## Friday Worksheet Volumetric analysis worksheet 6

Name: .....

1. **Volumetric Analysis** is an analytical technique that can be used for many different types of aqueous reactions other than acid/base reactions. Consider the following procedure.

To analyse the concentration of hydrogen peroxide in a sample of hair bleach a student placed 20.00 mL of the bleach in a 250.0 mL volumetric flask and made it up to the mark with distilled water. A 25.00 mL aliquot of the diluted bleach was then taken and titrated against 0.150 M acidified potassium permanganate solution (KMnO<sub>4 (aq)</sub>). The relevant equation for this reaction is given by:

 $2MnO_{4}^{-}{}_{(aq)} + 5H_2O_{2(aq)} + 16H^{+}{}_{(aq)} \rightarrow 2Mn^{2+}{}_{(aq)} + 8H_2O_{(I)} + 5O_{2(g)} + 10H^{+}(aq)$ 

a. Give a balanced half equation for the oxidation reaction  $H_2O_{2(aq)} + => O_{2(g)} + 2H^{+}_{(aq)} + 2e$ b. Give a balanced half equation for the reduction reaction  $MnO_{4^{-}(aq)} + 8H^{+}_{(aq)} + 5e => Mn^{2+}_{(aq)} + 4H_2O_{(I)}$ 

c. If the average titre for the 25.00 mL aliquots was 28.35 mL. Calculate the molarity of the hydrogen peroxide in the *original sample* of hair bleach. Clearly show your workings out.

## Step 1 Draw a flow chart of the procedure

Step 2 Calculate the mol of MnO<sub>4</sub><sup>-</sup> needed to react with the hydrogen peroxide in the 25.00 mL aliquot of diluted hair bleach.

=> n = C X V = 0.150 X 0.02835 = 0.0042525 mol

Step 3 Calculate the mol of hydrogen peroxide in the 25.00 mL aliquot.

=> n = (5/2) X 0.0042525 = 0.01063125 mol

Step 4 Calculate the mol of hydrogen peroxide in the volumetric flask

=> n = (250/25) X 0.01063125 = 0.1063125 mol

Step 4 Calculate the concentration of hydrogen peroxide in the hair bleach.

=> C = n/V = 0.1063125 / 0.0200 = 5.31 M

