Efficient Use of Nepheline Syenite as a Fluxing Agent in Industrial Ceramic Formulations

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Feldspar and clay minerals are employed in ceramics industry as a raw material. Apart from these, feldspathoid (especially nepheline syenite) group minerals are commonly preferred in formulations. Nepheline syenite is a quartz-free aluminum silicate complex rock consisting of different mineral phases such as nepheline, alkali feldspar, and biotite. Because of its extremely low melting point and high alumina content, nepheline syenite is used as a glass phase promoter, a ceramic flux and also as a functional filler in paint, plastics etc. Like Feldspar, nepheline syenite is used as a flux in tile, sanitaryware, porcelain, vitreous and semi-vitreous bodies. It contributes high alumina without associated free silica in its raw form and fluxes to form silicates with free silica in bodies. This stabilizes the expansion curve of the fired body. It is an excellent filler and flux, especially for fast firing conditions. Nepheline syenite is valuable in glass batches to achieve the lowest melting temperature while acting as a source of Alumina. Kırşehir Buzlukdağ nepheline syenite represents one of the largest and unaltered alkaline intrusive body in Central Anatolia region of Turkey. Main mineral composition is nepheline (15-35 wt. %), K-feldspar (orthoclase) (41-69 wt. %), albite (25-37w. %), biotite (0.3-2.5 wt. %). Buzlukdağ nepheline syenites have K2O/Na2O and Na2O/K2O ratios between 0.44-1.5 wt. % (mean 0.60 wt. %) and 0.89-2.66 wt. % (1.53 wt. % on average) respectively, thus they are very suitable for ceramic and glass industries.

In this study, Usability of Buzlukdağ nepheline syenite was examined as fluxing in place of albite in ceramic tile and ceramic sanitaryware bodies. The rheological behavior, energy efficiency and its effect on technical properties of the representative bodies were examined.

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