

INVESTIGATIONS OF HYDROXYAPATITE CRYSTALS IN ORAL CARE PRODUCTS USING THE TEM METHOD

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Introduction

The work presents the possibilities of using transmission electron microscopy to detect the presence of hydroxyapatite, determine the size and shape of its crystals in oral care products. In order to distinguish crystals of hydroxyapatite, the EDS microanalysis was additionally performed.

Materials and Methods

Thirteen oral care products containing hydroxyapatite were tested: 10 tooth cleaners, 1 oral hygiene gel and 1 oral hygiene powder.

The insoluble fraction of product was analyzed. It was obtained by dilution of the product in water and vacuum filtration through filter with a 0.47 μm pore size.

The picture and micrograph for microanalysis were obtained by TEM JEM 1400 (Jeol Co., Japan, 2008).

Results and Discussion

Photographs and micrographs (FIG. 1) of individual elements were superimposed on each other, which allowed for attributing groups of crystals to silica, titanium oxide and hydroxyapatite. In order to improve the clarity, the micrographs were given different colors and colored images were thus obtained.

The detected crystals were subjected to size measurements and their morphology was described.

Conclusions

The applied methodology of photo analysis allowed for the attribution of hydroxyapatite crystals to silica and titanium oxide. The isolation of hydroxyapatite crystals and the determination of their morphology allowed the confirmation of the presence of hydroxyapatite in the tested products. Silica crystals were the smallest in the tested products, and the crystals of hydroxyapatite and titanium oxide were of similar size. The hydroxyapatite crystals had the shape of needles, rolls and plates.

Acknowledgments

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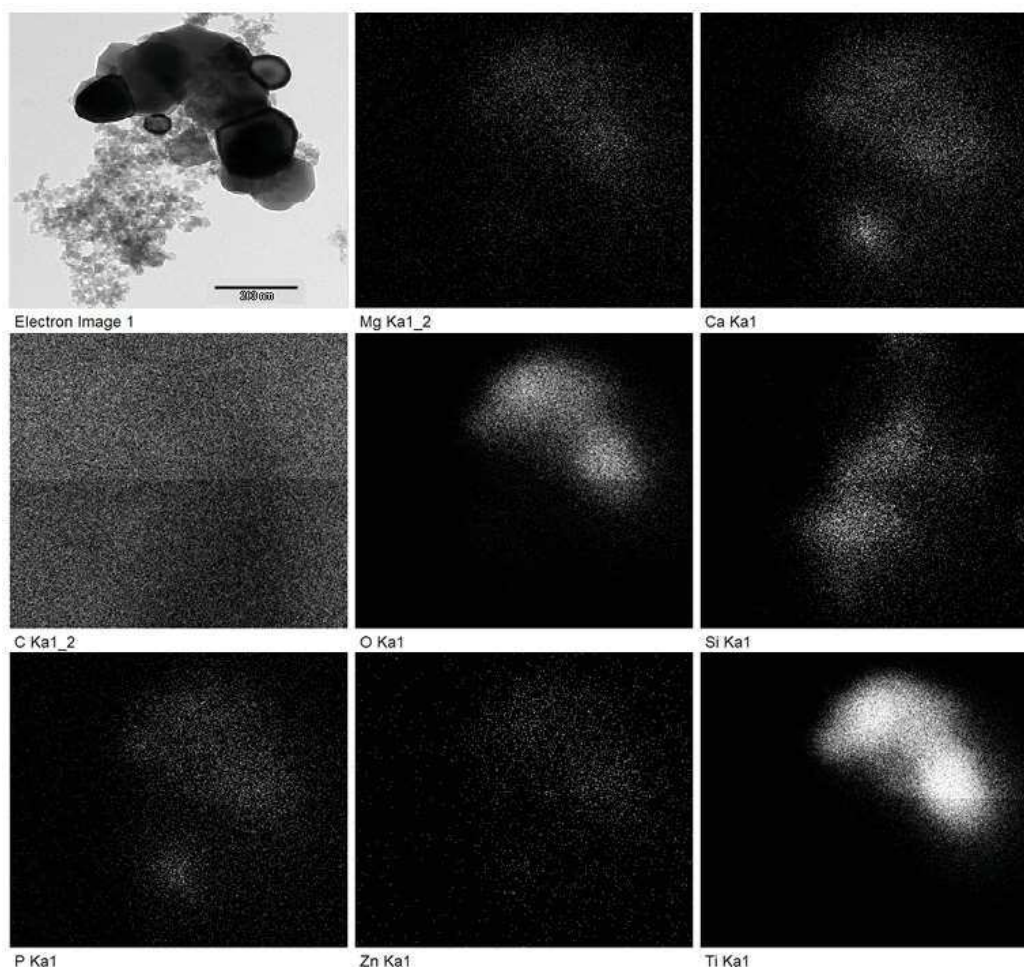


FIG. 1. Picture of TEM and results of microanalysis EDS of GC Mousse paste for magnesium, calcium, carbon, oxygen, silicon, phosphorus, zinc and titanium.