Title : Analytical Method Development And Validation For Assay And Related Compound of Pramipexole Drug and Finish Product.

1. INTRODUCTION:

Development of analytical methods for bulk drug and their formulations is an important aspect in the drug product development as it helps to maintain the quality and efficacy of the drug product right from the product development process till its ultimate therapeutic use. Quality can be defined as the character, which defines the grade of excellence. The quality drug is something, which will meet the established product specifications, can be safely bought and confidently used for the purpose for which it is intended. There is no fear of adulteration or unpredictable side effects with such a quality drug. Quality is important in every aspect of life and when it comes to life it is crucial. Quality issues such as the studies of impurity, stability, degradation and analysis of drug product would be the research work to stress upon. These demands analytical development and standardization of sensitive and specific instrumental methods for testing of simultaneous, product study and analysis of drug product. Quality assurance plays a central role in determining the safety and efficacy of medicines. Highly specific and sensitive analytical technique holds the key to the design, development, standardization and quality control of medicinal products.\(^{[1]}\)

The efficacy and safety of a medicinal product can be assured by analytical monitoring of its quality. It is important that analytical procedure proposed of a particular active ingredient or its dosage form should be systematically sound under the condition in which it is to be applied.

**Parkinson's disease:**

Parkinson's disease is a neurodegenerative disease affecting the substantia nigra, a component of the basal ganglia. The substantia nigra has a high quantity of dopaminergic neurons, which are nerve cells that release the neurotransmitter known as dopamine. When dopamine is released, it may activate dopamine receptors in the striatum, which is another component of the basal ganglia. When neurons of the substantia nigra deteriorate in Parkinson's disease, the striatum no longer properly receives dopamine signals. As a result, the basal ganglia can no longer regulate body movement effectively and motor function becomes impaired. By acting as an agonist for
the D₂, D₃, and D₄ dopamine receptors, pramipexole may directly stimulate the under functioning dopamine receptors in the striatum, thereby restoring the dopamine signals needed for proper functioning of the basal ganglia.

Pramipexole (Mirapex, Mirapexin, Sifrol) is a non-ergoline dopamine agonist indicated for treating early-stage Parkinson’s disease (PD) and restless legs syndrome (RLS). It is also sometimes used off-label as a treatment for cluster headache and to counteract the problems with sexual dysfunction experienced by some users of the selective serotonin reuptake inhibitor (SSRI) antidepressants. Pramipexole has shown robust effects on pilot studies in a placebo-controlled proof of concept study in bipolar disorder. It is also being investigated for the treatment of clinical depression and fibromyalgia.²,³

Mol. Structure:

![Molecular Structure of Pramipexole](image)

**Formula**: C₁₀H₁₇N₃S

**Molecular Mass**: 211.324 g/mol

Pramipexole dihydrochloride⁴ is chemically (S)-2-amino 4, 5, 6, 7-tetrahydro -6-(propylamino) benzothiazole dihydrochloride. It is a non-ergot dopamine receptor agonist used for symptomatic treatment of Parkinson’s disease. Pre-clinical studies reveal that nanomolar concentrations of Pramipexole protect dopaminergic neurons invitro or invivo by a receptor-dependent pathway mediated by the high selectivity of the drug for D₃-receptors. At higher concentrations, the drug has been shown to be neuroprotective invitro independent of the dopaminergic agonism⁵. Molecular formula is C₁₀H₁₇N₃S.2HCl.H₂O and molecular weight is 302.3. It is white to off-white powder. It is soluble in water, sparingly soluble in methanol, ethanol and practically insoluble in dichloromethane.
Pramipexole can be synthesized from a cyclohexanone derivative by the following route\(^{[6,7]}\)