Chemical Equations

1. Write and balance the chemical equations…
    a) Aluminum metal reacts with iron (II) oxide powder to produce aluminum oxide solid and iron metal.

    b) Aluminum sulphate solution and calcium hydroxide solution produce a precipitate of aluminum hydroxide and solid calcium sulphate.

    c) Ammonia gas (NH_3) plus oxygen gas yields nitrogen monoxide gas plus water vapour.

    d) Calcium hydroxide solution and carbon dioxide gas yields solid calcium carbonate and liquid water.

    e) Aqueous iron (III) chloride and sodium carbonate solution yields aqueous sodium chloride and a precipitate of iron (III) carbonate.

    f) Solid iron (III) oxide and carbon monoxide gas yields iron metal and carbon dioxide gas.

    g) Magnesium carbonate solution plus aqueous hydrochloric acid (HCl) yields ???.

    h) Silicon dioxide solid plus aqueous hydrofluoric acid (HF) yields solid silicon tetrafluoride plus liquid water.

    i) Aqueous sodium hydroxide and carbon dioxide gas yields sodium carbonate solution and liquid water.

2. Balance the following chemical equations.
   a) ___ Al + ___ NaOH → ___ Na_3AlO_3 + ___ H_2

   b) ___ $C_{12}H_{22}O11$ + ___ O_2 → ___ CO_2 + ___ H_2O

   c) ___ $Ca_3(PO_4)_2$ + ___ H_2SO_4 → ___ $CaSO_4$ + ___ H_3PO_4

   d) ___ $FeOCr_2O_3$ + ___ K_2CO_3 + ___ O_2 → ___ K_2CrO_4 + ___ CO_2 + ___ Fe_2O_3

   e) ___ Cu + ___ HNO_3 ___ →$Cu(NO_3)_2$ + ___ NO + ___ H_2O

   f) ___ $SiF_4(s)$ + ___ NaOH(aq) →___ $Na_4SiO_4(s)$ + ___ NaF(aq) + ___ $H_2O(l)$

   g) ___ $Na_2B_4\ O_7$ + ___ HCl + ___ H_2O → ___ NaCl + ___ H_3BO_3

   h) ___ MnO_2 + ___ K_2CO_3 + ___ O_2 ___ → $KMnO_4$ + ___ CO_2

   i) ___ $KMnO_4$ + ___ HCl → ___ KCl + ___ $MnCl_2$ + ___ H_2O + ___ Cl_2

   j) ___ Ni_2O_3 + ___ Fe + ___ H_2O → ___ $Ni(OH)_2$ + ___ $Fe(OH)_2$

   k) ___ Si + ___ NaOH → ___ Na_4SiO_4 + ___ H_2

   l) ___ Cu + ___ HNO_3 → ___ $Cu(NO_3)_2$ + ___ NO + ___ H_2O

   m) ___ $FeCl_2$ + ___ KNO_3 + ___ HCl → ___ $FeCl_3$ + ___ NO + ___ H_2O + ___ KCl

   n) ___ $KMnO_4$ + ___ HBr ___ → $MnBr_2$ + ___ Br_2 + ___ KBr + ___ H_2O

   o) ___ $K_2Cr_2O_7$ + ___ HCl ___ → KCl + ___ $CrCl_3$ + ___ H_2O + ___ Cl2