

Electrocatalytic activity of vitamin B12 adsorbed on graphite electrode for the oxidation of cysteine and glutathione and the reduction of cystine

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We have investigated the electrocatalytic activity of vitamin B12 adsorbed on ordinary pyrolytic graphite (OPG) for the oxidation of cysteine and glutathione and for the reduction of cystine, using cyclic voltammetry and rotating-disc techniques. The activity of the bare graphite substrate is very low for all reactions studied. The presence of monolayer levels of vitamin B12 on OPG substantially decreases the overpotential of these reactions. Tafel plots of slope RT/F are obtained for the oxidation of cysteine, suggesting a mechanism controlled by the Co(II/III) couple in the vitamin. Similar slopes are obtained for the oxidation of glutathione, but they gradually change to $2RT/F$ for acid pH. No linear Tafel regions are obtained for cysteine reduction and the process occurs on Co(I).

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