BENEFICIATION OF BENFIELD SOLUTION

AND

THE USE OF SOLVENT EXTRACTION - FLOW INJECTION ANALYSIS FOR

THE DETERMINATION OF VANADIUM

THESIS

ON THE RESEARCH PROJECT

SUBMITTED AS A PARTIAL FULFILMENT FOR THE

MASTER OF SCIENCE DEGREE
IN ANALYTICAL CHEMISTRY
UNIVERSITY OF COLOMBO
SRI LANKA

PRESENTED BY

MISS. K. CHINTHA MIRANI FONSEKA, B.Sc. HONS. (SRI LANKA)

408096

Centre for Analytical Research and Development Department of Chemistry University of Colombo Sri Lanka.

August, 1987.

800801

ERREBERT BERTARRIS BORRES BERTARRIS BERTARRIS BERTARRIS FOR FRANCE

ABSTRACT

The Benfield solution which is a disposal liquid of the State Fertilizer Manufacturing Corporation, contains mainly potassium carbonate & bicarbonate, diethyl (DEA) and vanadium. Vanadium is present as both tetra and penta valent states. The content of potassium and vanadium in both states were determined after eliminating DEA. Attempts were made to remove potassium from the Benfield solution as potassium sulphate and vanadium resulting solution as vanadium pentoxide. The precipitation of vanadium was studied and the experimental conditions have been optimized such that a simultaneous precipitation of both penta and tetra valent vanadium was achieved. Most of the potassium and vanadium in the Benfield solution were precipitated successfully in two successive steps.

The effect of pH on the speciation of vanadium was also studied spectrophotometrically, based on metavanadate-sulphuric acid - water system.

The factors influencing symmetry of the flow injection analysis (FIA) response were studied and tests were Vanadium(V) was carried out to optimize the system. analysed using the FIA technique under the optimum The FIA was coupled with solvent extraction conditions. using a phase segmentation device and a membrane phase separator consisting of Zitex (teflon) and Millipore(mitex) filter membranes. Vanadium(V) was extracted into toluene as its 8-hydroxy quinolene complex and was determined using the above FIA device. Both a peristaltic pump and an external pressure source were used to achieve a satisfactory phase separation.