CHAPTER III

SAMPLE PREPARATION

3.1 Introduction

This chapter describes test specimens' preparation with different bedding plane orientations and scratching directions, description of specimens, and their mineral compositions obtained from X-ray diffraction analysis (XRD). The rock samples include Khao Khad argillaceous limestone, Khao Khad bedded limestone, Phu Kradueng sandstone, Phu Phan sandstone, and Tak Fa gypsum. The location of these rocks is shown in Figure 3.1.

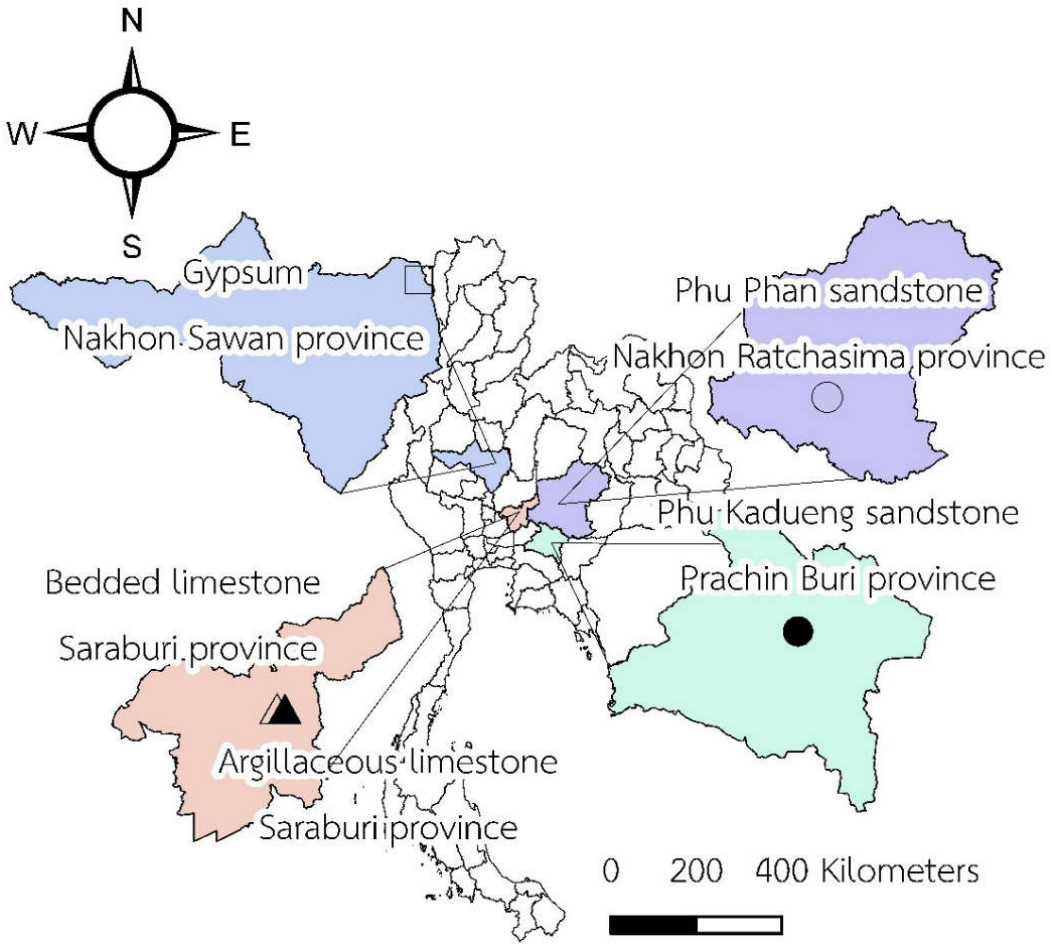

Figure 3.1 Samples obtained from various locations in Thailand.

3.2 Rock Description

3.2.1 Khao Khad argillaceous limestone

Rock samples obtained from Khao Khad formation, located on Saraburi Province, have bedding planes which can be observed by the alternation of gray limestone and pale brown clay bands, with average thickness of 1 mm.

3.2.2 Khao Khad bedded limestone

The bedded limestone is obtained from Khao Khad formation, located on Saraburi Province. Their bedding planes can be observed by the alternation of gray limestone and white calcite bands, with average thickness of 0.5 mm.

3.2.3 Phu Kradueng sandstone

Phu Kradueng sandstone is a member of the Korat Group, found in the Korat Plateau region. Their bedding planes can be observed by the alternation of pale green quartz and black biotite bands, with average thickness of 1.5 mm.

3.2.4 Phu Phan sandstone

Rock samples obtained from Phu Phan formation, located on the Korat Plateau in northeastern Thailand have bedding planes that can be observed by the alternation of pale red quartz and red microcline bands, with average thickness of 1 mm.

3.2.5 Tak Fa gypsum

Gypsum samples are collected from Nakhon Sawan Province. Their bedding planes can be observed by the alternation of white gypsum and gray anhydrite bands, with average thickness of 2 mm.

3.3 Rock specimens preparation

Cylindrical specimens with diameter is 63.5 mm are prepared from all rock types (Figure 3.2). Test specimens contain different bedding plane orientations and scratching directions. The α angle is measured between scratching direction on the

horizontal plane and dip angle of bedding planes varying from 0, 45, 90 and 135 degrees. The θ angle is between strike line and scratching directions varying from 0, 45 and 90 degrees. A total of 30 specimens have been prepared. Table 3.2 shows rock dimensions and their density.

The specimens after CERCHAR test are finely ground to obtain a powder with less than 0.25 mm particle size (pass through mesh #60) as following the ASTM E1426-14e1 standard practice. The representative specimens, maximum and minimum density values, are used to determine the average weight percentage of mineral compositions by using the X-ray diffraction method (XRD). The results are shown in Tables 3.1. The X-ray diffraction (Bruker, D2 Phaser) is used.

Table 3.1 Mineral composition for all rock types.

Rock type	Mineral compositions (%)
Khao Khad argillaceous limestone	Quartz 2.80, Feldspar, 0.86, Calcite 94.90, Montmorillonite 1.33, Pyrite 0.04, Illite 0.06
Khao Khad bedded limestone	Quartz 0.58, Calcite 99.42
Phu Kadueng sandstone	Quartz 79.72, Feldspar 0.33, Biotite 0.76, Anorthite 1.14, Muscovite 0.28, Kaolinite 4.98, Andesine 0.18, Oligoclase 1.91, Calcite 6.78, Illite 3.55, Montmorillonite 0.25, Orthorhombic kalsilite 0.11
Phu Phan sandstone	Quartz 67.69, Oligoclase 11.50, Albite 8.26, Chlorite 5.58, Microcline 3.35, Anorthite 2.00, Calcite 1.11, Kaolinite 0.25, Muscovite 0.25
Tak Fa gypsum	Chlorite 3.00, Calcite 7.98, Gypsum 88.90, Anhydrite 0.12

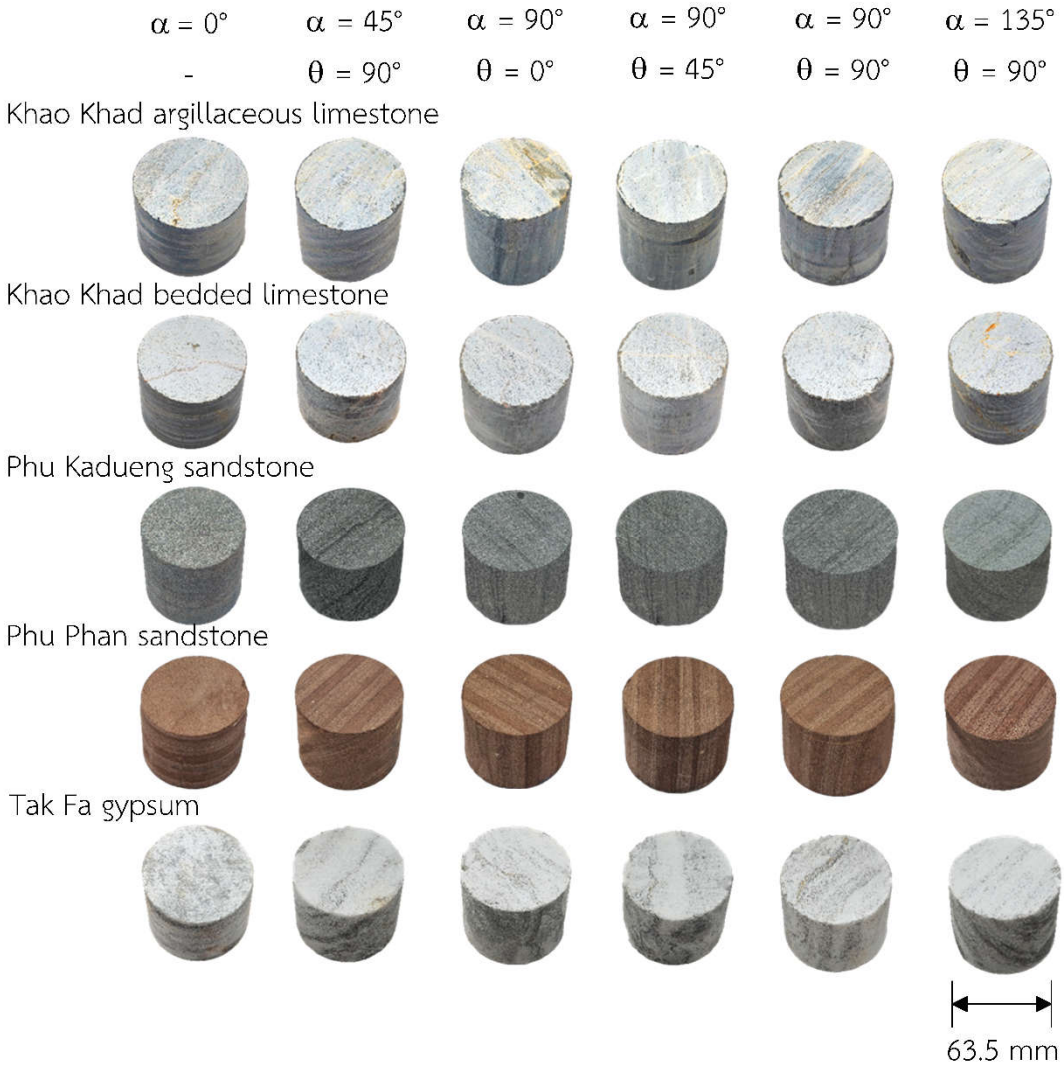

Figure 3.2 Specimens with various bedding plane orientations and scratching directions prepared for CERCHAR tests.

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Table 3.2 Rock dimensions and density for all rock types.

Rock type	α (degrees)	θ (degrees)	Length (mm)	Weight (g)	Density (g/cc)
Khao Khad argillaceous limestone	0	-	40.42	343.65	2.68
	45	90	39.42	334.32	2.68
	90	0	41.28	352.45	2.70
	90	45	42.58	364.12	2.70
	90	90	41.74	355.38	2.69
	135	90	41.58	355.14	2.70
Khao Khad bedded limestone	0	-	40.24	342.58	2.69
	45	90	38.58	330.12	2.70
	90	0	40.46	344.25	2.69
	90	45	40.98	349.58	2.69
	90	90	40.44	346.25	2.70
	135	90	38.62	330.25	2.70
Phu Kadueng sandstone	0	-	40.22	334.58	2.63
	45	90	38.58	321.28	2.63
	90	0	40.24	334.25	2.62
	90	45	40.3	333.45	2.61
	90	90	41.28	342.48	2.62
	135	90	38.78	320.54	2.61
Phu Phan sandstone	0	-	40.18	299.88	2.36
	45	90	40.32	299.84	2.35
	90	0	40.18	298.98	2.35
	90	45	40.24	298.55	2.34
	90	90	40.22	298.95	2.35
	135	90	40.22	299.58	2.35
Tak Fa Gypsum	0	-	40.02	293.65	2.32
	45	90	40.18	294.68	2.32
	90	0	40.04	293.45	2.31
	90	45	39.88	292.58	2.32
	90	90	40.12	294.36	2.32
	135	90	40.08	294.68	2.32