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Electrochemical investigations of copper corrosion inhibition by azithromycin in 0.9% NaCl

Žaklina Z. Tasić¹, Marija B. Petrović Mihajlović¹, Milan B. Radovanović¹, Milan M. Antonijević^{1*}

¹University of Belgrade, Technical Faculty in Bor, VJ 12, P.O. Box 50, 19210 Bor, Serbia

*Corresponding author: PhD, Milan M. Antonijevic; mantonijevic@tfbor.bg.ac.rs; University of Belgrade, Technical Faculty in Bor, VJ 12, P.O. Box 50, 19210 Bor, Serbia; Tel.: +381 30 424 555; Fax: +381 30 421 021

Abstract

The corrosion behavior of copper in 0.9% NaCl solution in the presence of azithromycin was investigated. For this purpose electrochemical methods such as open circuit potential measurements, potentiodynamic polarization and electrochemical impedance spectroscopy measurements and scanning electron microscopy with energy dispersive X-ray spectroscopy were used. The results obtained by potentiodynamic polarization indicated that azithromycin behaves as mixed type inhibitor. The order of inhibition efficiency obtained by potentiodynamic polarization is in good agreement with results achieved by electrochemical impedance spectroscopy. Also, the inhibition efficiency of azithromycin increases with increasing its concentration. According to the micrographs obtained by scanning electron microscopy with energy dispersive X-ray spectroscopy, in the presence of azithromycin, protective film is formed on the copper surface.

Keywords: azithromycin, protection, copper, corrosion, polarization, 0.9% NaCl

1. Introduction

Copper possesses good properties which allow it to be used in various areas of industry and also in everyday life. Besides good mechanical and thermal qualities, copper has antimicrobial activity [1, 2]. Further, it is known that exposure of copper in aggressive environments leads to its dissolution and deterioration [3–6]. Having that in mind, the question which is the best way to protect copper against corrosion constantly raises. Based on the previous researches of many authors [7-9] the use of organic compounds is the most efficient and cost effective method for this purpose. Nowadays, numerous organic compounds are tested as corrosion inhibitors for metals in different mediums [10-12]. However, most of them are toxic and hazardous for the environment. Extensive investigations are carried out to find an efficient corrosion inhibitor which is biodegradable and non-toxic for the environment. During recent years, it was noted that different drugs can effectively protect metals from attack of aggressive ions. Also, realizing of unused or expired drugs presents a risk for environment [13, 14], so these drugs can be used as potential corrosion inhibitors for metals. Thus, environmental pollution is prevented and an

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