CHAPTER-6
CONCLUSION

Organophosphorus heterocycles containing O and N in a six-membered ring have gained much attention ever since cyclophosphamide was discovered as anti-cancer drug. The significant activity of all these compounds was accredited to the presence of six-membered heterocyclic rings. Chalcogenides of the heterocyclic compounds shows a great contribution towards their stability and reactivity. So, importance of heterocyclic discipline within organophosphorous chemistry has increased continuously. Phosphorus–heterocycles and their derivatives are of great interest as bioactive substances with various properties. In view of various applications of organophosphorous heterocyclic compounds, we studied different types of phosphorous heterocycles.

In this thesis, we synthesized a new range of heterocycles containing nitrogen (N), oxygen (O) and phosphorous (P) as heteroatoms and their chalcogenides. The main objectives was to prepare the chalcogenides and metal complexes of 3-(4-methyl-phenyl)-2-phenyl-3,4-dihydro-2H-benzo[e] [1,3,2]oxazaphosphinine, 3,9-Bis-(2,4-di-tert-butyl-phenoxy)-2,4,8,10-teraoxa-3,9-diphospha-spiro[5.5]undecane, 2-Phenyl-benzo[1,3,2]dioxophosphinin-4-one. Most of the reports about the preparation of these P-heterocycles are with phosphoryl/ thiophosphoryl chloride, as P (V) precursors or with Lawesson’s reagent but no compound have been reported from P (III) precursors, for example- PCl$_3$/ PhPCl$_2$ etc. We are reporting here the synthesis of such P-heterocycles with PCl$_3$/ PhPCl$_2$ where P is in (III) oxidation state and these P-
heterocycles have been stabilized with organometallic moieties like M(CO)₅ (M= W, Mo, Cr) and phosphorous (V) compounds are prepared by oxidizing with chalcogenides.

In conclusion, we have prepared a number of P-heterocycles as stable solid compounds and additionally they are stabilized by either complexation with organometallic moiety i.e. M(CO)₅ or oxidation with DMSO, sulphur and selenium to isolate their chalcogenides. But during preparation of these compounds one should take care that these compounds are air sensitive and must be prepared only under strictly anhydrous/moisture-free conditions, i.e. in an inert atmosphere of dry nitrogen gas. These compounds could prove as potential reagents for biological and other industrial applications.

**Suggestion for future work** - A large number of applications of phosphorous heterocycles are now available in medicinal, biological and industrial fields. The great efforts of many researchers have culminated in the development of heterocycles and their stability. Phosphorous heterocycles in (III) oxidation state decomposes readily. To overcome this problem, several efforts have been made to improve their stability and reactivity. It has been found that P-heterocycles are stabilized by either complexation with organometallic moiety i.e. M(CO)₅ where (M= W, Mo, Cr) or oxidation with sulfur and selenium to isolate their chalcogenides. But during preparation of these compounds low temperature and dry nitrogen atmosphere should be required to store for long time. Therefore, the synthesis and stabilization of P-heterocycles is of importance for various applications.