

USE OF BIODEGRADABLE OILS AS AN ALTERNATIVE COOLING IN QUENCHING TREATMENT

Reference	Presenter	Authors (Institution)	Abstract
04-038	Suellen Signer Bartolomei	Bartolomei, S.S.(FATEC - Sorocaba); Bartolomei, M.R.(Instituto de Pesquisas Energéticas e Nucleares); Silva, F.A. (Fatec Sorocaba); Oliveira, A.A. (Fatec Sorocaba);	<p>Ferrous alloys stand out for their use in various branches of the mechanical industry, as they encompass a series of mechanical properties that directly influence their application. For their implementation to be successful, they must have a suitable microstructure, which provides steel with sufficient mechanical characteristics so that it can withstand various types of efforts resulting from its implementation. Heat treatments are responsible for developing this microstructure in a controlled manner, through a set of heating and cooling operations with controlled conditions of temperature, time, atmosphere and cooling speed, in order to change their properties or give them some features. One of the most conventional treatments used worldwide to impart mechanical resistance to steels is the quenching treatment, which consists of heating the metal to austenitization temperature, kept at the same temperature for a certain time and after cooling it rapidly in a liquid medium. great efficiency in the extraction of heat, which can be water, saline solutions, polymeric solutions and oils, in order to form a new microstructure, harder but more fragile than its initial state, called martensite, which after tempering, has its stress-free internal structure, increasing its toughness. The most common cooling medium of the last decades is mineral oil, which due to its viscosity, has excellent capacity to extract heat, but it is a great villain when it comes to environmental issues, an example of this is the increase of water contamination. underground, where mineral oils are the most abundant contaminants present in the analyzed samples of these sources. Due to these and other environmental problems, studies have been developed to obtain an alternative cooling medium as effective as mineral oil, but which has less environmental impact. One solution to this problem is to use compound oils from renewable and biodegradable sources such as vegetable oils. Therefore, this work studies the effects of tempering on SAE 1045 carbon steel and AISI 420 martensitic stainless steel, using biodegradable soy and castor oil as cooling medium. For this, the viscosity of the oils was measured at room temperature and heated to 70 °C, temperatures at which tempering treatments were performed on 10 x 20 x</p>

20mm rectangular section specimens. The specimens were cut, embedded and polished to be characterized by optical micrograph and Vickers microhardness. The results showed that biodegradable oils have excellent stability to bath temperature variation and can be applied over large temperature ranges due to their high flash points. Regarding the hardness and microstructure formed inside the specimen, the vegetable oils were also efficient, presenting values very similar to mineral oil, being soy oil more efficient than castor oil due to its low viscosity influencing hardness of the pieces and also in the formation of martensite. Biodegradable oils have proven to be an alternative

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