

CONTENTS

| | |
|------------------|---|
| Chapter-1 | 1. Introduction |
| | 1.1. Transition metal complexes as anticancer agents 1.1.1. Platinum based anticancer drugs 1.1.2. Non-platinum anticancer agents |
| | 1.2. Transition metal complexes in other therapeutic uses |
| | 1.3. Transition metal complexes as anti-inflammatory agents and free radical quenchers |
| | 1.4. Biological importance of heterocyclic compounds 1.4.1. Quinoxaline 1-4-di-N-Oxide derivatives 1.4.2. Heterocyclic compounds as antimalarial agents 1.4.3. Heterocyclic compounds as Diuretic agents 1.4.4. Heterocyclic compounds as anthelmintic agents 1.4.5. Heterocyclic compounds as antineoplastic agents 1.4.6. Heterocyclic compounds as antidepressants 1.4.7. Heterocyclic compounds as antiulcer agents 1.4.8. Heterocyclic compounds as antipsychotic agents |
| | 1.5. Schiff bases and its complexes 1.5.1. Transition metal complexes of Schiff bases 1.5.2. Applications of Schiff base transition metal complexes |
| | 1.6. Ruthenium Schiff base complexes |
| Chapter-2 | 2.1. Quinoxalines 2.1.1. Review on quinoxaline derivatives and its transition metal complexes |
| | 2.2. Pyrimidines 2.2.1. Review on various pyrimidine derivatives and its transition metal complexes |
| | 2.3. Benzothiazoles 2.3.1. Review on benzothiazole derivatives and its transition metal complexes |
| Chapter-3 | 3.1. Introduction |
| | 3.2. Experimental Work |

| | |
|--|---|
| | <p>3. 2. 1. Synthesis of ligand</p> <p>3. 2.1.1 Synthesis of 1,4-dihydroquinoxaline-2,3-dione</p> <p>3.2.1.2. Synthesis of 3-[(2-aminoethyl) amino]quinoxalin-2(1H)-one(II)</p> <p>3.2.1.3. Synthesis of 3-[(2-[(E)-(hydroxyphenyl) methylidene]amino} ethyl) amino] quinoxalin-2(1H)-one(III) (L)</p> <p>3.2.2. Synthesis of the complexes</p> |
| | <p>3.3. Characterisation of the ligand and the metal complexes</p> <p>3.3.1. Instrumentation</p> <p>3.3.2. Magnetic moment studies</p> <p>3.3.3. Computational procedures</p> |
| | <p>3.4. Pharmacology</p> <p>3.4.1. Antimicrobial activity</p> <p>3.4.2. In-vitro anticancer activity-Cell treatment procedure and MTT assay</p> <p>3.4.3. DNA Binding</p> <p>3.4.4. Antioxidant activity</p> |
| | <p>3.5. Results and discussion</p> <p>3.5.1. Analytical data</p> <p>3. 5. 2. IR Spectral data of the ligand and complexes</p> <p>3. 5. 3. NMR Spectra</p> <p>3. 5. 4. Magnetic moment and electronic spectral data of the complexes</p> <p>3.5. 5. Thermogravimetric analysis of complexes</p> <p>3. 5. 6. ESR spectral studies of copper complex</p> <p>3. 5. 7. Quantum chemical computational studies</p> <p>3. 5. 8. EDAX spectral details of Cu(II) and Ni(II) complex</p> |
| | <p>3.6. Pharmacology</p> <p>3. 6. 1. Antimicrobial activity</p> <p>3. 6. 2. Anti-Cancer activity</p> |

| | |
|------------------|---|
| | 3. 6. 3 DNA Binding 3.6.4. Antioxidant activity |
| | 3.7. Conclusion |
| Chapter-4 | 4.1. Introduction |
| | 4. 2. Experimental work 4. 2.1. Synthesis of ligands 4.2.2 Synthesis of complexes |
| | 4. 3. Characterization of ligands and complexes |
| | 4.4. Determination of X-Ray crystal structure |
| | 4. 5. Results and discussion 4.5.1. Structural description of the ligand 4.5.2. Infrared Spectra 4. 5. 3. Electronic spectra 4.5.4. NMR Spectra 4.5.5. Thermogravimetric analysis of the complexes 4.5.6. Mass spectral analysis 4.5.7. ESR Spectral data of the Cu(II) complexes 4.5.8. EDX Spectral details of the complexes 4.5.9. Theoretical structure of the complexes 4.5.10. HOMO-LUMO Calculations |
| | 4.6. Pharmacology 4.6.1. Antimicrobial studies 4.6.2. In-vitro anticancer activity 4.6.3. DNA Binding Study 4.6.4. DNA Cleavage Studies 4.6.5. Anti-tuberculosis activity 4.6.6. Complexation of β -Cyclodextrin 4.6.7. Docking |
| | 4.7. Conclusion |
| Chapter-5 | 5.1. Introduction |
| | 5.2. Synthesis of Schiff base ligand 5.2.1. 6-amino-5-[2-hydroxy-benzylidene)-amino]-2-thioxo-dihydro-pyrimidin-4-one (1) L ₁ |

| | |
|--|---|
| | <p>5.2.2.6-amino-5-[2-bromo-6-hydroxy-benzylidene)-amino]-2-thioxo-dihydro-pyrimidin-4-one (2) L²</p> <p>5.2.3.6-amino-5-[(2-hydroxy-6-methoxy-4-nitro-benzylidene) amino]-2-thioxo-2, 3-dihydro-1H-pyrimidin-4-one (3) L³</p> <p>5.2.4.6-amino-5-[(2-hydroxy-naphthalen-1-ylmethylene)-amino]-2-thioxo-dihydro-pyrimidin-4-one (4) L⁴</p> |
| | <p>5.3. Preparation of the complexes</p> <p>5.3.1. Synthesis of [RuCl₃(PPh₃)₃]</p> <p>5.3.2. Synthesis of [Ru(Cl)₂(PPh₃)(L¹)](5)</p> <p>5.3.3. Synthesis of [Ru(Cl)₂(PPh₃)(L²)](6)</p> <p>5.3.4. Synthesis of [Ru(Cl)₂(PPh₃)(L³)](7)</p> <p>5.3.5. Synthesis of [Ru(Cl)₂(PPh₃)(L⁴)](8)</p> |
| | <p>5.4. Catalytic oxidation of alcohols</p> <p>5.4.1. H₂O₂ as oxidant</p> |
| | <p>5.5. Results and Discussion</p> <p>5.5.1. FT-IR Spectra</p> <p>5.5.2. Electronic spectra</p> <p>5.5.3. Magnetic moment and EPR spectra</p> <p>5.5.4. Mass spectral analysis</p> <p>5.5.5. EDX Analysis</p> <p>5.5.6. Thermogravimetric analysis</p> <p>5.5.7. DFT Calculations</p> |
| | <p>5.6. Pharmacology</p> <p>5.6.1. In-vitro antimicrobial activity</p> <p>5.6.2. <i>In-vitro</i> anticancer activity</p> <p>5.6.3. Anti-tuberculosis activity</p> <p>5.6.4. Anti-oxidant activity</p> <p>5.6.5. DNA Binding</p> <p>5.6.6. Docking with DNA</p> <p>5.6.7. Nuclease activity in the presence of radical scavengers</p> |

| | |
|------------------|---|
| | 5.7. Catalytic activity |
| | 5. 8. Conclusion |
| Chapter-6 | 6. 1. Introduction |
| | 6.2. Experimental 6.2.1. Synthesis of Co(II) complex 6.2.2. Computational details |
| | 6.3. Results and Discussion 6.3.1. Single Crystal XRD studies of Co(II) complex 6.3.2. Spectral characterization of Co(II) complex 6.3.3. Magnetic properties 6.3.4. Luminescence spectra |
| | 6.4. Pharmacology 6.4.1. In-vitro anti-microbial activity 6.4.2. In-vitro anti-cancer activity 6.4.3. Anti-tuberculosis activity 6.4.4. Anti-oxidant activity 6.4.5. UV–visible absorption spectral titrations 6.4.6. Docking with DNA |
| | 6.5. Conclusion |
| Chapter-7 | 7.1. Introduction |
| | 7.2. Synthesis of Schiff bases 7.2.1.2-[6-Methyl-benzothiazol-2-ylimino)-methylphenol (1) L ¹ 7.2.2. 3-Bromo-2-[6-methyl-benzothiazol-2-ylimino)-methylphenol (2) L ² 7.3. Synthesis of complexes 7.3.1. Synthesis of [Ru(Cl) ₂ (PPh ₃)(L ¹)](3) 7.3.2. Synthesis of [Ru(Cl) ₂ (PPh ₃)(L ²)](4) 7.3.3. Structural description of Schiff base ligand 7.3.4. FT-IR spectra 7.3.5. Electronic spectra 7.3.6. Magnetic susceptibility 7.3.7. EPR spectroscopic analysis |

| | |
|------------------|---|
| | 7.3.8. EDX Analysis 7.3.9. SEM images |
| | 7.4. Sensor applications of Schiff bases |
| | 7.5. Pharmacology 7.5.1. In-vitro antimicrobial activity 7.5.2. In-vitro anticancer activity 7.5.3. DNA Binding Studies 7.5.4. Tuberculosis activity 7.5.5. Computer aided drug design |
| | 7.6. Conclusion |
| Chapter-8 | 8.1. Introduction |
| | 8.2. Synthesis of ligands 8.2.1. Synthesis of ligand 1 (L ¹) 8.2.2. Synthesis of ligand 2 (L ²) 8.2.3. Synthesis of ligand 3 (L ³) |
| | 8.3. Synthesis of complexes |
| | 8.4. Results and discussion 8.4.1. Structural description of the ligands 8.4.2. FT-IR spectra 8.4.3. Electronic spectra 8.4.4. Thermal analysis 8.4.5. Photoluminescence spectra |
| | 8.5. Pharmacology 8.5.1. Anti-microbial activity 8.5.2. DNA Cleavage activity |
| | 8.6. Conclusion |
| Chapter-9 | 9.1. Synthesis, characterization, single crystal XRD, <i>in-vitro</i> antimicrobial and cytotoxicity study of tris (ethylene diamine)cobalt(III)chlorideoxalate trihydrate. |
| | 9.2. Synthesis, Structure, and Pharmacological Evaluation of Co(III) Complex Containing Tridentate Schiff Base Ligand. |
| | 9.3. Synthesis, Characterization, Single Crystal XRD and |

| | |
|-------------------|---|
| | biological evaluation of Nickel(II)salen sulphadiazine complex. |
| Chapter-10 | SUMMARY AND CONCLUSIONS |
| | SCOPE FOR FUTURE WORK |
| | LIST OF PUBLICATIONS |