Chemical Reactions

Set 12

1. a) %Na: $\dfrac{22.99}{39.998}$ x 100 = 57.5%

   %O: $\dfrac{16.00}{39.998}$ x 100 = 40.0%

   %H: $\dfrac{1.008}{39.998}$ x 100 = 2.50%

   b) %C: $\dfrac{2x12.01}{60.052}$ x 100 = 40.0%

   %O: $\dfrac{2x16.00}{60.052}$ x 100 = 53.3%

   %H: $\dfrac{4x1.008}{60.052}$ x 100 = 6.70%

   c) %Cu: $\dfrac{63.55}{249.69}$ x 100 = 25.4%

   %S: $\dfrac{32.06}{249.69}$ x 100 = 12.9%

   %O: $\dfrac{9x16.00}{249.69}$ x 100 = 57.7%

   %H: $\dfrac{10x1.008}{249.69}$ x 100 = 4.00%

   d) %K: $\dfrac{117.3}{212.27}$ x 100 = 55.3%

   %P: $\dfrac{30.97}{212.27}$ x 100 = 14.6%

   %O: $\dfrac{4x16.00}{212.27}$ x 100 = 30.1%

2. a) %Cl: $\dfrac{2x35.45}{110.98}$ x 100 = 63.9%

   b) %S: $\dfrac{3x32.06}{200.18}$ x 100 = 48.0%

   c) %O: $\dfrac{4x16.00}{158.04}$ x 100 = 40.5%

   d) %N: $\dfrac{2x12.01}{80.052}$ x 100 = 35.0%

3. a) %H₂O: $\dfrac{10 \times ((2 \times 1.008) + 16.00)}{286.15}$ x 100 = 62.9%

b) %H₂O: $\dfrac{6 \times 18.016}{262.846}$ x 100 = 41.1%

c) %H₂O: $\dfrac{2 \times 18.016}{244.232}$ x 100 = 14.7%

4. a) total mass = 25.44 + 1.36 + 7.20
   = 48.0 g

   %Bi: $\dfrac{25.44}{48.0}$ x 100 = 53.0%

   %Pb: $\dfrac{15.36}{48.0}$ x 100 = 32.0%

   %Sn: $\dfrac{7.20}{48.0}$ x 100 = 15.0%

b) m(Bi) = 0.530 x 150.0
   = 79.5 g
   m(Pb)   = 0.320 x 150.0
   = 48.0 g
   m(Sn) = 0.150 x 150.0
   = 22.5 g

5. m(Al) = 11.34 – 2.73 g
   = 8.61 g
   m(Mg) = 2.73 – 0.90
   = 1.83 g
   %Al: $\dfrac{8.61}{11.34}$ x 100 = 75.9%

   %Mg: $\dfrac{1.83}{11.34}$ x 100 = 16.14%

   %Cu: $\dfrac{0.90}{11.34}$ x 100 = 7.94%

6. %Zn: $\dfrac{3.030}{3.771}$ x 100 = 80.4%

   %O: $\dfrac{3.771 - 3.030}{3.771}$ x 100 = 19.6%

7.   %Cu: $\dfrac{12.77}{15.98}$ x 100 = 79.9%

         %O: $\dfrac{15.98 - 12.77}{15.98}$ x 100 = 20.1%

8.   a)   %Cu(chalcopyrites): $\dfrac{63.55}{183.52}$ x 100 = 34.6%

               %Cu(malachite): $\dfrac{2x63.55}{221.126}$ x 100 = 57.5%

    b)   m(chalcopyrites) = $\dfrac{100}{34.6}$ x 100 000

                          = 2.89 x 10^5 g

9.   Gibbsite   %Al: $\dfrac{2x26.98}{156.008}$ x 100 = 34.6%

                    %H$_2$O: $\dfrac{3x18.016}{156.008}$ x 100 = 34.6%

         Kaolinite   %Al: $\dfrac{2x26.98}{258.172}$ x 100 = 20.9%

                    %H$_2$O: $\dfrac{2x18.016}{258.172}$ x 100 = 14.0%

10.   a)   %Ti: $\dfrac{47.88}{79.88}$ x 100 = 59.9%

        b)   m(TiO$_2$ required) = $\dfrac{100}{59.95}$ x (1.00 x 10^6)

                             = 1.668 x 10^6 g

              m(ilmenite) = $\dfrac{100}{53.5}$ x (1.668 x 10^6)

                          = 3.10 x 10^6 g (3.10 tonne)