SUMMARY & CONCLUSIONS:

CHAPTER-1

We have described various kinds of antipsychotic drugs along with their pharmacological activity, and comparison among typical and atypical antipsychotic pharmaceutical ingredients. We further discussed importance for alternate synthetic processes for the preparation of active pharmaceutical ingredients to a pharmaceutical industry and reasons for the formation of related compounds (impurities) of an active pharmaceutical ingredient.

CHAPTER-2

We have provided a new, simple, scalable and cost effective process for the preparation of Quetiapine (23) involving the use of simple reagents in excellent yields. Further to this, we have also identified, characterized and synthesized two potential process related substances of Quetiapine. Our new route to 23 is schematically described as follows (Scheme 1)
We have also identified, characterized and synthesized two process related compounds of Quetiapine 55 and 56, which are generated during the synthetic process.

**CHAPTER-3**

We have systematically designed and synthesized three alternate routes for the preparation of atypical antipsychotic drug substance,
Ziprasidone (24) based on the encountered problems through precedent synthetic schemes.

The first synthetic approach (Scheme 2) involved the condensation of 62 with 60 under basic conditions to yield 76, which was conveniently transformed to the targeted compound with the aid of triethyl silane and methane sulfonic acid with good purity and yield.

**Scheme 2**

Compound 77, a novel intermediate was utilized in 2nd alternate method to prepare Ziprasidone involving usual reaction conditions and the desired compound was obtained in appreciable yield with ICH grade purity (Scheme 3)
The third approach was unique when compared to others and four new intermediate compounds were involved to provide the targeted compound in a satisfactory yield with required purity (Scheme 4). All these new intermediate compounds were fully characterized by their individual spectral data.

Scheme 4:
Summary & Conclusions

In this chapter, we have provided the synthetic process for the first time for three pharmacopoeial related compounds of Ziprasidone. Apart, from this we have also identified, characterized and synthesized one process related impurity of Ziprasidone.

CHAPTER-4

We have established a new route for the preparation of Aripiprazole (27) mainly using Beckmann rearrangement conditions to form carbostyril moiety from the corresponding oxime derivative (Scheme 5)
Two other synthetic approaches (Scheme 6) were also established for the preparation of key intermediate 109.

Scheme 6:
Summary & Conclusions

This chapter also described process for the preparation of four related compounds of compound 27 and they are as follows:

CHAPTER-5

In this chapter, we have established a simple two step process for the preparation of Olanzapine (26) by following the reaction conditions of Suzuki coupling, particularly with the aid of palladium catalyst with the marginal yields (Scheme 7).
This chapter also provided following four process related compounds of 26.
The present research work summarized herewith encompasses alternate, non-infringing and scalable processes for the preparation of atypical antipsychotic key drug substances like Quetiapine, Ziprasidone, Aripiprazole and Olanzapine. Since, most of the processes for these drug substances were protected in valid patents across the globe to have monopoly patent rights by Innovator Pharma companies. It is required to circumvent the processes protected by these patents, in order to timely market the product and particularly in less regulated countries of European region, a non-infringing process will certainly have an advantage to get an early launch opportunity. In view of exploring the unique opportunity for an early launch at an affordable cost to the needy patients, we have successfully ventured the non-infringing processes for the abovementioned molecules and the same was the basis for the present work.