This thesis presents the preparation of sulfoxide (DTSO, DPSO & DOSO) and their extraction properties. Extraction of Fe(III) In(III) and Mo(VI) from acid medium by the sulfoxides, TBP and their mixtures are investigated.

The extraction is carried out by taking equal volumes of aqueous phase (Metal ions and acid) and organic phase (extractant in benzene). These are equilibrated at room temperature (25 - 30°C) by manual shaking after which the phases are allowed to separate for 45 minutes and subsequently analyzed by suitable method. Extraction of acids, by sulfoxides in benzene with the change of acid concentration and sulfoxide concentration are studied titrimetrically. Fe(III) tagged with radioactive isotope (Fe$^{55+59}$) is extracted from 1 to 10 M hydrochloric acid by DTSO. The effects of the concentrations of iron, DTSO, HCl, Foreign ions, different diluents and temperature are studied. Synergic extraction by TBP-DTSO and mixed sulfoxide is also observed. Extraction property of different sulfoxides, viz; DMSO, DPSO; DTSO, DOSO and PMSO is investigated.

Neutron activation analysis is extended to the extraction of indium. Extraction of In(III) from HBr solution has been studied. Effect of [HBr], [DTSO], [TBP] and [H$^+$], foreign ions, different diluents on the extraction are investigated. Synergic extraction of mixed ligand and
capacity of different sulfoxides are examined. Similarly, extraction of Mo(VI) tagged with Mo$^{99}$ and effect of [$\text{HCl}$], [$\text{sulfoxide}$], [$\text{TBP}$], [$\text{H}^+$], foreign ions diluents, and different sulfoxide is also investigated.

The extraction equilibria of acids, Fe(III), In(III) and Mo(VI) are examined on the basis of solvation mechanism. It is concluded that acid is extracted as ion pair, part of which expected to be dissociated. Fe(III) and In(III) extract as ion pair in the neutral solvent like benzene and Mo(VI) forms an adduct with sulfoxide. It is suggested that increase in temperature cause dehydration of species. Effect of diluents is explained on the basis of dielectric constant and basicity. Extraction capacity of sulfoxide is observed in an order of DOSO DTSO DPSO PMSO.

Lastly I should express my acknowledgement as follows:

I express my sincere thanks to Dr. M.N. Ray, Reader in Chemistry, Nagpur University, Nagpur for the encouragement and guidance during the course of investigations. I express my gratitude to Prof. K.N. Munshi, Head and Prof. R.H. Sahasrabudhey, ex-Head, Department of Chemistry, Nagpur University, Nagpur, for the laboratory facilities and encouragement.

The award of a Junior Research Fellowship to me by U.G.C., New Delhi is thankfully acknowledged. I also wish to thank authorities of Ravishankar University and Nagpur.
University for giving me permission to carry out the present research work in the Deptt. of Chemistry, N.U., Nagpur.

I also appreciate the co-operation extended by my colleagues. Last but not least, I am thankful to my husband, Alok, for sacrificing many hours which rightfully belonged to him and other relatives for being nice and letting me continue the work.

Date: 8-12-83

Manjula Saxena.