

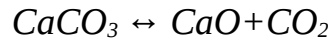
In mine furnaces, it is most expedient to burn limestone separately in fractions of 40-80, 80-120 mm across, and in rotary kilns - 5-20 and 20-40 mm.

Limestone calcination is the main technological operation in the production of air lime. At the same time, a number of complex physical and chemical processes that determine the quality of the product occur. The following processes occur during firing:

- complete decomposition of $CaCO_3$ and $MgCO_3$, $CaCO_3$ into CaO , MgO and CO_2 ;
- obtaining a high-quality product with an optimal microstructure of particles and their pores.

If clay and sand impurities are present in the raw material, then during firing between them and carbonates reactions occur with the formation of silicates, aluminates, calcium and magnesium ferrites.

The decomposition reaction (decarbonization) of the main component of limestone - calcium carbonate:



Theoretically, 179 kJ or 1,790 kJ per 1 kg of $CaCO_3$ are consumed for decarbonization of 1 mole of $CaCO_3$ (100 g). In terms of 1 kg of the resulting CaO , the costs are 3,190 kJ.

The firing duration is also determined by the size of the pieces of the fired product.

The main difference in the technologies for the production of lump quicklime is the firing method.

Limestone is fired in various furnaces: mine, rotary, fluidized bed, in suspension, etc. The most widespread are lime kilns.

Three zones are distinguished by the nature of the processes occurring in a mine furnace, by its height.

In the upper part of the furnace there is a heating zone - in it the raw material is dried and heated by hot flue gases, organic impurities burn out.

In the middle part of the furnace there is a firing zone, where the temperature of the fired material varies between 850-1,200-900°C, where limestone decomposes and carbon dioxide is removed from it.

In the cooling zone in the lower part of the furnace, lime is cooled by air from below from 900 to 50-100°C; the air in turn heats up and enters the firing zone to maintain combustion.