KALSILITE PRODUCTION OPTIMIZED NEW PROCESS

CSIC organization has patented a new method to synthesize higher purity kalsilita ($KAlSiO_4$) from an easily available precursor, kaolinite, under mild conditions of pressure and temperature and with a substantially time and costs reduction of the process. The kalsilita is used as the precursor of leucite, a major component in the porcelain-fused-to-metal and ceramic dental restoration systems, as high thermal expansion ceramic for bonding to metals and in applications in diesel engines.

An offer for Patent Licensing

Economic process in mild hydrothermal conditions

A new procedure of obtaining calsilita ($KAlSiO_4$) has been patented, consisting of kaolinite hydrothermal treatment at temperatures between 250 and 350 °C The process is performed in a stainless steel hydrothermal reactor, where the solid and liquid are introduced. The reactor is capable of maintaining the desired temperature. The pressure reached in the reactor is the corresponding to the water vapor temperature employed (around 85 bars). The heating process is carried out on a gradual rise in temperature, having a duration of around 100 hours.

Kalsilite has been synthesized previously by a variety of techniques including cation exchange from nepheline, solid state synthesis from zeolite, kaolinite or other silicate compounds, sol-gel methods using TEOS or SiO_2 as Si source and hydrothermal methods from muscovite. Many of these methods give rise to secondary products or to poorly ordered kalsilite. In addition the hydrothermal conditions of these processes are much more demanding, making use of high pressure (1000 bars), high temperatures (up to 600 °C) and long times of reaction (15 days), with the consequent fabrication costs increase.

Compared with other synthesis methods, the hydrothermal method is economical and convenient to prepare pure materials with fine particle size at low temperature.

New method of synthesis of calsilita, leucite precursor, using mild temperature and pressure, and of short duration. Substantial lowering of the process costs. Higher purity calsilita obtained, avoiding side products.

Main innovations

- The new patented procedure provides kalsilite with a higher degree of purity than the existing market techniques.
- The pressure values required are an order of magnitude lower than the one used by traditional methods, facilitating the process.
- The new process works at temperatures up to 300 °C lower than the procedures used to date.
- Manufacturing times are reduced from 15 days traditional processes to around 100 hours.
- The previous advantages result in substantial costs reduction of the kalsilite manufacturing process.

Patent Status

PCT ("International") patent application filed. Priority established by a Spanish patent application.

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