Exercises for Volumetric Analysis

1. What is the difference between an end point and the equivalence point in a titration?

2. What is a primary standard?

3. What is the difference between a direct titration and a back titration?

4. What effect will the deionized water used to deliver a partial drop from a buret tip have on the end point volume of a titration?

5. A 0.3147-g sample of primary standard grade $Na_2C_2O_4$ was dissolved in dilute H_2SO_4 and titrated with a solution of $KMnO_4$. The end point was observed after addition of of 31.67 mL of the titrant.

$$5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

a) Calculate the molarity of the $KMnO_4$ solution.

The iron in a 0.6656-g ore sample in acidic solution was then reduced quantitatively to Fe^{2+} and titrated with 26.75 mL of the standard $KMnO_4$ titrant solution.

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$$

b) Calculate the mass percent Fe_2O_3 in the sample.

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6. A cyanide solution with a volume of 12.73 mL was treated with 25.00 mL of Ni^{2+} solution (containing excess Ni^{2+}) to convert the cyanide into tetracyanonickelate(II).

$$4CN^- + Ni^{2+} \rightarrow Ni(CN)_4^{2-}$$

The excess Ni^{2+} was then titrated with 10.15 mL of 0.01307 M ethylenediaminetetraacetic acid (EDTA).

$$Ni^{2+} + EDTA^{4-} \rightarrow Ni(EDTA)^{2-}$$

The $Ni(CN)_4^{2-}$ does not react with the EDTA. If 39.35 mL of the EDTA solution were required to react with 30.10 mL of the original Ni^{2+} solution, what is the molarity of CN^- in the 12.73-mL cyanide solution?

Solutions for Volumetric Analysis Exercises