

### CH1020 Exercises (Worksheet 4)

- 1) In the reaction  $A + B \rightarrow C + D$ , 3.00 grams of substance C and 3.00 grams of substance D are produced as 2.00 grams of substance A are consumed. How many grams of substance B are also consumed?
- 2) Combustion of sulfur may, depending on reaction conditions, produce  $\text{SO}_2$  or  $\text{SO}_3$ . If  $x$  grams of  $\text{O}_2$  combine with  $y$  grams of sulfur to form  $\text{SO}_2$ , how many grams of  $\text{O}_2$  combine with  $y$  grams of sulfur to form  $\text{SO}_3$ ?
- 3) Write a balanced chemical equation for each of the following reactions:
  - a) Carbon dioxide reacts with carbon to form carbon monoxide.
  - b) Potassium reacts with water to give potassium hydroxide and the element hydrogen
  - c) Phosphorus ( $\text{P}_4$ ) burns in air to give diphosphorus pentoxide.
- 4) Some scientists believe that life on Earth originated near geothermal vents. Balance the following reactions, which are among those taking place near such vents:
  - a)  $\text{CH}_3\text{SH}(aq) + \text{CO}(aq) \rightarrow \text{CH}_3\text{COSCH}_3(aq) + \text{H}_2\text{S}(aq)$
  - b)  $\text{H}_2\text{S}(aq) + \text{CO}(aq) \rightarrow \text{CH}_3\text{CO}_2\text{H}(aq) + \text{S}_8(s)$
- 5) Balance the following reactions that occur during volcanic eruptions:
  - a)  $\text{SO}_2(g) + \text{O}_2(g) \rightarrow \text{SO}_3(g)$
  - b)  $\text{H}_2\text{S}(g) + \text{O}_2(g) \rightarrow \text{SO}_2(g) + \text{H}_2\text{O}(g)$
  - c)  $\text{H}_2\text{S}(g) + \text{SO}_2(g) \rightarrow \text{S}_8(s) + \text{H}_2\text{O}(g)$
- 6) Copper was one of the first metals used by humans because it can be recovered from several copper minerals including cuprite ( $\text{Cu}_2\text{O}$ ), chalcocite ( $\text{Cu}_2\text{S}$ ), and malachite [ $\text{Cu}_2\text{CO}_3(\text{OH})_2$ ]. Balance the following reactions for converting these minerals into copper metal:
  - a)  $\text{Cu}_2\text{O}(s) + \text{C}(s) \rightarrow \text{Cu}(s) + \text{CO}_2(g)$
  - b)  $\text{Cu}_2\text{O}(s) + \text{Cu}_2\text{S}(s) \rightarrow \text{Cu}(s) + \text{SO}_2(g)$
  - c)  $\text{Cu}_2\text{CO}_3(\text{OH})_2(s) + \text{C}(s) \rightarrow \text{Cu}(s) + \text{CO}_2(g) + \text{H}_2\text{O}(g)$