

# **Passive Mineralization of Biomaterials**

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## Table of Contents

<u>Section</u>	<u>Page</u>
Abstract	2
1.0 Introduction	3
2.0 Methods and Materials	5
3.0 Results	10
4.0 Conclusion	19
Acknowledgments	20

## List of Figures & Tables

<u>Figures &amp; Tables</u>	<u>Page</u>
EDX-ray analysis of Experiment 2.2.4	13
Infrared Spectroscopy of Experiment 2.2.4	13
Scanning Electron Microscopy of Filtered Deposits from Experiment 2.2.4	14
Temperature vs. Time Graph of Experiment 2.2.4	15
EDX-ray analysis of Experiment 2.2.5	16
Scanning Electron Microscopy of Experiment 2.2.5	17
Infrared Spectroscopy of Experiment 2.2.7	18

## Abstract

In this experiment, the effects of substratum surface properties on the amount of calcium phosphate nucleation were investigated. A two part supersaturated solution, JAW solution, was selected to simulate mineralization. Part A is made of KOH and  $\text{KH}_2\text{PO}_4$  and Part B is made of  $\text{CaCl}_2$  and NaCl. Substrata were placed in freshly combined Part A and Part B JAW solution at room temperature and/or  $35^\circ\text{C}$ . The range of substrata included Cast epoxy, polystyrene, quartz, and glass, with different coatings and treatments. Observations were taken periodically from 7/9/96 to 8/6/96 for visual evidence of mineralization. At room temperature, no visible mineralization was manifest. At  $35^\circ\text{C}$ , mineral deposits were observed on most of the slides, but in varying quantities. Temperature-related conditions were tested on the JAW solution using a hot plate tester. Scanning electron microscopy, EDX-ray analysis and Infrared Spectroscopy were used to examine the mineral deposits formed. In addition to these tests, numerous additional substrata were tested in a limited manner for mineralization in the JAW solution; fascinating results were obtained on such additional substrata as Chinese Hamster Ovary(CHO) Cells, Methylene Blue Stained Biofilm, Paper Clips, and Stainless Steel. Various techniques were used to place substrata in the JAW solution. When comparing final results, it was concluded that mineral deposits tended to form on the sharp edges of the substrata, rather than their flat surfaces.

*Keywords: Calcium Phosphate, Mineralization, Nucleation, Surfaces*

