

Calcination Encyclopedia Article

Calcination

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Calcination

In calcination, a substance is heated to a high **temperature** below its melting point to bring about thermal decomposition or a phase transition other than melting. Calcination often has the effect of making a substance friable. The process usually takes place in long cylindrical kilns. Calcined materials may lose **water** (as in the conversion of ferric hydroxide to ferric oxide) or some other volatile constituent (such as **carbon** dioxide upon heating limestone), or may undergo **oxidation** or **reduction**. In oxidative calcination (also known as roasting), a substance is heated in the presence of air or **oxygen**. Oxidative calcination is commonly used to convert metal sulfide ores to oxides in the first step of recovering such **metals** as **zinc**, **lead**, and **copper**. Reductive calcination (smelting) involves the heating and reduction of metals from their ores, followed by separation out of the valueless material.

Calcination reactions may include thermal **dissociation**, including the destructive **distillation** of organic compounds, i.e., heating a highly carbonaceous material in the absence of air or oxygen, to produce **solids**, **liquids**, and gases). Examples of other calcination reactions include the **concentration** of **aluminum** by heating bauxite; polymorphic phase transitions such as the conversion of anatase to the rutile; and thermal recrystallizations such as the devitrification of **glass**. Materials that are commonly calcined include **phosphate**, aluminum **oxide**, **manganese** carbonate, petrol coke, and sea water magnesite.