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DETERMINATION OF LEAD, CADMIUM AND ANTIMONY CONTENT IN A CERAMIC GLAZE

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It is common to apply a surface coating to tiles, which, when fired, produces a vitreous layer that is hygienic, easily cleanable and provides aesthetic qualities. In selecting raw materials it can generally be stated that the cations having high coordination strengths with respect to the oxygen anion behave as lattice-formers (Si^{4+} , B^{3+}) while those with the lowest values act as lattice modifiers (Pb^{2+} , Ca^{2+} , Ba^{2+} , Na^+ , K^+ , Li^+) and finally, those have intermediate values may perform both functions (Fe^{3+} , Be^{2+} , Mg^{2+} , Ni^{2+} , Zn^{2+} , Co^{2+}). This presence of heavy metals has an effect on the surrounding environment and anti-pollution measures has been taken at different levels, one of which consists in using materials with low content in harmful components. In particular Pb, Cd and Sb limits are indicated in Ecolabel, for ceramic tiles in the framework of Hard Floor Coverings. This paper describes the validation of method used to determine the % of the three oxides in a ceramic glaze because a standard generally accepted procedure does not yet exist. Three commercial glazes samples and one reference materials (Multicomponent Glass, NBS Standard Reference Materials 1412) have been investigated. The dissolution of samples is carried out by acid digestion by heating a known amount of powder added with HNO_3 and HF. The solution is investigated by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-OES OPTIMA 3200 XL Perkin Elmer). Detection limit, recovery, repeatability and the uncertainty of measurement were calculated. The results seem to underline that the calculated uncertainty fits the method parameters requested, but the problem is not the compliance with the permissible limits. The matter of facts is that the limits are so low that the aim of the method is to confirm if the banned elements is present or not in the ceramic glaze.

Keywords: Ceramic glaze, Pb-Cd-Sb, Ecolabel, Validation Method.