



industrial process of lime

Lime production is a key industrial process that transforms limestone into calcium oxide (quicklime) and related products through heating and chemical reactions. It follows the "lime cycle," starting with raw limestone and enabling uses in construction, steelmaking, and water treatment.^{[1] [2]}

Quarrying and Preparation

Limestone (calcium carbonate, CaCO_3) is extracted from quarries or mines, then crushed and sized into uniform pieces, often fist-sized for kilns. Washing removes impurities like clay, and screening sorts material by size for optimal processing.^{[3] [4]}

This diagram shows the full lime cycle, from limestone calcination to slaking and carbonation back to CaCO_3 .^[1]

Calcination

The core step heats crushed limestone in kilns (rotary, shaft, or parallel flow regenerative types) at 900–1,300°C, decomposing it via $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ to produce quicklime (CaO). Fuel like natural gas sustains the high temperatures, with modern kilns optimizing energy efficiency.^{[5] [6] [7]}

Hydration and Finishing

Quicklime is slaked with water to form hydrated lime ($\text{Ca}(\text{OH})_2$) through an exothermic reaction, improving handling for applications like mortar. Further milling, cooling, and storage prepare it for markets, with some plants skipping hydration for direct quicklime use.^{[2] [8]}

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7. [https://en.wikipedia.org/wiki/Lime_\(material\)](https://en.wikipedia.org/wiki/Lime_(material))
8. <https://www.generalkinematics.com/blog/limestone-processing/>

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