Back Titrations Practice

1. 3.55g of impure magnesium oxide (MgO, molar mass = 40.30) was completely dissolved in 80ml of 1.6M HCl (in excess). The excess acid required 15.8ml of 0.20M NaOH for neutralisation. Calculate the % purity of the magnesium oxide.

   $HCl + NaOH \rightarrow NaCl + H_2O$

   $MgO + 2HCl \rightarrow MgCl_2 + H_2O$

2. 195ml of 0.30M nitric acid (HNO_3) was added to 3.142g of impure $CaCO_3$ (100.09g/mol). The excess acid was back titrated with 0.15M NaOH, it required 98.2ml to reach the end point. Calculate the percentage mass of $CaCO_3$ in the sample.

   $HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$

   $CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + CO_2 + H_2O$

3. A 6.64g sample of dolomite, containing $CaCO_3$ and $MgCO_3$, is dissolved in 100ml of 3M HCl solution. 20ml of this solution requires 24ml of 1.3M NaOH solution for complete neutralisation. Calculate the % composition of the sample.
(molar mass of $CaCO_3$ = 100.09, molar mass of $MgCO_3$ = 84.31)

$HCl + NaOH \rightarrow NaCl + H_2O$

$MgCO_3 + CaCO_3 + \_\_\_\_HCl \rightarrow CaCl_2 + MgCl_2 + 2CO_2 + 2H_2O$

4. An impure sample of 4.00g $CaCO_3$ was dissolved in 80ml of 3M HCl solution. What was the $CaCO_3$ percentage in the original sample, if 80.3ml of 0.7M $Al(OH)_3$ was used to titrate excess HCl? (molar mass of $CaCO_3$ = 100.09)