

## Resumen nº 6

### INCREASE IN VITRIFIED TILE PRODUCTION BY THE USE OF BORATE FLUX

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#### ABSTRACT

In this work we are reporting the use of ulexite, a borate flux, in vitrified tile production. Increase in productivity during slip making by substitution of a major quantity of feldspar by minor amount of ulexite and clay which helps in reduction of grinding time, increase in green production by increase of pressing cycle due to substantial increase in dry MOR by the use of ulexite and increase in kiln productivity by reduction of kiln temperature and making the kiln cycle faster, is reported here. We have also addressed the flocculation issue arising during addition of the borates in ceramic tile slip making.

#### DETAILED SUMMARY

Use of borates such as Neobor (Sodium Borate), Optibor TG (Boric Acid), Vitribor Calcium Borate), Hydroboracite (Calcium Magnesium Borate) and Ulexite (sodium calcium borate) have been referred in literature in the past<sup>1, 2, 3</sup>, for vitrified tile production, by replacing feldspar with ulexite and clay. Borates are great flux and as mentioned earlier can replace substantial quantity of feldspar as fluxing material. Among all the borates, ulexite is the cheapest one and gives the same functionalities as compared to all the other borates such as increase in vitrification, dry and fired strength, and reduced water absorption etc.

**Novelty** of our work lies in the fact that we have used ulexite for vitrified tile making resolving one of the major problems inherent by the use of ulexite or other borates which is their tendency to cause flocculation due to presence of  $Ca^{++}$ , and  $Mg^{++}$ . In the past, people have either ignored this issue or have used other expensive borate such as Boric acid which does not have any of flocculation causing cations. But use of boric acid would increase the cost of production. By design of experiment, we have developed a combination of deflocculants which would give very good flow properties (35 to 50 sec in Ford cup 4 mm) to the slip even at very high water TDS (1500-2000 ppm) and thus can be easily used in production. Secondly, we have also increased the productivity in various stages of vitrified tile production trial. In our production trial, by replacing major quantity of feldspar with a minor amount of ulexite and remaining clay, we have reduced the grinding time for vitrified body and also by increasing the residue of the final slip. Due to the excellent dry MOR, even without the use of organic binder, we have increased the press productivity by reducing the pressing pressure, without affecting green, dry and fired property. Finally, we have increased the kiln output by making the cycle faster by 2-4 minutes and also by reducing the kiln temperature by 5-10 °C.

Detailed results will be presented in the complete paper.

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