Stoichiometry Practice

(Old exam questions)

name: SOLUTIONS

1) **A camp opens every year with a simple fireworks demonstration. Black powder is used as the active ingredient.**

The balanced chemical equation for the reaction is:

$$2\,KNO_3 + S + 3\,C \rightarrow K_2S + N_2 + 3\,CO_2$$

If 20.0 g of carbon are used, what mass of K_2S will be produced in the reaction?

3 mole | 1 mole

$m = n \cdot M$ | $m = n \cdot M$

$m = 3(12)$ | $m = 1(110)$

$m = 36\,g$ | $m = 110\,g$

$20\,g$ | x

$x = 61.4\,g$

2) The following equation shows the reaction between aluminum sulfate and calcium hydroxide. How many moles of aluminum hydroxide are produced if 15.4moles of Calcium hydroxide react with aluminum sulfate?

$$Al_2(SO_4)_3 + 3\,Ca(OH)_2 \rightarrow 2\,Al(OH)_3 + 3\,CaSO_4$$

3 moles | 2 moles

15.4 moles | x

$x = 10.27$ moles

3) A welder has to cut a metal door with her acetylene (C_2H_2) torch.

The following chemical equation represents the combustion of acetylene:

$$2\,C_2H_2 + 5\,O_2 \rightarrow 4\,CO_2 + 2\,H_2O$$

How many moles of CO_2 will be released into the atmosphere if the welder uses 12 kg of acetylene to cut the metal door?

2 moles
$m = n \cdot M$
$m = 2(26)$
$m = 52\,g$

4 moles
$m = n \cdot M$
$m = 4(44)$
$m = 176\,g$

$12000\,g$ — x

$x = 40\,615.4\,g$

$n = \frac{m}{M}$

$n = \frac{40615.4}{44} = 923$ moles

4) Barium chloride, $BaCl_2$, is used in fireworks to produce a bright green color. Gary tried to produce $BaCl_2$ by reacting hydrochloric acid, HCl, with barium hydroxide, $Ba(OH)_2$, according to the chemical reaction below.

$$2\,HCl_{(aq)} + Ba(OH)_{2\,(aq)} \rightarrow BaCl_{2\,(s)} + 2\,H_2O_{(l)}$$

Gary used 100.0 mL of a HCl solution and obtained 7.8 g of $BaCl_2$.

What was the molar concentration of the HCl solution used in this reaction?

① 2 moles
$m = n \cdot M$
$m = 2(36.5)$
$m = 73\,g$

1 mole
$m = n \cdot M$
$m = 1(208.3)$
$m = 208.3\,g$

x — $7.8\,g$

$x = 2.73\,g$ HCl

② $n = \frac{m}{M}$

$n = \frac{2.73}{36.5}$

$n = 0.075$ moles

③ $C = \frac{n}{V}$

$C = \frac{0.075\ \text{moles}}{0.1\ L}$

$C = 0.75\ mol/L$