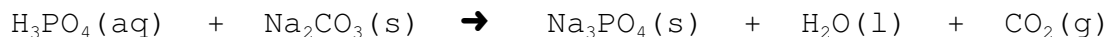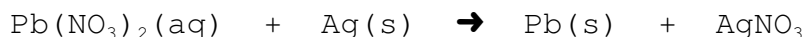# Stoichiometry With Solutions

1. What volume of 0.5 M H_3PO_4 is required to fully react with 250 g of Na_2CO_3? What amount of water is produced by this reaction?

    $H_3PO_4(aq) + Na_2CO_3(s) \rightarrow Na_3PO_4(s) + H_2O(l) + CO_2(g)$

2. What volume of 0.25 M lead(II) nitrate is required to consume 500 g of pure silver? What mass of lead metal will form?

    $Pb(NO_3)_2(aq) + Ag(s) \rightarrow Pb(s) + AgNO_3$

3. 115 g of aluminum sulphate is formed through a reaction between 2250 ml of aluminum nitrate solution and sufficient ammonium sulphate solution. What is the concentration of the aluminum nitrate solution?

    $(NH_4)_2SO_4(aq) + Al(NO_3)_3(aq) \rightarrow Al_2(SO_4)_3(s) + NH_4NO_3(aq)$

4. If 5.00 g of $KHSO_3$ is fully reacted by 208 ml of calcium hydroxide solution, what is the concentration of the calcium hydroxide solution?

    $Ca(OH)_2(aq) + KHSO_3(s) \rightarrow Ca(HSO_3)_2(aq) + KOH(aq)$

    If only 100 mL of the calcium hydroxide solution was used, what mass of $KHSO_3$ would be consummed?

5. In one method of gold purification, potassium gold(III) cyanide is reacted with pure magnesium metal. If 56 000 L of $K_3Au(CN)_6$ solution (yes that is a very large volume) can be fully extracted by 25.2 g of magnesium, what is the concentration of the solution? What mass of pure gold would form?

    $K_3Au(CN)_6(aq) + Mg(s) \rightarrow Au(s) + Mg(CN)_2(aq) + KCN(aq)$
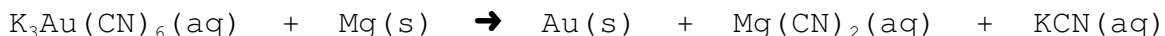
Answers: 1. 3.14 L H_3PO_4 2.36 mol H_2O
          2. 9.27 L $Pb(NO_3)_2$ 480 g Pb
          3. 0.302 M
          4. 0.100 M   2.40 g $KHSO_3$
          5. 1.23 x 10^{-5} M   306 g Au