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Research paper

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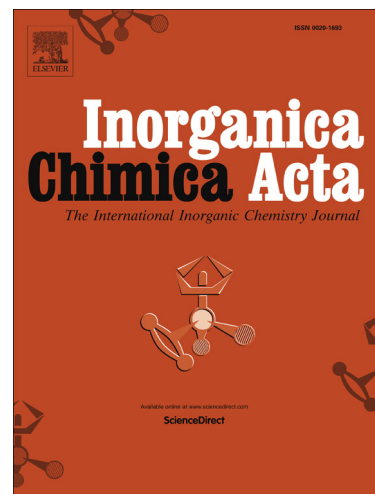
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# Homogeneous and Heterogeneous Electrocatalytic Reduction of Halo-Organic Compounds by $(\text{Ni}^{\text{II}}\text{L}^{\text{i}})^{2+}$ ( $\text{L}^{\text{i}}$ = tetraaza-macrocyclic ligand) in Aqueous Solutions.

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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  $(\text{Ni}^{\text{II}}\text{L}^{\text{i}})^{2+}$ , 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  $(\text{Ni}^{\text{I}}\text{L}^{\text{i}})^+$  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 contaminants most often found in the subsurface environment. As such their remediation has

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