



Chapter I

Introduction

Comminution is one of the processes playing an important role in many industrial fields especially those involve with particulate materials such as mineral processing, pharmaceutical production, cosmetics and pigments preparation. The purpose of comminution is not only reducing the sizes of materials, but also producing materials with suitable properties.

In mineral beneficiation, comminution is also the most energy-consuming process. The energy consumed in comminution alone represents up to 70% of the energy for the whole beneficiation process. Therefore, it becomes an important task to increase efficient of comminution.

One of the comminuting machines widely used in various industries is a vibration mill because of its excellent efficiency and operational facility for production of fine particles. Although studies on the performance and operation variables of vibration mills have been investigated by many researchers, the change in particle shape during comminution has not been clearly understood.

In the past, for determining the efficiency of comminution average particle size and its size distribution has been taken into account. However, in some certain cases ground particle have not only the same average size, but also the same size distribution. However, with the difference of overall particle shape, such ground particle will show the difference flow behavior. The flowability is an important characteristic because it will affect on transportation of product in processes.

Therefore, in this work effect of comminuting condition on the shape particles and flow characteristics is investigated using a vibration mill. The concept of fractal geometry is employed to analyze the particle shape quantitatively. The correlation of particle shape with its flow characteristics evaluated by powder tester.

1.1 Objectives of Present Study

In this study, the effect of grinding conditions on particle shape of feldspar using a vibration mill were investigated. The main objectives of this work are as follows:

1.1.1 To study the change in particle shape of feldspar taking place during comminution.

1.1.2 To study the analysis of particle shape with the concept of fractal dimensional analysis.

1.1.3 To investigate relationship of the fractal dimension and flowability of ground feldspar particles.

1.2 Scope of Present Work

1.2.1 To investigate possibility of the particle shape analysis by applying the concept of fractal geometry.

1.2.2 Studying the major factors that influence the particle shape during comminution of feldspar. The study factors in this work are as follows:

1.) Grinding times : 15,20,25 and 30 minutes.

2.) Weight ratio of grinding media to substance : 3:1,4:1,5:1 and 6:1.