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Bonite – a New Raw Material Alternative for Refractory Innovations

Bonite is introduced as a new synthetic dense refractory aggregate based on the mineralogical phase calcium hexaluminate, CA6.

Bonite is a pre-reacted aggregate and thus shows no volume increase due to the formation of new phases during heat-up.

The mineral calcium hexaluminate is already well-known from the literature, but with the introduction of Bonite it is now available as a new dense synthetic refractory aggregate. The bulk density of Bonite is 3.0g/cm³, which is about 90 % of the theoretical density of calcium hexaluminate (3.38 g/cm³).

Bonite based test castables show a hot modulus of rupture at 1500 °C of 5 MPa or higher, and a high refractoriness under load with a temperature T_l of min. 1578 °C at load of 0.2 MPa. In spite of the high density of 2.85 g/cm³, the Bonite based test castable shows a very low thermal conductivity of only 1.7 W/mK at 1000 °C. This offers opportunities for combined wear and insulating linings, e.g. for steel ladles or aluminium melting furnaces.

The low wettability of Bonite based refractories is proved by the high aluminium resistance in the advanced laboratory test of Corus IJmuiden. Even after high pre-firing temperature of 1400 °C, where conventional Aluminium refractories show a high increase in pore size diameter and a reduced infiltration resistance, Bonite exhibits superior infiltration resistance behaviour. This provides a potential for major improvements of aluminium and other non ferrous metal applications.

Even a conventional, high porosity Bonite based castables achieved a class A/B rating in CO resistance acc. to ASTM C288-87, which makes Bonite suitable for petrochemical applications.

The high alkali resistance of calcium hexaluminate, which is known from the literature, is currently being tested for Bonite based refractories. This is of special interest e.g. for applications in the cement industry but also others.

With Bonite, a new innovative tool is introduced to improve refractories for various industrial applications. First industrial trials, e.g. in the aluminium industry, have already started.