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POTENTIODYNAMIC POLARIZATION

DARAPORN SAE-LEE : ELECTROCHEMICAL BEHAVIOR OF HIGH
COPPER AMALGAMS IN VARIOUS ELECTROLYTES. THESIS ADVISOR :
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Since a corrosion resistance is one of the primary prerequisites for a dental alloy, the corrosion behavior of the high copper amalgam was investigated using *in vitro* electrochemical techniques. Specimens of five high copper amalgams and one conventional amalgam were prepared according to the ISO specification for amalgam alloys and stored in an incubator at 37°C for 7 days. Electrochemical corrosion tests were performed in various electrolytes i.e. modified Fusayama's artificial saliva, modified Tani and Zucci's artificial saliva, 1% NaCl, 1% lactic acid, at 37 °C and exposed to air. Potentiodynamic anodic polarization curves were obtained. The corrosion behavior of conventional amalgam and high copper amalgam were significantly different in almost all solutions. In both synthetic saliva, the corrosion resistance of high copper amalgams were better than conventional amalgam, except in 1 % lactic acid, the conventional amalgam exhibited better characteristic. In 1% NaCl, the corrosion resistance of all amalgams were similar, i.e the corrosion process occurred rapidly and aggressively. The effect of each electrolyte to the corrosion behavior of dental amalgam was different. Modified Fusayama's solution and modified Tani and Zucci's solution were the least corrosive solutions, whereas 1% NaCl offers the most corrosive environment. The SEM micrograph of the conventional and high copper amalgams after tested in artificial saliva were not markedly changed, but after tested in 1 % NaCl, all amalgam surfaces were covered with corrosion products contained Sn, Cu, Cl and O. No corrosion products occurred on the amalgam surfaces tested in 1% lactic acid. The surface of the conventional amalgam was slightly changed, but all of high copper amalgams were markedly corroded. To study corrosion behavior by using electrochemical technique, the testing solutions that would be appropriate are both types of artificial saliva. Since, the characteristic of polarization curve illustrated several information i.e. E_{pp} , I_c and the breakdown of passivity more clearly than using 1% NaCl and 1% lactic acid as testing solution.