6.02×10^{23} particals

atoms

compounds

molecules

molecules are covalently bonded

compounds are covalent and ionic bonds

Ca $40 \times 1 = 40$

Cl $35.5 \times 2 = 71$

$111\ g = 1\ mol$

"84.5g" $\times \frac{1\ mol}{111\ g} = .7612\ mol$

$.761\ mol$

NaCl

Na 23

Cl 35.5

58.5 g = 1 mol

Mg 24 g = 1 mol

Ni 59 g = 1 mol

g/mol g = 1 mol

3.

$$\frac{.0054\text{mol} \times 158\text{ g}}{1\text{ mol}} = .8532\text{g}$$

$8.5 \times 10^{-1}\text{g}$

.85 g

K $39 \times 1 = 39$

Mn $55 \times 1 = 55$

O $16 \times 4 = 64$

158 g = 1mol

6. $Sr_3(PO_4)_2$

strontium phosphate

Sr^{+2} Sr^{+2} Sr^{+2} } $+6$ PO_4^{-3} PO_4^{-3} } -6

Sr $88 \times 3 = 264$

P $31 \times 2 = 62$

O $16 \times 8 = 128$

454g = 1mol

$$\frac{350g \times 1mol}{454g} = .77092mol$$

$.77\,mol$

$7.7 \times 10^{-1}\,mol$

4. Na $23 \times 1 = 23$

O $16 \times 1 = 16$

H $1 \times 1 = 1$

$40\,g = 1\,mol$

$$\frac{7.15 \times 10^{8}\,mol \times 40\,g}{1\,mol} = 2.86 \times 10^{10}\,g$$

Polyatomic ions

8.

coefficient

$Ba(NO_3)_2 + 2NaCl \rightarrow BaCl_2 + 2NaNO_3$

reactants
ingredients

products
make

$Na(NO_3)_2$

Na^{+1} NO_3^{-1}

1) Find polyatomic ion
2) To make sure the polyatomic ion is equal on both sides of the equation
3) The polyatomic ion is attached to another atom make sure they are equal on both side.
4) repeat 3 until done w/ the connected atoms.

11.

$$2\,Al_2(SO_4)_3 + 6\,Ca(OH)_2 \rightleftharpoons 4\,Al(OH)_3 + 6\,CaSO_4$$

$Fe_2O_3 + 3H_2 \rightarrow 2Fe + 3HOH$

$2Sb + 3Cl_2 \rightarrow 2SbCl_3$

$2NI_3 \rightarrow N_2 + 3I_2$

$2Fe + 3H_2SO_4 \rightarrow Fe_2(SO_4)_3 + 3H_2$

$Al_2(SO_4)_3 + 6NaOH \rightarrow 3Na_2SO_4 + 2Al(OH)_3$

$3Mg + N_2 \rightarrow Mg_3N_2$

$3Mg + 2H_3PO_4 \rightarrow Mg_3(PO_4)_2 + 3H_2$

$Cr_2O_3 + 3H_2 \rightarrow 2Cr + 3HOH$

$MgCl_2 + 2AgNO_3 \rightarrow Mg(NO_3)_2 + 2AgCl$

$C_6H_6 + O_2 \rightarrow 6CO_2 + 3HOH$

2

12 + 3 = 15

$2C_6H_6 + 15O_2 \rightarrow 12CO_2 + 6HOH$

2

24 + 6 = 30

Odd-even-

must balance odd even first.

12. $16Fe + 3S_8 \rightarrow 8Fe_2S_3$

13. $2NaN_3 \rightarrow 3N_2 + 2Na$

17. $4Al + 3O_2 \rightarrow 2Al_2O_3$

$4Al + 3O_2 \rightarrow 2Al_2O_3$

Hydrocarbons contain Hs and Cs.

① Balance the Cs

② Balance the Hs

③ Balance the Os.

If the Os do not balance put a 2 in front of the hydrocarbon and start at step ① again.

9.

$C_2H_6 + O_2 \rightarrow 2CO_2 + 3HOH$

2 4 + 3 = 7

$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6HOH$

8 + 6 = 14

10.

$C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2HOH$

$4 + 2 = 6$

14.

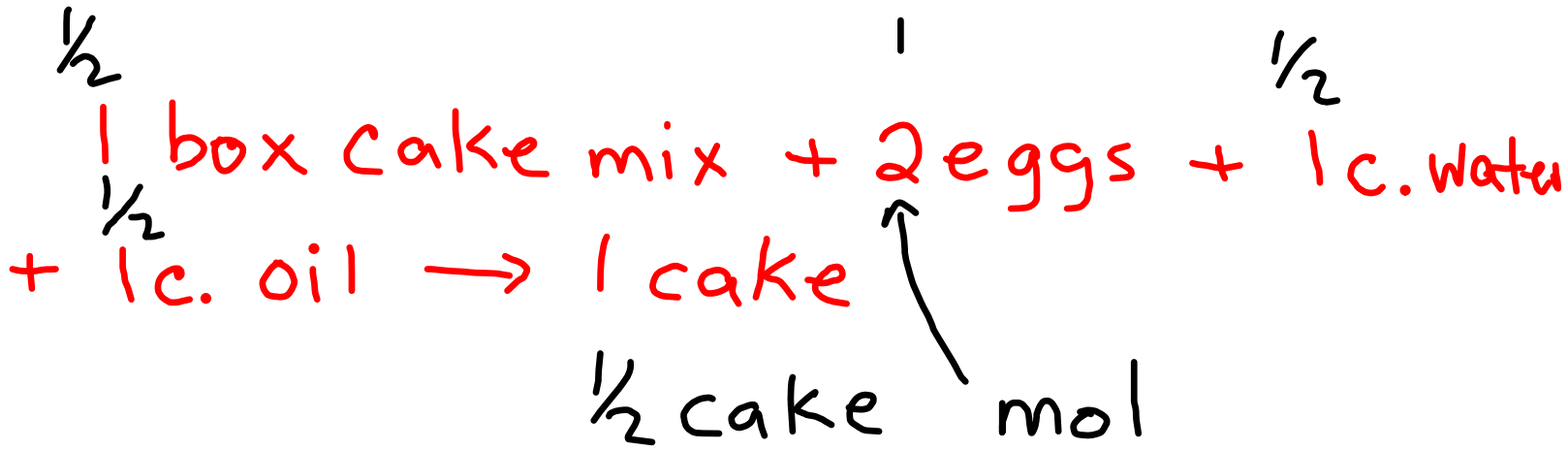
$$NaClO_3 + Fe \rightarrow FeO + NaCl + O_2$$

① start w/ metal

15

$$CaC_2 + HOH \rightarrow CaO + C_2H_2$$

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$


½
1
box cake mix
+
2
eggs
+
½
1 c. water
½
+ 1 c. oil
→
1 cake
½ cake
mol

H_2S

.5 mol

$CH_4 + 2O_2 \longrightarrow CO_2 + 2HOH$

1 mol

methane gases

$$.5 \text{ mol } CH_4 \times \left(\frac{2 \text{ mol } HOH}{1 \text{ mol } CH_4} \right) =$$

$$1 \text{ mol } HOH$$

$7.5\,\text{mol}\,Cr(NO_3)_3 \times \left(\frac{6\,\text{mol}\,NaNO_3}{1\,\text{mol}\,Cr(NO_3)_3}\right) =$

$45\,\text{mol}\,NaNO_3$

$6\,NaNO_3 + CrCl_6 \rightarrow 6NaCl + Cr(NO_3)_6$

$12\,\text{mol}\,NaNO_3 \times \left(\frac{1\,\text{mol}\,Cr(NO_3)_6}{6\,\text{mol}\,NaNO_3}\right) =$

$2\,\text{mol}\,Cr(NO_3)_6$

O $16 \times 2 = 32\ g/mol$

$$4Fe + 3O_2 \rightarrow 2Fe_2O_3$$

$$2.3\ mol\ Fe \times \left(\frac{3\ mol\ O_2}{4\ mol\ Fe}\right) \times \left(\frac{32\ g}{1\ mol\ O_2}\right) = 55\ g$$

23.

Na $23 \times 1 = 23$

Cl $35.5 \times 1 = 35.5$

58.5 g/mol

$$6NaNO_3 + CrCl_6 \rightarrow 6NaCl + Cr(NO_3)_6$$

$$3.48 \text{ mol } CrCl_6 \times \left(\frac{6 \text{ mol NaCl}}{1 \text{ mol } CrCl_6}\right) \times \left(\frac{58.5 \text{ g NaCl}}{1 \text{ mol NaCl}}\right) =$$

1221.48 g NaCl

1.22×10^3 g

21.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

$$850\ mol\ H_2O \times \left(\frac{2\ mol\ HCl}{1\ mol\ H_2O}\right) \times \left(\frac{36.5\ g\ HCl}{1\ mol\ HCl}\right) =$$

RxN

g/mol

H 1x1=1

Cl 35.5x1=35.5

36.5 g = 1 mol

62050 g HCl

6.2×10^4 g HCl

22.

$3CsC_2H_3O_2 + AlPO_4 \rightarrow Al(C_2H_3O_2)_3 + Cs_3PO_4$

$1.25 \times 10^{-6}\ mol\ Al(C_2H_3O_2)_3 \times \left(\frac{3\ mol\ CsC_2H_3O_2}{1\ mol\ Al(C_2H_3O_2)_3}\right) \rightarrow$

RxN

$3.75 \times 10^{-6}\ mol\ CsC_2H_3O_2$

24

C $12 \times 1 = 12$

O $16 \times 2 = 32$

$44\ g/mol$

O $16 \times 2 = 32$

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

$$345\ g\ CO_2 \times \left(\frac{1\ mol\ CO_2}{44\ g\ CO_2}\right) \times \left(\frac{2\ mol\ O_2}{1\ mol\ CO_2}\right) \times \left(\frac{32\ g\ O_2}{1\ mol\ O_2}\right) = 501.818\ g$$

$502\ g$

mol → mol RXN

g → mol MW RXN

mol → g RXN MW

g → g MW RXN MW

19.

Na $23 \times 1 = 23$
N $14 \times 1 = 14$
O $16 \times 3 = 48$
$85\ g/mol$

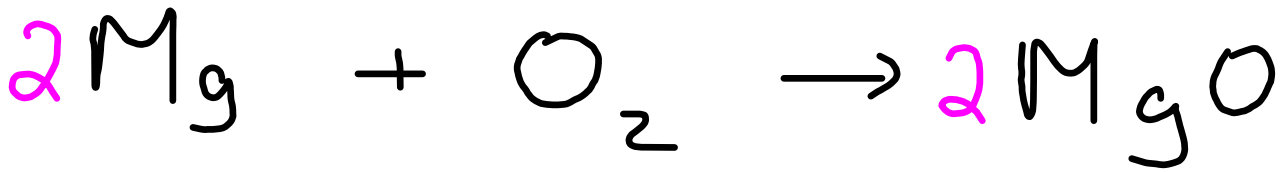
$$6NaNO_3 + CrCl_6 \rightarrow 6NaCl + Cr(NO_3)_6$$

$$2.32 \times 10^4\ g\ NaNO_3 \times \left(\frac{1\ mol\ NaNO_3}{85\ g\ NaNO_3}\right) \times$$

$$\left(\frac{1\ mol\ Cr(NO_3)_6}{6\ mol\ NaNO_3}\right) \times \left(\frac{424\ g\ Cr(NO_3)_6}{1\ mol\ Cr(NO_3)_6}\right)$$

$1.92878 \times 10^4\ g$
$1.93 \times 10^4\ g$

1 Cr $52 \times 1 = 52$
N $14 \times 6 = 84$
O $16 \times 18 = 288$
$424\ g/mol$


2Mg + O2 → 2MgO

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

$$24.5\,g\,CH_4 \times \left(\frac{1\,mol\,CH_4}{16\,g\,CH_4}\right) \times \left(\frac{2\,mol\,O_2}{1\,mol\,CH_4}\right) \times \left(\frac{32\,g\,O_2}{1\,mol\,O_2}\right)$$

MW (for CH_4)

RXN

MW (for O_2)