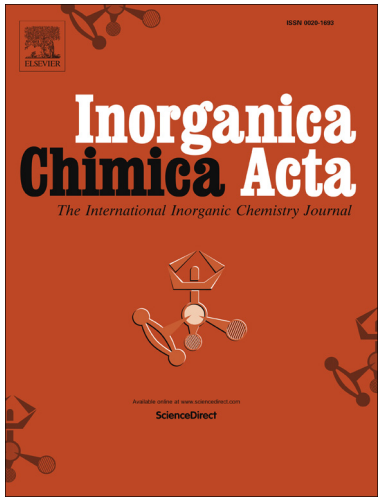

Research paper

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Homogeneous and Heterogeneous Electrocatalytic Reduction of Halo-Organic Compounds by $(Ni^{II}L^{i})^{2+}$ (L^{i} = tetraaza-macrocyclic ligand) in Aqueous Solutions.

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Keywords: Reductive dehalogenation; Ni complexes; electrocatalysis; Haloacetic acids

Abstract

The electrocatalytic reduction of bromoacetic, chloroacetic, bromobenzoic and chlorobenzoic acids by four Ni macrocyclic complexes $(Ni^{II}L^{i})^{2+}$, was studied in both homogeneous and heterogeneous systems using glassy-carbon, nafion and carbon-paste modified electrodes. The results indicate that the electrocatalytic reduction of the bromo-compounds is more efficient than that of the chloro-compounds. The electrocatalytic activity increases with the redox potential of the electrocatalyst. The nafion-modified electrodes show poor electrocatalytic ability, whereas the carbon-paste electrodes are good electrocatalysts for the reduction of bromo-alkyls only. For this purpose, the latter electrode is better than the bare glassy-carbon electrode. The results show that the rates of reduction of the halo-organic compounds by the $(Ni^{I}L^{i})^{+}$ are slowed down when the complexes are incorporated into the modified electrodes.

1. Introduction

Halogenated pollutants have low solubility, are toxic, tend to accumulate in food chains and are the contaminates most often found in the subsurface environment. As such their remediation has