Summary

Chapter I:

Formation constants of complexes formed by (I) Thiophene-2-carboxylic Acid and (II) Tetrahydro-thiophene-2-carboxylic Acid with metal ions like Mn(II), Fe(II), Co(II), Ni(II), Cu(II), Zn(II), Cd(II), Hg(II), Ag(I) and Tl(I) are measured at 30° ±0.1° and at 0.1M NaClO₄ ionic strength. Formation constants of complexes of these metal ions with (III) Acetic acid, (IV) m-Nitrobenzoic Acid and (V) o-Chlorobenzoic Acid in the same experimental conditions have also been measured for comparison.

M-S π interaction has been suggested for Cu(II), Cd(II), and Fe(II) complexes of both I and II. With II metal-sulphur interaction has been suggested for Cu(II), Cd(II), Ag(I), Hg(II) and Fe(II) complexes. Irving and Williams order is not followed by Co(II) and Fe(II). The reversal of order, viz., \( \log K_2 > \log K_1 \) is found for Zn(II), Cd(II), Fe(II) and Ag(I) complexes of II, Fe(II) and Ni(II) complexes of V, and Cu(II) and Ni(II) complexes of IV.

Chapter II:

Formation constants of complexes formed by (I) 2-Thenylamine (2-TA), (II) Tetrahydro-2-thenylamine (THTA), (III) 5-Methyltetrahydro-2-thenylamine(5-MeTHTA), (IV) Benzyllamine (BZA), and (V) Thiophene-2-carboxamide (TCAMD) with metal ions like
Cu(II), Ni(II), Co(II), Zn(II), Cd(II), Hg(II) and Ag(I), are measured at $30^\circ \pm 0.1^\circ$ and at 0.1M NaClO$_4$ ionic strength. Metalsulphur interaction is suggested for Ag(I) complex with 2-TA. Irving and Williams' order is not followed by Co(II) with 2-TA and TCAMD. With the amine ligands for Zn(II) and Ag(I) the order of successive stabilities is $\log K_2 > \log K_1$.

CHAPTER III:

Formation constants of Mn(II)-, Co(II)-, Ni(II)-, Cu(II)-, Zn(II)-, Cd(II)-, Hg(II)-, Ag(I)- and Tl(I)- complexes of Thiophene-2-aldoxime and 5-Methyl-thiophene-2-aldoxime under the above mentioned experimental conditions have been measured.

For Ni(II)- and Zn(II)- complexes of both the ligands it is observed that $\log K_2 > \log K_1$. Zinc-sulphur bond has been suggested for its complexes with both the ligands.

CHAPTER IV:

Spectrophotometric method has been used for the determination of compositions and stability constants of Pd(II)- complexes of Thiophene-2-aldoxime and Thiophene-2-carboxylic acid in water at 20°C with ionic strength = 0.1M NaClO$_4$. With both the ligands Pd(II) forms complexes with metal ion to ligand ratio 1:2. Values of stability constants for the oxime are $\log K_1^{\text{Pd(II)}} = 14.31; \log K_2^{\text{Pd(II)}} = 11.30$. With thiophene-2-carboxylic acid, $\log \beta_2^{\text{Pd(II)}} = 10.23$. 5-Methyl-thiophene-2-aldoxime gives 1:1 complex.
CHAPTER V:

2:1 (ligand:metal) complexes of 2-TA and 5-Me-T-2-OXM with the chlorides of Co(II), Ni(II), Cu(II), Zn(II), Cd(II) and Pd(II) have been prepared from alcoholic solutions of ligands and anhydrous chlorides. I.R. absorption frequencies are reported for the OH, C = N conjugated and N = O stretching vibrations. Assignments of metal-nitrogen vibrations are made. With 2-TA only metal-nitrogen bondings have been suggested.