# Ap Chem Summer Assignment #3

Shaurya Singh

August 25, 2021

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

$$Fe_2O_3(s)_2^+X(s) = 2 Fe(s)^+X_2O_3(s)$$

$$79.947g + 2x = 55.847g + 50.982g$$

$$2x = 106.829g - 79.847g$$

$$2x = 26.982q$$

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 Balance the following equations

- 1.  $2 \operatorname{AgI}^{+} \operatorname{Na_2S} \to 2 \operatorname{Ag_2S}^{+} \operatorname{NaI}$
- 2.  $(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3^+N_2^+{}_4H_2O$
- 3.  $Na_3PO_4^+{}_3HCl \rightarrow 3NaCl^+H_3PO_4$
- 4.  $TiCl_4^+_2H_2O \rightarrow TiO_2^+_4HCl$
- 5.  $Ba_3N_2^+{}_6H_2O \rightarrow 3Ba(OH)_2^+{}_2NH_3$
- 6.  $3 \, \text{HNO}_2^+ \text{HNO}_3 \rightarrow 2 \, \text{NO}^+ \text{H}_2 \text{O}$

## 3 Balance the following equation:

 $4 \text{ NH}_4 \text{OH}(\text{aq})^+ \text{KAI}(\text{SO})_4 \cdot {}_{12}\text{H}_2\text{O} = \text{Al}(\text{OH})_3(\text{s})_2^+ (\text{NH}_4)_2 \text{Cr}_2 \text{O}_7^+ \text{KOH}(\text{aq})_{12}^+ \text{H}_2\text{O}$  We can multiple NH<sub>4</sub>OH by 4, and increase NH4 and H2O on the product side to compensate

## 4 Balance the following equation

$$2 \operatorname{Fe_6}^+ \operatorname{HC_2H_3O_2} = 2 \operatorname{Fe(C_2H_3O_2)_3}^+ \operatorname{_3H_2}$$

- 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  $\text{HgCl}_2^+_2\text{KL} = \text{HgI}_2^+_2\text{KCl}$  Next we to find the total atomic weight. 200.59 + 2(35.45) + 2(39.10 + 126.90) Afterwards, we calculate the ratio needed  $\frac{332}{271.40} = 1.22$  Finally we multiply 20.61 \* 1.22 = 25.203

- 7 How many grams of water vapor can be generated from the combustion of 18.74 g of ethanol (C 2 H 6 O)?
- 8 A reaction combines 64.81 grams of silver nitrate with 92.67 grams of potassium bromide
  - 1. 72g
  - 2.  $AgNO_3$  is the limiting reactant
  - 3. 47.3g
  - 4. 20.5%

9 The moleculer weight of an insecticide, dibromoethane, is 187.9. Its molecular formula is  $C_2H_2Br_2$ , What percent by mass of bromine does dibromoethane contain?

$$C = 12.011 H = 1.008 Br = 79.90$$
 $C_2H_4Br_2$ 
 $= 24.022 + 4.032 + 159.8 = 187.9 = 159.8/187.9 = .8505$ 
 $= \%85.05$ 

10 A given sample of xenon fluoride contains molecules of a single type of XeFn, where n is some whole number. Given that  $9.03*10^{20}$ 

```
moles = 9.03*10^{20}/6.022*10^{23} = 1.5*10^{-3} = 0.31~0.31/131+19n = 186,5+23.5n = 310 n = 4 therefore its XeF<sub>4</sub>
```

#### 11 Molar mass of KCIO

```
k = 39.0983 Cl = 35.45 O = 16.00 39.0983 + 35.45 + 3*16 = 122.55g 6.32/122.55 = 6.052 \text{ moles 2 mol KClO3} = 3 \text{ mol O2} \\ 2 = 3 \ 0.052*3/2 = 0.078 \text{ mol}
```

## 12 The equation (balanced) is

$$Ca(OH)_2^+ {}_2HCl = CaCl_2 + 2 H_2O$$

Therefore the coeffecient is 2

## 13 the answer is

1

#### 14 The answer is

$$2 \operatorname{CHCl}_3 + 2 \operatorname{Cl}_2 = 2 \operatorname{CCl}_4^+{}_2 \operatorname{HCl}$$

$$CHCl_3 = 119.378 \ CCl_4 = 153.823$$

Theoretical mass = 153.823 \* 0.097 = 15.336g % yield = 12.6/15.336 = %82.16

#### 15 The answer is

Ch4 is the limiting reactant  $8x\ 1\ mol\ Ch4\ /\ 16.04\ g/mol = .499$ 

$$.499 * 153.82 = 76.72g$$

#### 16 The answer is

sodium carbonate + hydrohloric acid = sodium chloride + carbon doxide + water =  $Na_2CO_3^+HCl + NaCl + CO_2 + H_2O = Na_2CO_3^+_2HCl + 2NaCl + 2CO_2 + H_2O$ 

#### 17 The answer is

- 1.  $NaOH + KNO_3 = NaNO_3 + KOH = double replacement$
- 2.  $CH_4^+{}_2O_2 = combustion$
- 3.  $Fe + 3 NaBr = FaBr_2^+{}_3Na = single replacement$
- 4. already balanced, double replacement
- 5. already balanced, double replacement

- 6. already balanced, synthesis
- 7. already balanced, decomposition

### 18 The answers are

- 1.  $Ba(OH)2 \rightarrow BaO + H2O$
- 2.  $Na2CO3 \rightarrow Na2O + CO2$
- 3.  $2\text{LiCLI3} \rightarrow 2\text{LiCL} + 3\text{O}2$
- 4. Al2O3 -> 2AL2 + O3
- 5. H2SO4 -> H2O + SO3

### 19 The answers are

- 1. 2Mg + O2 = 2MgO
- 2. N2 + 3H2 = 2NH3
- 3. S + O2 = SO2
- 4.  $CaO + H2O \rightarrow Ca(OH)2$

#### 20 The answers are

- 1. 2H2O2 -> 2H2O + O2
- 2. Cu2+ + So42- + Ba2+ 20H- -> Cu (OH)2 + BaSO4
- 3. Al + 3Ag + -> Al3 + + 3Ag
- 4.  $Cl2 + 2NaBr \rightarrow Br2 + 2NaCl$
- 5. C2H6 + 3O2 -> CO2 + CO + 3H2O

## 21 The answers are

Part A:
1. Soluble
2. Insoluble
3. Insoluble
4. Insoluble
5. Soluble
6. Insoluble
7. Insoluble
8. Insoluble
9. Soluble
10 Insoluble.
1. Insoluble
2. Soluble
3. Soluble
4. Soluble
5. Insoluble
6. Insoluble
Part B:
$1. \ AgBr(s) \ KNO_3(aq) \ BaBr_2(aq) \ KCl(aq) \ AlBr_3(aq) \ KNO_3(aq) \ K_2SO_4(aq) \ CuBr_2(aq)$
$2. \ \operatorname{Ag_2CO_3(s)} \ \operatorname{KNO_3(aq)} \ \operatorname{NaCl(aq)} \ \operatorname{KCl(aq)} \ \operatorname{Al_2(CO_3)_3(s)} \ \operatorname{KNO_3(aq)} \ \operatorname{CuCO_3(s)} \ \operatorname{CuBr_2(aq)} \ \operatorname{CuCO_3(s)} \ \operatorname{CuDO_3(s)} \ \operatorname{CuCO_3(s)} \ \operatorname{CuDO_3(s)} \ Cu$
$3. \ \operatorname{Ag_2S(s)} \ \operatorname{KNO_3(aq)} \ \operatorname{CaCl(aq)} \ \operatorname{KCl(aq)} \ \operatorname{AlBr_3(aq)} \ \operatorname{KNO_3(aq)} \ \operatorname{K_2SO_4(aq)} \ \operatorname{CuBr_2(aq)}$

 $4. \ \operatorname{AgOH}(s) \ \operatorname{KNO}_3(aq) \ \operatorname{Ba}(\operatorname{OH})_2(aq) \ \operatorname{KCl}(aq) \ \operatorname{Al}(\operatorname{OH})_3(aq) \ \operatorname{KNO}_3(aq) \ \operatorname{NH}_4(\operatorname{SO}_4)_2(aq) \ \operatorname{CuBr}_2(aq)$ 

\*