Optimization of the electrocatalytic activity of MN4- macrocyclics adsorbed on graphite electrodes for the electrochemical oxidation of L-cysteine by tuning the M (II)/(I) formal potential of the catalyst: An overview

Recio F.J.

Gutierrez C.A.

Venegas R.

Linares-Flores C.

Caro C.A.

Zagal J.H.

The M(II)/(I) formal potential of MN4 macrocyclic complexes dictates their electrocatalytic activity for many reactions and L-cysteine oxidation is not an exception. In this work we review the literature related to this reaction and propose a semi-empirical model that can describe the catalytic activity of these chelates in terms of their formal potential. A correlation of log i (at constant potential) versus the M(II)/(I) formal potential for M= Fe,Co) of the catalysts gives a volcano curve. Our results clearly show that the M (II)/(I) formal potential of N4-macrocyclic complexes needs to be adjusted to values around -1.0 V vs. SCE to obtain the highest catalytic activity for the oxidation of L-cysteine. When comparing chelates of different metals (M= Cr, Mn, Fe, Co) of tetrasulphonated phthalocyanines only a linear correlation is obtained.

L-cysteine oxidation

Metal macrocyclics

Optimizing electrocatalytic activity

Phthalocyanines

Porphyrins

Volcano plots

Amino acids

Chelation

Electrochemical oxidation

Graphite electrodes

Nitrogen compounds

Porphyrins

Volcanoes

Electrocatalytic activity

L-cysteine

Macrocyclics

Phthalocyanines

Volcano plots

Catalyst activity

Porphyrins