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PREDICTION COLOR OF CERAMIC GLAZES WITH KUBELKA-MUNK MODEL

L.M. Schabbach¹; F. Bondioli²; A. M. Ferrari²; T. Manfredini²; M.C. Fredel¹; C.O Petter³

¹Departamento de Engenharia Mecânica, Centro Tecnológico, Universidade Federal de Santa Catarina, Caixa Postal 476, Campus Universitário, Trindade, 88040-900, Florianópolis, Brazil

²Dipartimento di Ingegneria dei Materiali e dell' Ambiente, Università degli Studi di Modena e Reggio Emilia, Via Vignolese 905, 41100, Modena – Italy

³Departamento de Engenharia de Minas, Centro de Tecnologia, Universidade Federal do Rio Grande do Sul, Caixa Postal 15021, Porto Alegre, Brazil

e-mail: lucianamacarini@bol.com.br

ABSTRACT

The formulation, as well as the adjustment of glazes colours in the ceramic tile industry is still mostly empirical, usually based in the measuring of the L^* , a^* , b^* parameters of the CIELab system. This procedure makes the control difficult because frequently the L^* , a^* , b^* parameters were not systematically related to the concentration of pigment in the glaze. The model developed by Kubelka-Munk permits the relation of the final color with the concentration of added pigments supported by the reflectance data and can be helpful to explain the color variation.

In this study the efficiency of the Kubelka-Munk model (already known and consolidated in other industrial sectors) was evaluated by using to predict the colour of an opaque ceramic glaze obtained by a mixture of yellow zircon-praseodymium pigment ($(Zr,Pr)SiO_4$) and zircon opacifier ($ZrSiO_4$).

Glazes with different percentages of yellow pigment and opacifier were prepared to determine the absorption and scattering optical constants of the Kubelka-Munk model with the reflectance curves provide by a spectrophotometer. The L^* , a^* , b^* parameters obtained of the glazes were confronted with the date of absorption and scattering of light obtained with Kubelka-Munk model. It was verified that there is no linear relationship of the b^* parameter with the concentration of yellow zircon-praseodymium pigment. On the other side a linear function between the optical constants of the Kubelka-Munk model with the concentration of the yellow zircon-praseodymium pigment was verified.

The reflectance curves (colour) predicted by the Kubelka-Munk model were in good agreement with the experimental reflectance curves. The Kubelka-Munk model allows to reproduce a selected colour and to evaluate its behaviour with the concentration of the added pigments. This model is actually used in computational software's and provides quickness for the obtainment of a specified colour formulation.

Keywords: color, ceramic glazes, Kubelka-Munk model, CIELab