

**CHEMICAL CALCULATIONS:
mass of reactants / products**

When metallic aluminum reacts with iodine the product that is formed is aluminum triiodide. Calculate the mass of product that appears when 25 g of iodine reacts with aluminum.

Atomic weights: Al=27; I=126.9

A sample of manganese dioxide (MnO_2) is combined with 20 g of hydrogen chloride and yields manganese (II) chloride, chlorine and water.

- write and adjust the chemical equation
- calculate the mass of manganese (II) chloride that is obtained

Atomic weights: Mn=55; Cl=35.5; H=1; O=16

Calculate the mass of lead (II) iodide -PbI_2 - obtained when 15 g of potassium iodide -KI - combine with lead (II) nitrate $\text{-Pb(NO}_3)_2$ -. In this reaction potassium nitrate -KNO_3 - is also obtained.

Atomic weights: K=39.1; I=126.9; Pb=207.2

Calculate the mass of calcium hydroxide -Ca(OH)_2 - that we need in order to be combined with 16.5 g of hydrogen chloride, HCl.

Atomic weights: Ca=40; O=16; H=1; Cl=35.5

When metallic aluminum reacts with iodine the product that is formed is aluminum triiodide. Calculate the mass of product that appears when 25 g of iodine reacts with aluminum.

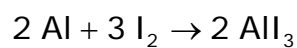
Atomic weights: Al=27; I=126.9

STRATEGY:

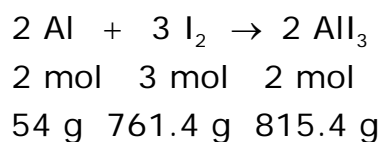
- Write and adjust the chemical equation
- Write the proportions of moles and grams
- Calculate the mass

SOLUTION:

- The chemical equation adjusted is:



- The proportions of moles and grams



- The mass of the product is

$$\left\{ \begin{array}{l} \text{data: } 25 \text{ g I}_2 \\ \text{unknown: } m(\text{AlI}_3) \end{array} \right.$$

$$m(\text{AlI}_3) = 25 \text{ g I}_2 * \frac{815.4 \text{ g AlI}_3}{761.4 \text{ g I}_2} = 26.77 \text{ g AlI}_3$$

A sample of manganese dioxide (MnO_2) is combined with 20 g of hydrogen chloride and yields manganese (II) chloride, chlorine and water.

- write and adjust the chemical equation
- calculate the mass of manganese (II) chloride that is obtained

Atomic weights: Mn=55; Cl=35.5; H=1; O=16

STRATEGY:

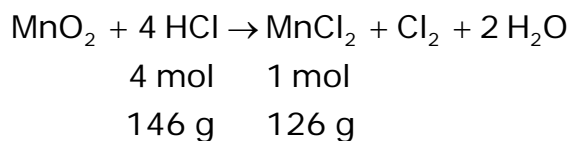
- Write and adjust the chemical equation
- Write the proportions of moles and grams
- Calculate the mass

SOLUTION:

- The adjusted chemical equation is:



- The proportions of moles and masses are:



We don't need to calculate all the proportions; only the proportions that are going to be part of the calculations are written here.

- Calculation of the mass

$$\left. \begin{array}{l} \text{data: } 20 \text{ g HCl} \\ \text{unknown: } m(\text{MnCl}_2) \end{array} \right\} m(\text{MnCl}_2) = 20 \text{ g HCl} * \frac{126 \text{ g MnCl}_2}{146 \text{ g HCl}} = 17.26 \text{ g MnCl}_2$$

Calculate the mass of lead (II) iodide –PbI₂– obtained when 15 g of potassium iodide –KI– combine with lead (II) nitrate - Pb(NO₃)₂-. In this reaction potassium nitrate -KNO₃- is also obtained.

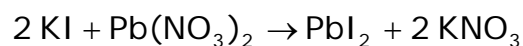
Atomic weights: K=39.1; I =126.9; Pb=207.2

STRATEGY:

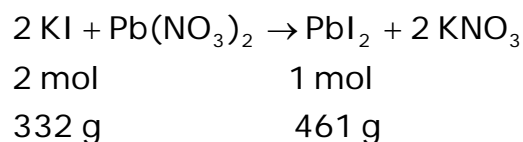
- Write and adjust the chemical equation
- Write the proportions of moles and grams
- Calculate the mass

SOLUTION:

- The adjusted chemical equation is



- The proportions are



- The mass of lead (II) iodine is:

$$\left. \begin{array}{l} \text{data: } 15 \text{ g KI} \\ \text{unknown: } m(\text{PbI}_2) \end{array} \right\} m(\text{PbI}_2) = 15 \text{ g KI} * \frac{461 \text{ g PbI}_2}{332 \text{ g KI}} = 20.83 \text{ g PbI}_2$$

Calculate the mass of calcium hydroxide -Ca(OH)₂- that we need in order to be combined with 16.5 g of hydrogen chloride, HCl.

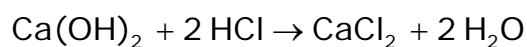
Atomic weights: Ca=40; O=16; H=1; Cl=35.5

STRATEGY:

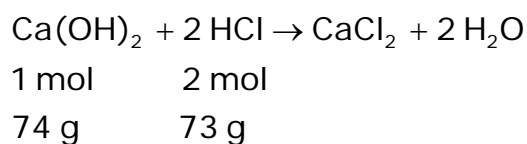
- Write and adjust the chemical equation
- Write the proportions of moles and grams
- Calculate the mass

SOLUTION:

- The adjusted equation



- The proportions of masses and moles are:



- The mass of calcium hydroxide

{ data: 16.5 g HCl
unknown: m(Ca(OH)₂)

$$m(\text{Ca(OH)}_2) = 16.5 \text{ g HCl} * \frac{74 \text{ g Ca(OH)}_2}{73 \text{ g HCl}} = 16.73 \text{ g Ca(OH)}_2$$