CHAPTER I

INTRODUCTION

Mixing action is not only to produce uniform mixings of component. In some cases, an important part of the mixing operation is movement or transfer of materials to or from surfaces of particles or phases. Examples of such operations are dissolution, crystallization, liquid-liquid extraction, gas absorption, and leaching solid dissolution for suspended particle in turbulent liquid flow is important and depends on several parameters. Physico-chemical properties are essentials among them. Agitated vessels are often used because they are effective in suspending solid particles, ensuring that all the surface area available is utilized and because they lead to good dissolution rate.

In lubricating oil blending process (Fig.1.1) mixing is very important to obtain homogeneous lubricating oil solution. The problem encouraged mixing in is that, the solid particles of styrene-butadiene is rather difficult to dissolve in mineral oil and a long blend time is needed. On the other hand, the rate of solid dissolution and homogeneity have significant effect on production capacity and power consumption in the production of lubricating oil product.

There is very little work reported in the literature where either the theoretical or the experimental aspects of solid-liquid dissolution in agitated vessel. A survey of technical literature on this problem have been published, especially about suspended particles in agitated vessels. Hixson and Baum[1], Nagata and Yamagushi[2], Barker and Treybal[4], Johnson and Chen-Jung.[8], and Harioit[9] are representative investigations for agitated vessels. However a detailed analysis proves that there exists a wide divergence of theories, results and correlations.

The main objective of this study is to obtain a solid-liquid dissolution correlation equation to predict the solid dissolution rate coefficient of 2 wt%, 3wt% and 4wt% solid particles of polystyrene-butadiene in mineral oil. The study will be conducted in standard configuration tank using standard six-bladed disc turbine impeller, as follows:

1. The important parameters for solid dissolution, such as impeller speed, temperature and solid concentration will be studied and correlated in terms of dimensionless number of Sherwood, Reynolds, and Schmidt.The various mixing conditions to be investigated are

- Impeller speed in a range of 350-550 rpm.
- Liquid temperature in a range of 115-135°C
- Solid concentration of styrene-butadiene in a range of 2-4 wt%

2. The physicochemical properties of styrene-butadiene dissolution in mineral oil will be studied and include

- Solid dissolution rate coefficient
- Solubility
- Viscosity
- Density

3. A comparison with correlation of other investigation will be conducted.

Figure : 1.1 Lubricating Oil Blending Process