CONCEPT: GRAVIMETRIC ANALYSIS

In *gravimetric analysis* the mass of a product in a chemical reaction is used to calculate the amount of the original analyte.

EXAMPLE: A 25.00 mL solution containing Br^- was treated with excess $PbSO_4$ to precipitate 0.7550 g of $PbBr_2$. What was the molarity of the Br^- in the unknown?

$$PbSO_4\,(s) + 2\,Br^-\,(aq) \longrightarrow PbBr_2\,(s) + SO_4^{2-}\,(aq)$$

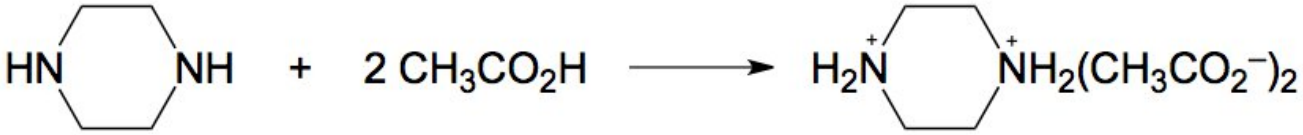
PRACTICE: The Fe in a 1.1530 g sample of iron ore is precipitated as $Fe_2O_3 \bullet x\,H_2O$ by the addition of NH_3. The residue is ignited at high temperatures to give 0.6310 g of pure Fe_2O_3. Calculate the weight percent of Fe in the ore.

$$2\,Fe^{3+}\,(aq) + 6\,OH^-\,(aq) \longrightarrow Fe_2O_3 \bullet x\,H_2O$$

$$Fe_2O_3 \bullet x\,H_2O + \text{heat} \longrightarrow Fe_2O_3 + 6\,x\,H_2O$$

CONCEPT: TITRATION CALCULATIONS 1

EXAMPLE 1: The reaction between piperazine and acetic acid creates an adduct product known as piperazine diacetate.



A 7.50 g sample of impure piperazine contained 83.01% piperazine. How many grams of piperazine diacetate would be formed in the process?

EXAMPLE 2: The amount of iron within an ore sample was determined by an oxidation-reduction titration using potassium permanganate, $KMnO_4$, as the titrant. A 0.5600 g sample of the ore was placed into acid and the newly freed Fe^{3+} was then reduced to Fe^{2+}. The titration of this solution required 39.82 mL of 0.0315 M $KMnO_4$ to reach the end-point. Determine the mass percent of Fe_2O_3 in the sample.

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