Year 12 Chemistry

Quick Quiz: Analytical Techniques

(and some stuff from before)

1. The conical flask needs to have the correct number of moles (the water gets rid of any contaminating moles and doesn't contribute itself) whereas the volumetric pipette needs to have the correct concentration (any extra water would dilute it).

2. Half equations (spectator ions ignored):

   $Fe^{2+} \rightarrow Fe^{3+} + e^-$

   $6e^- + 14H^+ + Cr_2O_7^{2-} \rightarrow 2Cr^{3+} + 7H_2O$

   $\therefore$ Full equation:

   $6Fe^{2+} + 14H^+ + Cr_2O_7^{2-} \rightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$

   $\therefore$ Mole ratio $Fe^{2+} : Cr_2O_7^{2-}$ is 6:1

   $C_{Cr_2O_7^{2-}} = 1.00 \text{ mol L}^{-1} \quad V_{Cr_2O_7^{2-}} = 0.01224 \text{ L}$

   $\therefore n_{Cr_2O_7^{2-}} = C_{Cr_2O_7^{2-}} \times V_{Cr_2O_7^{2-}} = 0.01224 \text{ mol}$

   $\therefore n_{Fe^{2+}} = 6 \times n_{Cr_2O_7^{2-}} = 0.07344 \text{ mol}$

   $V_{Fe^{2+}} = 0.0200 \text{ L} \quad \therefore C_{Fe^{2+}} = \frac{n_{Fe^{2+}}}{V_{Fe^{2+}}} = \frac{0.07344}{0.0200} = 3.67 \text{ mol L}^{-1}$

3. 10 ppm is 10 mg L^{-1}
   which is 100 mg per ten L

4.
   (a) -1 and -2

   (b) Removal of solids by dissolving away. In the Elemental Chemistry topic this specific applies to ions in the soil being dissolved and washed out of the soil.

   (c) $pH = -\log_{10}\left[H^+\right] = -\log_{10}\left[1.4 \times 10^{-3}\right] = 2.9$

   (d) The concentration of hypochlorite increases.
   (Reason: adding base increases OH^-, upsetting the equilibrium. To oppose this change, the reaction moves to the left, increasing hypochlorite and H_2O)