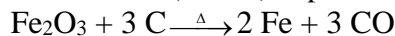


# Stoichiometry 2

## Chemistry

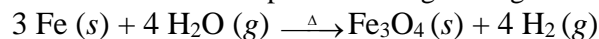
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- 1 In a blast furnace, iron(III) oxide reacts with coke (carbon) to produce molten iron and carbon monoxide:



How many kilograms of iron would be formed from 125 kg of  $\text{Fe}_2\text{O}_3$ ? *Convert the kilograms to gram first.*

- 2 How many grams of steam and iron must react to produce 375 g of magnetic iron oxide,  $\text{Fe}_3\text{O}_4$ ?



- 3 Polychlorinated biphenyls (PCBs), which were formerly used in the manufacture of electrical transformers, are environmental and health hazards. They break down very slowly in the environment. The decomposition of PCBs can be represented by the equation



(a) How many moles of water are needed to react 10.0 mol  $\text{O}_2$ ?

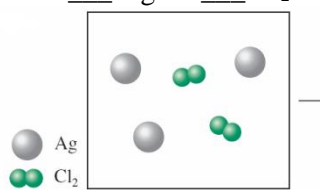
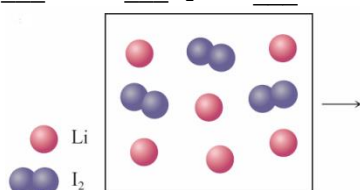
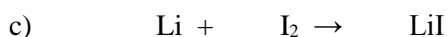
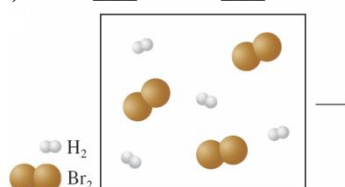
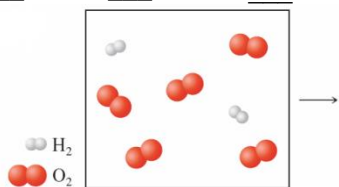
(b) How many grams of HCl are produced when 5.00 mol  $\text{H}_2\text{O}$  react?

(c) How many moles of  $\text{CO}_2$  are produced when 76.5g HCl are produced?

(d) How many grams of  $\text{C}_{12}\text{H}_4\text{Cl}_6$  are reacted when 100.g  $\text{CO}_2$  are produced?

(e) How many grams of HCl are produced when 2.5 kg  $\text{C}_{12}\text{H}_4\text{Cl}_6$  react?

4 Balance each reaction. Then draw the molecules of product(s) formed for each of the following reactions with the reactants given. Then determine which substance is the limiting reactant:



5 Draw pictures similar to those in the previous question, and determine which is the limiting reactant in the following reactions:

(a) Eight atoms of phosphorus react with five **molecules** of chlorine to produce phosphorus trichloride.

(b) Ten atoms of aluminum react with three **molecules** of oxygen to produce aluminum oxide.

6 Oxygen masks for producing  $\text{O}_2$  in emergency situations contain potassium superoxide ( $\text{KO}_2$ ). It reacts according to this equation:



(a) If a person wearing such a mask exhales 0.85 g of  $\text{CO}_2$  *every minute*, how many moles of  $\text{KO}_2$  are consumed in 1.0 hour?

(b) How many grams of oxygen are produced in 1.0 hour?