

STUDIES ON SYNERGISTIC EFFECTS IN ION-EXCHANGE AND SOLVENT EXTRACTION

SURYA PRASAD DUBEY, M. Sc.

**A THESIS SUBMITTED TO THE
INDIAN INSTITUTE OF TECHNOLOGY, NEW DELHI
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY IN CHEMISTRY
1971**

ACKNOWLEDGEMENTS

The author is greatly indebted to Dr. A.P.Rao, for suggesting the problem and for his keen interest in the progress of the work. He is grateful to Prof. R.D.Dua, Head of the Chemistry Department, for providing the necessary research facilities. The helpful discussions and continuous encouragement from Dr. V.Ramakrishna, Senior Professor, from time to time, proved immensely beneficial to the author who wishes to gratefully acknowledge the same. The author is also thankful to Dr. G.V.Jere for his kind help in recording the IR spectra.

It is a pleasure to acknowledge the cooperation received from the faculty members and the graduate students of Chemistry Department. Thanks are also due to the members of the supporting staff of the Chemistry Department for their assistance on several occasions.

The author expresses his grateful thanks to the Council of Scientific and Industrial Research, India, for providing financial assistance.

In the end the author would like to thank Mr. R.N.Shukla for typing the thesis.

.....

CERTIFICATE

This is to certify that the thesis entitled "Studies on Synergistic Effects in Ion-Exchange and Solvent-Extraction" being submitted by Mr. S.P.Dubey to the Indian Institute of Technology, Delhi for the award of the degree of Doctor of Philosophy in Chemistry, is a record of bonafide research work carried out by him. Mr. S.P.Dubey has worked under my guidance and supervision and has fulfilled the requirements for the submission of this thesis, which to my knowledge, has reached the requisite standard.

The results contained in this thesis have not been submitted, in part or in full, to any other University or Institute for the award of any degree or diploma.



Head of Chemistry Department,
Indian Institute of Technology,
Hauz Khas, New Delhi-29.
(INDIA).

A. Prabhakaran Rao 29/4/71
(A.P.Rao)
Thesis Supervisor.

CONTENTS

P..RT-I

	<u>Page</u>
Chapter-I	
<u>ANION-EXCHANGE IN MIXED AND NON-AQUEOUS SOLVENTS.</u>	
General Introduction. ...	1
Chapter-II	
<u>SYNERGISTIC EFFECTS IN ION-EXCHANGE AND SOLVENT EXTRACTION IN MIXED SOLVENTS IN CHLORIDE MEDIA.</u>	
Introduction. ...	27
Experimental. ...	28
Results and Discussion.	
(i) Anion-exchange in acetone - methanol - HCl mixtures. ...	38
(ii) Solvent-extraction into MIBK-iso-pentanol mixtures. ...	74
Chapter-III	
<u>SYNERGISTIC EFFECTS IN ION-EXCHANGE AND SOLVENT EXTRACTION IN MIXED SOLVENTS IN NITRATE MEDIA.</u>	
Experimental. ...	88
Results and Discussion. ...	89
Chapter-IV	
<u>SYNERGISTIC EFFECTS IN ION-EXCHANGE AND SOLVENT EXTRACTION IN MIXED SOLVENTS IN SULPHATE MEDIA.</u>	
Introduction. ...	108
Experimental. ...	108
Results and Discussion. ...	109

	<u>Page</u>
Chapter-V	
<u>SEPARATION OF MIXTURES OF METAL IONS ON A COLUMN OF THE ANION-EXCHANGE RESIN USING THE MIXED SOLVENTS.</u>	
Introduction. 	118
Experimental. 	118
Separation of mixtures of metal ions. 	122

PART-II

Chapter-VI	
<u>SYNERGISTIC EFFECTS IN SOLVENT EX- TRACTION OF METAL-SALICYLALDOXIMATES.</u>	
Introduction. 	133
Experimental. 	141
Study of the adduct formation of Zn(II) - salicylaldoxime. ...	148
Study of the adduct formation of Ni(II) - salicylaldoxime. ...	151
Study of the adduct formation of Cu(II) - salicylaldoxime. ...	154
Thermograms 	157
IR spectral studies of the complexes and their adducts. 	158
Summary 	174

.....