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**Effect of the Addition of Polyamide Micro Particles on
Some Mechanical Properties of Room Temperature
Vulcanized Maxillofacial Silicone Elastomer before and
after Artificial Aging**

A Thesis

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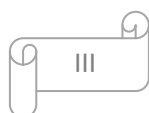
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Abstract

In the last decades, facial elastomers have been widely used in fabricating maxillofacial prosthesis. In general, the facial prosthesis made from silicone need to be replaced every 6–12 months due to the deterioration of elastomers as a result to the exposure to the solar radiation and other environmental conditions. Lately, researches has been focused on enhancing maxillofacial silicone properties through incorporating various types of fillers into a polymeric matrix in order to develop a new kind of materials that can overcomes the deficiencies in the silicones with the maintenance of the flexibility of polymer matrix. The purpose of this study was to evaluate the effect of adding polyamide 6 (nylon 6) micro-particles powder on tensile strength, elongation at break, tear strength, hardness and surface roughness of A-2186 platinum room temperature vulcanized silicone elastomer before and after (100 and 200) hours of accelerated artificial weathering conditions.

Micro polyamide-6 particles were added to the silicone base in concentrations of 1% by weights which improved the tensile and tear properties of the silicone in the pilot study, whereas the silicone with 0% micro fillers served as a control. A hundred and twenty specimens were fabricated and divided into 4 groups according to the tests conducted with 30 specimens for each test except for elongation percentage test which is measured concurrently with tensile strength test. Each group was then subdivided into three subgroups (A, B, and C) according to aging conditions (before aging, after 100 and 200 hours of aging) with 10 specimens for each.

Scanning electron microscope results show well distribution of the fillers within the silicone matrix. The fourier transform infrared spectroscopy analysis reported the absence of any chemical reaction between the polyamide-6 and the silicone, while X-ray diffraction analysis indicates the incorporation of the



polyamide-6 fillers within the silicone matrix. After aging for (100 hours), the tensile and tear strength mean value were non-significantly increased while after (200 hours) of the same conditions, both values were non-significantly decreased on the contrary to the hardness and surface roughness value which were significantly increased after (100 and 200 hours) of the exact aging conditions. The elongation percentage was non-significantly increased after (100 hours) and significantly decreased after (200) hours of artificial weathering.

To conclude, the addition of polyamide-6 micro fillers prevent rapid degradation of some mechanical properties of silicone under aging condition.