

A COMPARATIVE STUDY OF BRISTLE MATERIALS OF TOOTHBRUSHES BY RADIOMETRIC METHOD AND ELECTRONIC MICROSCOPY ANALYSIS

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The purpose of this work was to study the influence of bristle materials of toothbrushes on dentin wear as well as to compare the surfaces of these bristles before and after brushing operations. The bristles analysed were of nylon and polybutylene terephthalate (PBT) materials presenting medium hardness.

The wear on dentin was evaluated by the radiometric method¹. Irradiated dentin (root of tooth) was brushed with dentifrice slurry and the ³²P released was counted to measure amount of dentin removed. The irradiations of dentins of 1 h at a thermal neutron flux of 10^{12} n.cm⁻².s⁻¹ were performed at the IEA-R1 nuclear research reactor. The brushing was carried out in a brushing machine and the ³²P beta activity was measured using a plastic scintillation detector.

The results showed that nylon and PBT bristles present a different behaviour on dentin wear, that is, the mean counting rate of ³²P obtained using nylon bristles (8546 ± 623 cpm) was slightly lower than that obtained with PBT bristles (10456 ± 480 cpm).

Dentifrice abrasivity indices or RDA (Radioactive Dentin Abrasion) results obtained by using these two types of toothbrushes were of the same order of magnitude. RDA values of 70 ± 3 and 82 ± 2 were obtained with brushes made of nylon and PBT bristles, respectively.

The bristles was observed in a scanning electron microscopy Philips XL-30. The analysis of the bristles, before brushing, by scanning electron microscopy indicated a difference between the surfaces of the extreme ends of the nylon and PBT bristles, as can be deduced from micrographs presented in figure 1. Figure 2 shows the surfaces of the bristles, after brushing operations, by scanning electron microscopy. The extreme ends in this condition presented the same aspect and worn for both bristles.

Results obtained in this work indicate the feasibility in using radiometric method and scanning electron microscopy analysis to compare materials for bristles of toothbrushes.

References

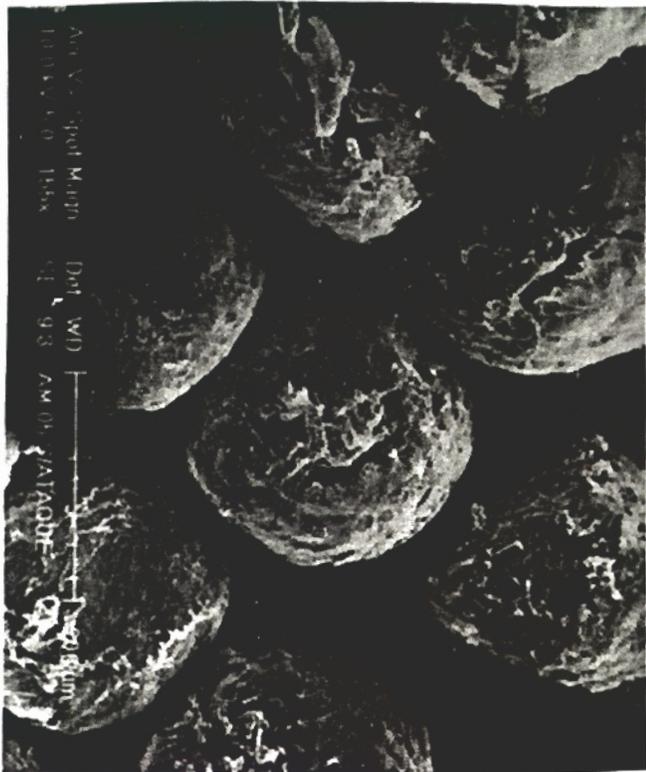
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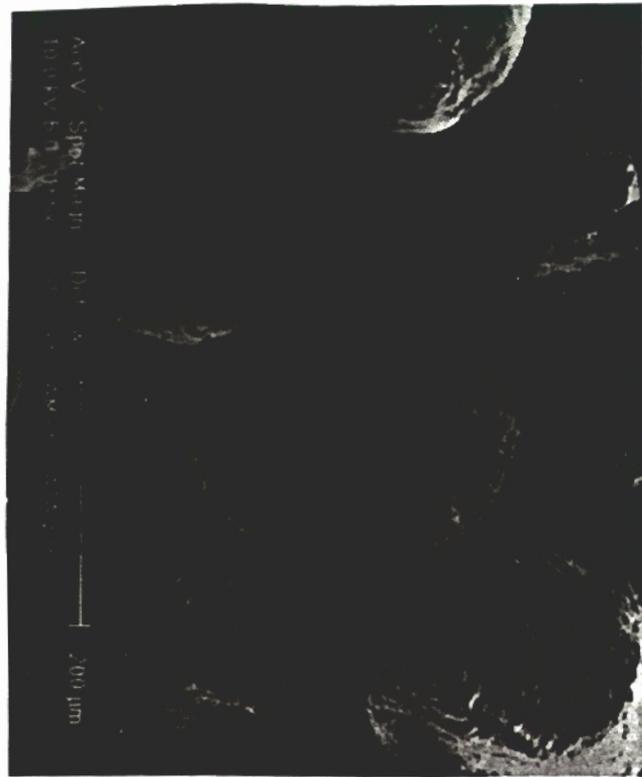
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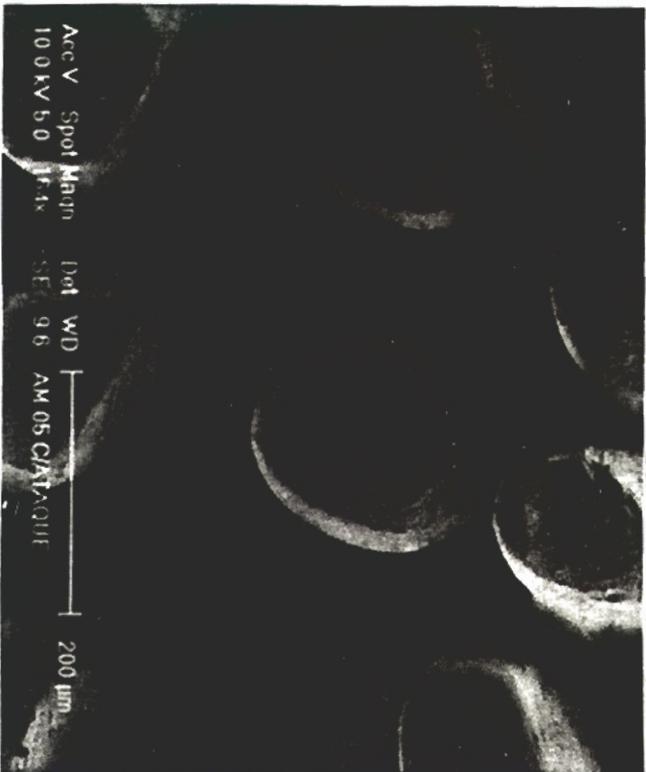


(A)



(B)

Figure 1: The extreme ends of the nylon (A) and PBT (B) bristles, before brushing, by scanning electron microscopy.



(A)



(B)

Figure 2: The extreme ends of the nylon (A) and PBT (B) bristles, after brushing operations, by scanning electron microscopy.