

NATURAL DIOPSIDE FOR CERAMICS IN BRAZIL AND A GEOLOGICAL APPROACH TO
THE STATE OF BAHIA OCCURRENCES

José Francisco Marciano Motta^{1a,2}

Eduardo Camargo Meneghel^{1a}

Ubiraci dos Reis Freitas²

Guillermo Rafael Beltran Navarro^{1b}

Antenor Zanardo^{1b}

^{1a} Associated Researcher- Petrology and Metallogeny Dept. IGCE-Unesp-Rio Claro- SP- Brazil

^{1b} Professor- Petrology and Metallogeny Dept. IGCE-Unesp-Rio Claro- SP- Brazil

² Lagoa Materias Primas Ltda. Castro Alves-BA- Brazil

Key words: diopside, ceramic tiles, raw material, Brazil

Email: motta.jf@gmail.com

The mineral diopside is a magnesium and calcium silicate belonging to the pyroxene group that along with quartz, feldspars, carbonates and other minerals forming some metamorphic rocks such as the calc-silicate ones. Whendiopside occurs in high concentrations and with low content of chromophores oxides, like Fe_2O_3 e TiO_2 , it constitutes a very useful raw material for engobe formulation in the Brazilian ceramic industry.

In the glazed tile production, diopside makes up about 15% of the engobe formulation and acts probably as a sintering agent and gives waterproof to the engobe layer, avoiding water mark to the tiles. In addition, it enhances the white color of the engobe due to its capacity to retain iron ions in its crystal structure during the sintering stage. For this reason it replaces partially the use of zircon and zirconium silicate.

Furthermore, the addition of diopside provides more crystalline phases and better strength value for ceramic bodies, making it suitable for porcelain stone tiles, sanitaryware, tableware and dinnerware among other potential ceramic uses. However, these uses are still going on research and development phase.

In the Brazilian scenario, diopside is produced in the states of Bahia, Alagoas and Paraná. Only for use in engobe its production is about 50.000 tpa (tons per

year). The present study focuses the diopside occurrences in the region of Castro Alves, Bahia state, about 200 kilometers from Salvador city.

Geologically, the region of study is part of the paleoproterozoic orogenic belt Itabuna-Salvador-Curaçá, with 800 km long and up to 150 km wide, located in eastern part of São Francisco Craton. The orogenic belt is formed by high grade metamorphic rocks, mainly orthogneisses and migmatites, containing hills of metasedimentary sequence with quartzite, paragneisses and calc-silicate rocks belonging to Tanque Novo-Ipirá complex. These rocks occur as discontinuous layers or lenses, oriented along the regional strike (N10E to N70W) and high dip angle, with extension of dozens to hundreds of meters in length and tens of meters thick. The sequence of calc-silicate rocks are composed by the follows associations: I) Monomineralic diopsidites with small quantities of carbonate, tremolite and/or flogopite; II) quartz diopsidites that may contain scapolite, garnet, sphene, plagioclase and/or wollastonite; III) microcline/orthoclase diopsidites; VI) calc-silicate gneisses interlayered with quartz-feldspathic bands and diopside bands.

The diopside from association I, currently marketed for engobe, is characterized by the white color, fine to coarse-grained, with isotropic to anisotropic structure and decussate, granoblastic or nematoblastic texture. The standard ceramic type presents 55% of SiO_2 , 3% of Al_2O_3 , 0,6 of Fe_2O_3 , 17,5% of MgO , 20,5% of CaO , 0,5% of Na_2O , 1% of K_2O and 0,5% of Loss on ignition (L.O.I). The other associations (rock types) also contain lithotypes of commercial interest, but is still on research and development study phase.