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APPLICATION OF CLAY ABOUT THE ELECTROCATALYTIC REDUCTION OF MOLECULAR OXYGEN: USING METHYL VILOGEN-CLAY MODIFIED ELECTRODE

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The electrocatalytic reduction of O_2 was investigated with a methyl viologen-clay modified electrode. Clay suspension were prepared as Na-montmorillonite (SWy-1), Ca-montmorillonite (STx-1), halloysite, dickite and biotite. The methyl viologen-clay modified electrode was made by coating clay suspension on glassy carbon (GC) electrode and adsorption of methyl viologen. Cyclic voltammetry was performed in aqueous media to investigate parameters of electrocatalytic reduction of O_2 . The clay that showed the best performance for the adsorption of the methyl viologen was Na-montmorillonite. The methyl viologen - Na-montmorillonite modified electrode was showed a better electrocatalytic activity and reproducibility for the reduction O_2 than the methylene blue - Na-montmorillonite modified electrode. The Na-montmorillonite suspension of 0.16 g clay in 1.83 ml solution was the best electrocatalytic activity. When the adsorption time of methyl viologen into the clay layer was more than 5 min, peak potential and current of reduction O_2 did not change. The methyl viologen - Na-montmorillonite modified electrode made the O_2 reduction potential shift between 65.5 and 435.0 mV in positive direction compared to the bare GC electrode depending on pH of media. Peak current of reduction O_2 at pH 2.6 and 12.7 electrolyte was higher than that at pH between 3.7 and 8.3. Peak current of reduction O_2 increases as temperature increases except pH 2.6. The results suggest that methyl viologen - Na-montmorillonite modified electrode has possibility of electrocatalyst of reduction O_2 .