## Chapter 3

### Objectives, Hypothesis and Specific Aims

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3.1 Objectives

Two overall objectives of the present investigation are listed below:
1. Dissolution enhancement of BCS Class-II drugs by formulation of solid dispersion adsorbate employing common technology of melts adsorption and solid dispersion.
2. Validation of the developed technology by use of another BCS Class-II drug and another surfactant based carrier.

3.2 Hypothesis

BCS Class II drug may behave as a BCS Class I drug if correct formulation strategy is adopted. Solid dispersions have tremendous potential in increasing the dissolution rate but it is commercially not much exploited due to problems like poor stability, poor compressibility and difficulty in process scale up. These problems can be overcome by converting the solid dispersion to adsorbate, which involves adsorbing the prepared solid dispersion on a free flowing adsorbent. Adsorbents having high porous structure will entrap the drug carrier system into its network and thus, improves the stability as well as compressibility property. Also, the use of surfactant-based carrier will limit the amount of carrier to be used. Hence large amount of carrier will not be required which is an added advantage of this technique.

3.3 Specific Aims

The aims of the present work are mentioned below:
1. Formulation development of solid dispersion adsorbate of BCS Class II drugs by a common technology of melt adsorption and solid dispersion. The carrier used was surfactant based and adsorbent selected was Neusilin due to its large surface area and good adsorbing capacity. The drugs selected were as follows:
   a. Ritonavir
   b. Febuxostat
   c. Lamotrigine
   d. Candesartan cilexetil (as a check-point API to validate the evolved hypothesis)
3. Proposition of a suitable design space in form of contour plots with the help of mathematical models.
4. Utilization of statistical tools to explain the results of experiments.
5. The target was to achieve at least 85% drug release in 60 min of the selected drugs as per the FDA guidelines except for ritonavir where the dissolution criteria is set for >70% drug release in 10 min.
6. Characterization of the optimized drug product by FTIR, DSC and XRD.
7. Application of convolution modeling to predict plasma concentration time profile for each selected drug.
8. Stability studies of the optimized formulation of each selected drug.
9. Understanding the mechanism of improvement in dissolution when combination of surfactant (Lutrol F127, Labrasol and Transcutol) and adsorbent (Neusilin) are used.
11. Validation of developed technique with the use of another surfactant based carrier (Vitamin E-TPGS) and the adsorbent Neusilin.