8.136 (a) Molecular: \[ 2 \text{HCl}(aq) + \text{Mg(OH)_2}(s) \rightarrow \text{MgCl}_2(aq) + 2\text{H}_2\text{O}(l) \]

Complete Ionic: \[ 2\text{H}^+ + 2\text{Cl}^- + \text{Mg}^{2+} + 2\text{OH}^- \rightarrow \text{Mg}^{2+} + 2\text{Cl}^- + 2\text{H}_2\text{O}(l) \]

Net Ionic: \[ 2\text{H}^+ + 2\text{OH}^- \rightarrow 2\text{H}_2\text{O}(l) \]

(b) One mole of \text{Mg(OH)_2} can neutralize two moles of \text{HCl}, while one mole of \text{NaOH can neutralize only one mole of HCl}.

(c) Follow the hint. First, write down the balanced equation:

\[ \text{Mg(OH)}_2(s) \rightarrow \text{MgO(s)} + \text{H}_2\text{O}(g) \]

because its added to the plastic, it’s not in aqueous solution \( \text{H}_2\text{O(g)} \) is ok as well

\[ \Delta H_{rxn} = \Delta H_f^\circ(\text{MgO(s)}) + \Delta H_f^\circ(\text{H}_2\text{O(l)}) - \Delta H_f^\circ(\text{Mg(OH)}_2(s)) \]

\[ = -601.5 \text{ KJ/mol} - 238.92 \text{ KJ/mol} + 924 \text{ KJ/mol} \quad \text{(data fr. Appendix D)} \]

\[ \Delta H_{rxn} = +84 \text{ KJ/mol} \] [ +37 KJ/mol if \( \text{H}_2\text{O(g)} \) is a product]

This rxn slows the burning of plastics by being endo thermic, i.e., absorbing thermal energy that would otherwise be used to burn more plastic.

[Part (d) not assigned]