Warm Up

How much water would need to be added to a 0.900M solution to create 190. mL of a 0.724M solution?

V_i = ?

C_i = 0.900M

V_F = 190. mL

C_F = 0.724M

$V_i C_i = V_F C_F$

$\frac{V_i(0.900M)}{(0.900M)} = \frac{(190.mL)(0.724M)}{(0.900M)}$

$V_i = 153 mL$

153mL
0.900M

37mL + H_2O

190.mL
0.724M

Homework - Worksheet

No! $C_F \downarrow$

(11) 3.00 M NaI ⟶ 6.00 M NaI

(12) 9.00 M ⟶ 6.00 M Yes!

$C_F < C_i$

Gravimetric Stoichiometry

Gravimetric - refers to mass measurement
Stoichiometric - refers to the procedure used to calculate quantities of chemicals.
GRAVIMETRIC STOICHIOMETRY - the procedure for calculating the masses of reactants and products in a chemical reaction.

ASSUMPTIONS IN STOICHIOMETRY
- the reaction is spontaneous.
- the reaction is fast
- the reaction is quantitative.
- the reaction is stoichiometric.
(there is a whole number ratio between MOLES of reactant and MOLES of product.)

What mass of iron (III) oxide is required to produce 1000. g of iron according to the following reaction?

UNKNOWN KNOWN

$Fe_2O_{3(s)} + 3\,CO_{(g)} \longrightarrow 2Fe_{(s)} + 3CO_{2(g)}$

m = ? m = 1000.g

Step 1: # moles known

$1000.\text{g Fe} \times \frac{1\text{ mol Fe}}{55.85\text{ g Fe}} = 17.905\text{ mol Fe}$

Step 2: moles unknown

$17.905\text{mol Fe} \times \frac{1\text{ mol } Fe_2O_3}{2\text{ mol Fe}} = 8.953\text{ mol } Fe_2O_3$

Step 3: mass unknown

$8.953\text{ mol } Fe_2O_3 \times \frac{159.70\text{g } Fe_2O_3}{1\text{ mol } Fe_2O_3} = 1430.\text{g } Fe_2O_3$

Try This

Al^{3+} O^{2-}

What mass of aluminum oxide will be produced if 17.0 g of oxygen reacts with excess aluminum?

KNOWN UNKNOWN

$$Al_{(s)} + O_{2(g)} \longrightarrow Al_2O_{3(s)}$$

$m = 17.0\,g$ $m = ?$