**Stoichiometry Part 2**

**Consider the following chemical equation to answer the questions.**

$Fe_2O_3$ (s) + CO (g) → Fe (s) + $CO_2$ (g)

a) Balance the equation

$Fe_2O_3$ (s) + 3 CO (g) → 2 Fe (s) + 3 $CO_2$ (g)

b) How many grams of $Fe_2O_3$ are required to react with 8.75 g of CO? (Don't forget to write a roadmap, write equivalences, and write the mole ratios)

Mole ratios: $\frac{1\ mol\ Fe_2O_3}{3\ mol\ CO}$ or $\frac{3\ mol\ CO}{1\ mol\ Fe_2O_3}$

Roadmap: g CO → mol CO → mol $Fe_2O_3$ → g $Fe_2O_3$

Equivalences: 1 mol CO = 28.01 g, 3 mol CO = 1 mol $Fe_2O_3$

1 mol $Fe_2O_3$ = 159.69 g

$$8.75\ g\ CO \times \frac{1\ mol\ CO}{28.01\ g} \times \frac{1\ mol\ Fe_2O_3}{3\ mol\ CO} \times \frac{159.69\ g}{1\ mol\ Fe_2O_3} = \mathbf{16.6\ g\ Fe_2O_3}$$

c) How many grams of solid iron are produced if 8.75 g of CO is reacted?

Mole ratios: $\frac{2\ mol\ Fe}{3\ mol\ CO}$ or $\frac{3\ mol\ CO}{2\ mol\ Fe}$

Roadmap: g CO → mol CO → mol Fe → g Fe

Equivalences: 1 mol CO = 28.01 g, 3 mol CO = 2 mol Fe,

1 mole Fe = 55.845 g

$$8.75\ g\ CO \times \frac{1\ mol\ CO}{28.01\ g} \times \frac{2\ mol\ Fe}{3\ mol\ CO} \times \frac{55.845\ g}{1\ mol\ Fe} = \mathbf{11.6\ g\ Fe}$$

d) How many grams of solid iron are produced if 10.65 g of $Fe_2O_3$ reacts with excess CO?

Mole ratios: $\frac{1\ mol\ Fe_2O_3}{2\ mol\ Fe}$ or $\frac{2\ mol\ Fe}{1\ mol\ Fe_2O_3}$

Roadmap: g $Fe_2O_3$ → mol $Fe_2O_3$ → mol Fe → g Fe

Equivalences: 1 mol $Fe_2O_3$ = 159.69 g, 1 mol $Fe_2O_3$ = 2 mol Fe,

1 mol Fe = 55.845 g

$$10.65\ Fe_2O_3 \times \frac{1\ mol\ Fe_2O_3}{159.69\ g} \times \frac{2\ mol\ Fe}{1\ mol\ Fe_2O_3} \times \frac{55.845\ g\ Fe}{1\ mol\ Fe} = \mathbf{7.45\ g\ Fe}$$