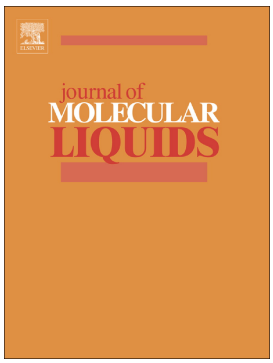

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Pyrazole, pyrazolone and enaminonitrile pyrazole derivatives: Synthesis, characterization and potential in corrosion inhibition and antimicrobial applications

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Abstract

Six pyrazole and pyrazolone derivatives namely: 3-amino-1-phenyl-5-pyrazolone (1), 3-amino-1-(2,4-dinitrophenyl)-5-pyrazolone (2), 1H-pyrazole-3,5-diamine-4-(2-phenyldiazenyl) (3), 1-phenyl pyrazole-3, 5-diamine, 4-[2-(4-methylphenyl) diazenyl] (4), 1H-pyrazole-3,5-diamine, 4-[2-(4-methylphenyl) diazenyl] (5), 5-amino-1,3–diphenyl-1H-pyrazolecarbonitrile (6) were synthesized and evaluated as corrosion inhibitors for copper alloy dissolution in basic medium. Corrosion inhibition evaluation was performed using weight loss, polarization and electrochemical impedance measurements. The results showed that the prepared compounds have high efficiency as corrosion inhibitors for dissolution prevention of copper in NH_4OH solution at pH of 9. The prepared compounds were evaluated for their antimicrobial activities against gram positive and gram negative bacteria using inhibition zone diameter measurements. The results revealed that the synthesized compounds have higher antibacterial activities than the conventional bactericide agents. The results of the antimicrobial activities and the corrosion inhibition tendencies of these compounds were correlated to their chemical structures.

Keywords

Pyrazole; pyrazolone; copper; corrosion inhibition; antimicrobial activity

1. Introduction

During the last decades, copper is used for industrial applications because excellent electrical and thermal conductivities, good mechanical workability and resistance to atmospheric and chemical agents [1]. The study of the copper corrosion phenomena has become important in alkaline medium due to increasing its dissolution in this medium. Organic inhibitors which used in copper protection include: triazoles [2–5], azoles [6], thiols [7, 8], amines [9], amino acids, triphenyl methane derivatives and many others [10]. Among of them, heterocyclic compounds showed high corrosion inhibition efficiency due to the formation of coordination bonds between the lone pairs of the heteroatoms and the vacant *d*-orbitals of copper atoms. The corrosion is prevented by the protective film formed on the metal surface. So, the formation of adsorbed layer of inhibitors is strongly dependent on the electron density at the heteroatoms, naturally on electron-donor or electron-withdrawing properties of functional