

3836494 SCAI/M : MAJOR : APPLIED ANALYTICAL AND INORGANIC
CHEMISTRY : M.Sc.

KEY WORD : VANADIUM / SIMPLEX OPTIMIZATION/ DIFFERENTIAL
PULSE POLAROGRAPHY / CYCLIC VOLTAMMETRY

BUABARN POONPERM : SPECIATION OF VANADIUM
CATIONS IN SULFURIC ACID BY DIFFERENTIAL PULSE
POLAROGRAPHIC AND CYCLIC VOLTAMMETRIC TECHNIQUES. THESIS

ADVISOR : WARET VEERASAI Dr.rer.nat., PRAPIN WILAIRAT Ph.D.,
JUWADEE SHIOWATANA Ph.D. 206 p. ISBN 974-589-424-9

Differential pulse polarographic and cyclic voltammetric techniques for the study of vanadium ions and their complexes in sulfuric acid were developed. The optimum condition for the differential pulse polarographic technique, the transient t-parameters, t_{meas} , t_{pulse} and t_{step} , was determined by using the simplex optimization method. The reduction current of vanadium ions in 6 M sulfuric acid was enhanced 3 times from the default condition, while maintaining good linearity. The irreversible behavior and the weak adsorption phenomena of vanadium species on HMDE surface were investigated by cyclic voltammetric technique.

Various concentrations of sulfuric acid and acetate buffer solutions were selected for the determination of vanadium ions in sulfuric acid. The DP signal of vanadium(III) cation in low concentration of sulfuric acid was well separated from the signals of higher oxidation species but peak current and peak potential were affected by the acid content. Six molar sulfuric acid was used as the supporting electrolyte for determining total vanadium concentration. The dependence of sensitivity on the mole ratio of vanadium species was observed, which was applied for determining ratio of dioxovanadium(V) and oxovanadium(IV) in sample. EDTA in acetate buffer was also used as supporting electrolyte for analysis of total concentration, in which equal sensitivity of both vanadium(V) and vanadium(IV) species was observed. The influence of pH, buffer concentration, EDTA concentration, acid content in standard vanadium solution and interferent metal ions have been studied. Finally, the optimal analytical procedures were applied for speciation studies of vanadium cationic species and their electrolytic products.