



ELECTROCHEMICAL CHARACTERIZATION OF SOME DENTAL MATERIALS IN ACCELERATED ENVIRONMENTAL TESTING

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Abstract

The aim of this study is to investigate the electrochemical behavior of a three casting non-precious dental alloys: Vera PDI (Co-Cr based), Heraenium (Ni-Cr based) and NPG+2 (Cu-Al based) three test solutions: artificial saliva (AFNOR, pH = 8), acidified saliva (pH = 2.5) and fluoridated acidified saliva (1000 ppm F⁻, pH = 2.5).

Open circuit potential (E_{OC}) measurement; potentiodynamic polarization curves and electrochemical impedance spectroscopy (EIS) are the electrochemical procedures selected for this work. Our results have shown that Vera PDI and Heraenium dental alloys have a good corrosion resistance in artificial saliva, but in acidified saliva the corrosion currents increase. Corrosion currents are also higher in fluoridated acidified saliva as expected because the presence of fluoride ions. The NPG+2 casting alloy present a low corrosion resistance in artificial saliva and a very low corrosion resistance in acidified and fluoridated acidified saliva. The EIS results show that all three dental alloys exhibit passivity at open circuit potential in artificial saliva. For NPG+2 alloy in acidified saliva and fluoridated acidified saliva, the protectiveness of oxide film was no more present. The corrosion resistance of the three non-precious alloys are in the following order: Vera PDI > Heraenium > NPG+2.

Key words: corrosion current, EIS, non-precious dental alloys, polarization curves

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