ANALYTICAL AND MECHANICAL COMPLEX INVESTIGATIONS ON STAINLESS STEEL 316L

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Abstract: Due to its high corrosion resistance, stainless steel AISI 316L is one of the ideal materials for numerous applications such as industrial equipment and machinery, automotive, aerospace, medical instruments, etc. This paper presents a series of mechanical and analytical investigations on 316L stainless steel. It was characterized by X-ray diffraction by micro analysis (optical and scanning electron microscopy) and mechanical investigation (the tensile behavior, Vickers hardness determination, the determination of surface roughness).

Keywords: *stainless steel AISI 316L, analytical investigations, mechanical investigations*

1. Introduction

Austenitic stainless steels find important and manifold applications as construction materials in chemical and petrochemical industries, in oil and gas exploitation, shipbuilding, food and drug processing, and in water purification and distribution systems. Their chief characteristics are good resistance to corrosion and elevated temperatures, good cryogenic strength, and low magnetic permeability [1,2]. The AISI 304 and 316 austenitic stainless steels, with their low-carbon 304L and 316L grades, account for the largest fraction of the world's stainless steel production and exploitations.

The different properties of the various stainless steels have been studied extensively for a very long period and thus are very well documented in the literature. [3]

The first stainless steel used for the realization of an implant material was 18-8 (the modern classification type 302), which has a higher strength than vanadium and is more resistant to corrosion. Based on Vanadium steel is not used in implants as resistance to corrosion is inadequate. Later, he began to be used 18-8sMo stainless steel. It contains molybdenum to improve the corrosion resistance in salt water. This alloy began to be known as stainless steel type 316. In 1950, the carbon type 316 stainless steel was reduced from 0.08 wt% to 0.03 wt% maximum for greater corrosion resistance chloride; this new alloy was known as type 316L.

Chromium is a major component of corrosion resistant stainless steel. The minimum effective concentration of chromium is 11% by weight. Chromium is a reactive element, but may be passivated so as to obtain an excellent corrosion resistance.

Austenitic stainless steels, especially types 316 and 316, are most often used in implants. They are hardening by heating, but by cold working. The inclusion of molybdenum increases the chances corrosion resistance in salt water. ASTM (American Society of Testing Materials - American Society for testing materials) recommends the type 316, and not in making implants 316L. The nickel is used to stabilize the austenitic phase at room temperature and, moreover, to increase resistance to corrosion.

Even type 316 may corrode in the body under certain circumstances, such as a high