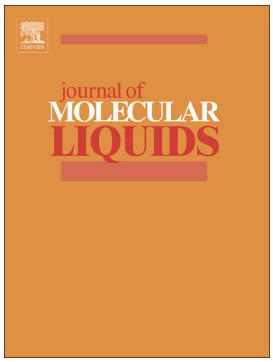

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Anionic oxide-vanadium Schiff base amino acid complexes as potent inhibitors and as effective catalysts for sulfides oxidation: Experimental studies complemented with quantum chemical calculations

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ABSTRACT

Three anionic oxide-vanadium Schiff base *N*-salicylidene amino acid complexes are derived from the reaction of sodium salicylaldehyde-5-sulfonate with phenylalanine (VO-1), alanine (VO-2) or glycine (VO-3), followed by mixing with vanadyl sulfate monohydrate. Inhibition effect of VO-1, VO-2 and VO-3 is investigated for the corrosion of carbon steel in chloride acid solution. From the electrochemical measurements, VO-complexes protect carbon steel form corrosion, yielding maximum inhibition efficiency up to 94.7% in the presence of 1.0 mM VO-1 inhibitor. All VO-complexes act as mixed-type inhibitors. The SEM and EDX investigations provided the appearance of an inhibitor layer encasement the steel surface. Catalytic efficiency of VO-complexes is measured in the symmetric and asymmetric oxidation of sulfides by using an aqueous H_2O_2. All complexes show high catalytic potentials towards sulfides oxidation. VO-1, VO-2 and VO-3 are optimized at B3LYP/GEN and B3LYP/LANL2DZ levels of theory in gas and aqueous phases. Theoretical results agree with the experimental reactivity of the VO-complexes, as corrosion inhibitors and catalysts for sulfides oxidation.

Keywords: Oxide-vanadium, Inhibition, Carbon steel, SEM/EDX, Catalysis, DFT calculations.