

Table 2: Environmental Lime Reactions		
Reaction Name	Equation	Consequences
Hydration	$\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{Heat}$	Converts quicklime, CaO, to calcium hydroxide with release of heat.
Recarbonation	$\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$	Carbon dioxide from the air converts lime to calcium carbonate (limestone) and lowers the pH
Water Softening – calcium removal	$\text{Ca(HCO}_3)_2 + \text{Ca(OH)}_2 \rightarrow 2 \text{CaCO}_3 + 2 \text{H}_2\text{O}$	Removes calcium from hard water. Neutralizes bicarbonate ion and consumes hydroxide. (pH \geq ~8-9)
Water Softening – magnesium removal	$\text{Mg(HCO}_3)_2 + 2 \text{Ca(OH)}_2 \rightarrow \text{Mg(OH)}_2 + 2 \text{CaCO}_3 + 2 \text{H}_2\text{O}$	Removes magnesium and hydroxide as precipitate. Neutralizes bicarbonate ion and consumes hydroxide. (pH \geq ~9)
Ion Exchange	$\text{Ca}^{+2}_{\text{aq}} + \text{Na-clay} \leftrightarrow \text{Na}^{+1}_{\text{aq}} + \text{Ca-clay}$	Flocculates clays to larger particles, reducing Total Suspended Solids (TSS), and clarifying water.