The thesis has explored the scope of N-hydroxy-3-azaspiro[5,5]undecane-2,4-dione (HO-ASUD) in peptide chemistry. HO-ASUD is structurally similar to the widely used N-hydroxysuccinimide (N-OSu) and with some advantages.

ASUD-diphenyl phosphate and ASUD-diethyl phosphate, prepared from HO-ASUD, are found to be excellent new reagents for the synthesis of N-protected amino acid- ASUD esters useful in the synthesis of peptides. The new reagents are stable crystalline material and react with N-protected amino acids in a facile manner under mild conditions and gives N-protected amino acid-ASUD esters in high yields while preserving the chiral integrity of the amino acid. The new reagents are eliminating the requirement of DCC, a skin allergen, which is used previously in preparing ASUD esters. Dipeptides were prepared using these reagents thorough N-protected amino acid-ASUD esters without losing chiral purity good yields are obtained.

The present study has shown that the 9-fluorenylmethoxy-carbonyl-N-Hydroxy-3-azaspiro [5, 5] undecane-2, 4-dione ester (Fmoc-OASUD) is a novel and excellent reagent for preparing Fmoc-amino acids. The reagent Fmoc-OASUD is a stable crystalline solid which can be prepared in high yields and purity by reacting HO-ASUD with Fmoc chloride. The reagent Fmoc-OASUD reacts with amino acids in a facile manner at room temperature, in a short time, to give Fmoc-amino acids in good yields.

The Fmoc-amino acids thus prepared showed high chemical and chiral purity. The impurities observed due to Lossen type rearrangement in the case of widely used, Fmoc-OSu, were absent in the present case. This is mainly due to the higher stability of Fmoc-OASUD in aqueous basic medium, compared to Fmoc-OSu.

Based on HO-ASUD, a new Boc protecting reagent, tert-butyl (2, 4-dioxo-3-azaspiro [5,5] undecan-3-yl) carbonate (Boc-OASUD) has been explored. It is a very useful reagent for the preparation of N-Boc protected amino acids and their esters. The new reagent is a stable crystalline material and reacts with the amino group in a facile manner under mild conditions without causing racemization.
The Z-OASUD is a novel and excellent reagent for preparing N-Z-protected amino acids. The new reagent is a stable crystalline solid, which can be prepared in high yields and purity by reacting HO-ASUD with Z-Cl. The reagent Z-OASUD reacts with amino acids in a facile manner at room temperature, in a short time, to give N-Z-protected amino acids in good yields without causing racemization.

Thus, the present study has showed that N-hydroxy-3-azaspiro[5,5]undecane-2,4-dione (HO-ASUD) is a versatile reagent useful in the peptide synthesis in various ways.