begin{aligned} &= 0.31 / 131 + 19n \\ &= 186.5 + 23.5n = 310 \\ n &= 4 \end{aligned}$$

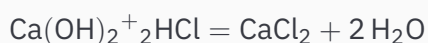
Therefore its formula is XeF<sub>4</sub>

**11 A 6.32 g sample of potassium chlorate was decomposed according to the following equation, how many moles were formed?**

$$k = 39.0983 \text{ Cl} = 35.45 \text{ O} = 16.00 \quad 39.0983 + 35.45 + 3 \times 16 = 122.55g$$

$$6.32 / 122.55 = 0.052 \text{ moles} \quad 2 \text{ mol KClO}_3 = 3 \text{ mol O}_2 \quad 2 = 3 \quad 0.052 \times 3 / 2 = 0.078 \text{ mol}$$

**12 What is the coefficient in front of water, when it is produced from the reaction of hydrochloric acid with calcium hydroxide? Calcium chloride is the other product.**

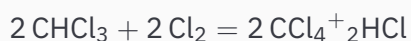


Therefore the coefficient is 2

**13 What is the subscript of aluminum in the formula of aluminum phosphate?**

1

**14 The reaction of 11.9 g of  $\text{CHCl}_3$  with excess chlorine produced 12.6 g of  $\text{CCl}_4$ , carbon tetrachloride, what is the percent yield?**



$$\text{CHCl}_3 = 119.378 \quad \text{CCl}_4 = 153.823$$

$$\text{Theoretical mass} = 153.823 \times 0.097 = 15.336 \text{ g} \quad \% \text{ yield} = 12.6 / 15.336 = \%82.16$$

**15 What mass of  $\text{CCl}_4$  is formed by the reaction of 8.00 g of methane with an excess of chlorine?  $\text{CH}_4$  is the limiting reactant**

$$8 \text{ g } \text{CH}_4 / 16.04 \text{ g/mol} = .499$$

$$.499 \times 153.82 = 76.72 \text{ g}$$

**16 A reaction occurs between sodium carbonate and hydrochloric acid producing sodium chloride, carbon dioxide, and water. Write the balanced chemical equation for the reaction.**

sodium carbonate + hydrochloric acid = sodium chloride + carbon dioxide + water =  
 $\text{Na}_2\text{CO}_3 + \text{HCl} + \text{NaCl} + \text{CO}_2 + \text{H}_2\text{O} = \text{Na}_2\text{CO}_3 + 2\text{HCl} + 2\text{NaCl} + 2\text{CO}_2 + \text{H}_2\text{O}$

**17 Classify the type of reaction from the five major type of reactions you learned in your first year chemistry course and write word equations. If necessary, balance.**

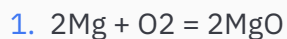
1.  $\text{NaOH} + \text{KNO}_3 = \text{NaNO}_3 + \text{KOH}$  = double replacement
2.  $\text{CH}_4 + 2\text{O}_2 =$  = combustion
3.  $\text{Fe} + 3\text{NaBr} = \text{FeBr}_2 + 3\text{Na}$  = single replacement
4. already balanced, double replacement
5. already balanced, double replacement
6. already balanced, synthesis
7. already balanced, decomposition

**18 Now try these reaction types, Rewrite as a balanced equation with the products predicted**

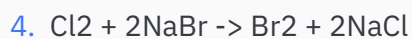
1.  $\text{Ba(OH)}_2 \rightarrow \text{BaO} + \text{H}_2\text{O}$
2.  $\text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{O} + \text{CO}_2$
3.  $2\text{LiClO}_3 \rightarrow 2\text{LiCl} + 3\text{O}_2$



**19 Now try these reaction types, Rewrite as a balanced equation with the products predicted**



**20 Attempt to write and predict products the following chemical reactions:**



**21 Using the solubility rules table, classify each of the substances as being soluble or insoluble in water. Then, Identify the two new compounds that form if the solutions, as suggested by the following table, were mixed via a double displacement reaction.**

**21.1 Part A**

1. Soluble
2. Insoluble
3. Insoluble
4. Insoluble
5. Soluble
6. Insoluble
7. Insoluble
8. Insoluble
9. Soluble
10. Insoluble.
11. Insoluble
12. Soluble
13. Soluble
14. Soluble
15. Insoluble
16. Insoluble



## 21.2 Part B

1.  $\text{AgBr(s)} \text{ KNO}_3\text{(aq)} \text{ BaBr}_2\text{(aq)} \text{ KCl(aq)} \text{ AlBr}_3\text{(aq)} \text{ KNO}_3\text{(aq)} \text{ K}_2\text{SO}_4\text{(aq)} \text{ CuBr}_2\text{(aq)}$
2.  $\text{Ag}_2\text{CO}_3\text{(s)} \text{ KNO}_3\text{(aq)} \text{ NaCl(aq)} \text{ KCl(aq)} \text{ Al}_2\text{(CO}_3)_3\text{(s)} \text{ KNO}_3\text{(aq)} \text{ CuCO}_3\text{(s)} \text{ CuBr}_2\text{(aq)}$
3.  $\text{Ag}_2\text{S(s)} \text{ KNO}_3\text{(aq)} \text{ CaCl(aq)} \text{ KCl(aq)} \text{ AlBr}_3\text{(aq)} \text{ KNO}_3\text{(aq)} \text{ K}_2\text{SO}_4\text{(aq)} \text{ CuBr}_2\text{(aq)}$
4.  $\text{AgOH(s)} \text{ KNO}_3\text{(aq)} \text{ Ba(OH)}_2\text{(aq)} \text{ KCl(aq)} \text{ Al(OH)}_3\text{(aq)} \text{ KNO}_3\text{(aq)} \text{ NH}_4\text{(SO}_4)_2\text{(aq)} \text{ CuBr}_2\text{(aq)}$

## 22 Name the following, then draw the Lewis Structure for the following hydrocarbons from their full names.

1.  $\text{CH}_4$  - methane
2.  $\text{C}_3\text{H}_8$  - propane
3.  $\text{C}_4\text{H}_8$  - butene
4.  $\text{C}_4\text{H}_8$  - butyne
5. Ethane  $\text{C}_2\text{H}_6$  (c-c)
6. Methane  $\text{CH}_4$  (c-c)
7. Propyne  $\text{C}_3\text{H}_4$  (c—c)
8. 2-Butene  $\text{C}_4\text{H}_8$  (c=c)