CHAPTER III
SAMPLE PREPARATION

3.1 Introduction

This chapter describes basic characteristics of stone dust used in this study. The limestone stone dust deposits and description are described.

3.2 Rock Description

Stonedust samples used for testing are limestone obtained from Khum-ngern Khum-tong Co., Ltd., stone crushing plant, Nakhon Ratchasima province. It belong to Permian sequences, characterized by predominantly thick carbonate sediments, and are extensively distributed throughout the country. They are classified as part of the Ratburi Limestone Formation or Ratburi Group, with the type locality situated in Ratchaburi province, western Thailand (Brown et al., 1951; Javaaphet, 1969). Bunopas (1981) proposed restricting the designation 'Ratburi Group' to Permian limestones found in western and peninsular Thailand. He introduced the term 'Saraburi Group' to encompass Permian limestones and clastic rocks in central and northeastern Thailand. This distinction is justified by the significant faunal disparity between the Ratburi Group, deposited in the peri-Gondwana realm, and the limestones of the northeast, including the current study area, which originated within the Tethyan realm.

3.3 Sample preparation

The stone dust used in this study is prepared from Khum-ngern Khum-tong Co., Ltd., stone crushing plant of the Saraburi group in Nakhon Ratchasima province. Sieve analysis is employed to determine the particle size distribution of the specimens, with the results presented in Figure 3.1. The bulk density of the specimens, defined as the ratio of dry mass to volume, is determined to be 1.62 g/cc in accordance with the ASTM C29/C29M-23 standard. Mineral composition analysis of the specimens is conducted using X-ray diffraction (XRD). To prepare the samples for XRD analysis, the stone dust is crushed into a rock powder with particle sizes less than 0.25 mm (mesh #60).

The XRD analysis is performed using a Bruker D2 Phaser instrument, adhering to the guidelines outlined in ASTM E1426-14 standard practice. The results of the XRD analysis are summarized in Table 3.1.

The sphericity and roughness of individual particles are evaluated across 7 particle size ranges: 4.75 mm, 2.0 mm, 0.85 mm, 0.425 mm, 0.25 mm, 0.15 mm, and 0.075 mm. Ten particles are examined within each size range using an optical microscope (as shown in Figure 3.2). Following the established classification systems outlined by Powers (1982) (Figure 3.3), the average roughness and sphericity values for each material are presented in Table 3.2.

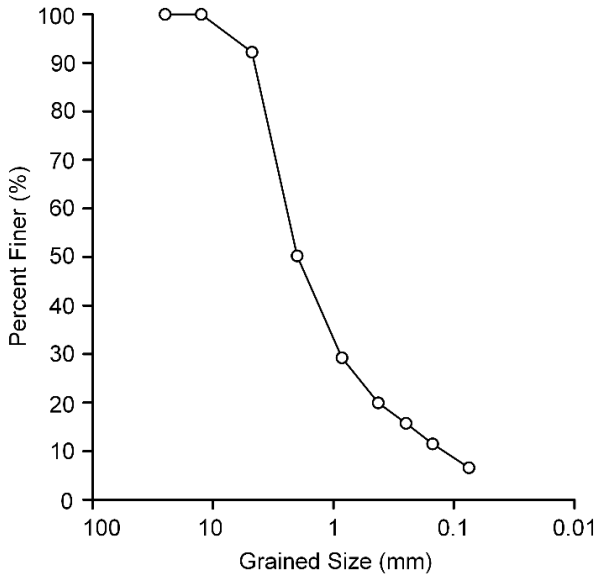

Figure 3.1 Particle size distributions of stone dust.

Table 3.1 Mineral compositions from XRD analysis.

Mineral Compositions	Concentration (%)
Calcite	66.92
Dolomite	25.97
Ankerite	3.51
Huntite	1.61
Cooperite	0.18
Cuspidine	1.12
Natron (Soda)	0.69

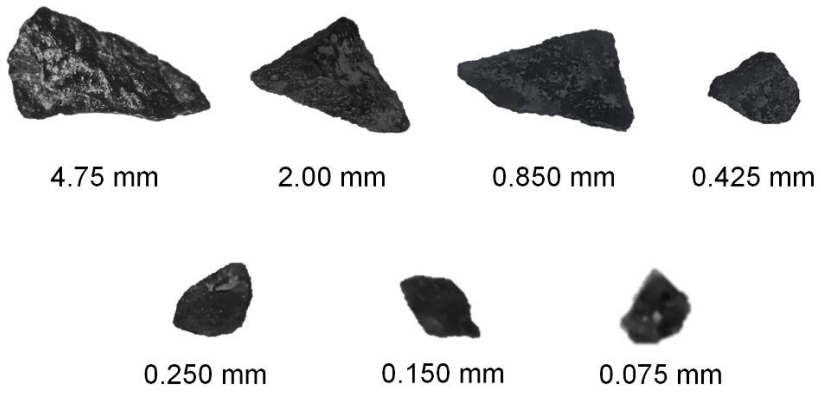

Figure 3.2 Examples of representative size and stone dust particles.

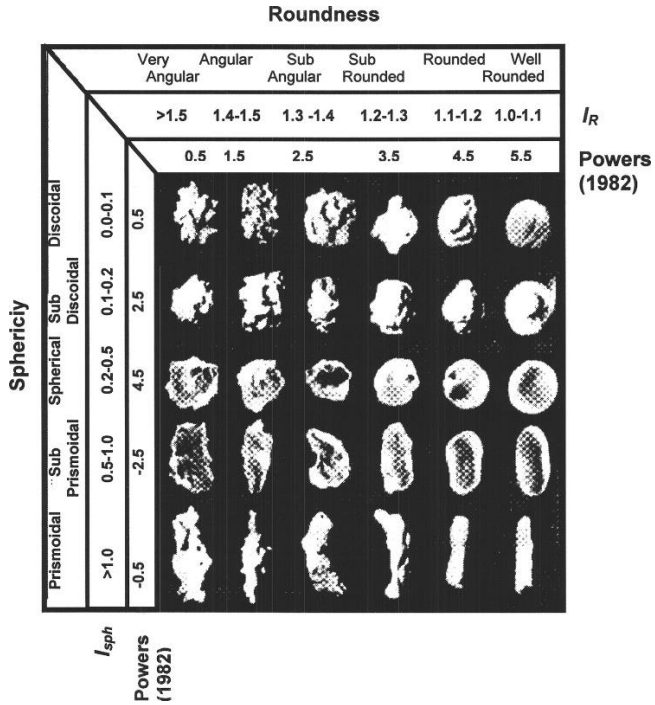

Figure 3.3 Estimation of roundness and sphericity of sedimentary particles (Powers,1982).

Table 3.2 Particle shape classification of stone dust particles based on Powers (1982).

Particle size (mm)	Roundness	Sphericity
4.75	0.37	0.48
2.0	0.46	0.77
0.85	0.51	0.57
0.425	0.43	0.80
0.25	0.49	0.91
0.15	0.41	0.77
0.075	0.74	1.00