

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

In this chapter, the materials used and procedure of testing is discussed in detail. In the initial part of this chapter shows the details about the preparation of required materials to be used in order to produce specimens or sample needed for experimental works. Next, the elaboration of this chapter is concentrate on preparation of samples and the standards required to conduct the experiment so that the objectives of the study is achieved. Therefore, the methodologies done in the current research are referred based on the experimental investigation.

#### **3.2 MATERIALS FOR CONCRETE PREPARATION**

##### **3.2.1 Ordinary Portland cement**

The type of cement used in this study is Ordinary Portland cement (OPC) as shown in Figure 3.1. Ordinary Portland Cement is the main component in producing concrete. It is a mixture that contain calcium, silicon, aluminium, iron, and also a small quantity of other components. This type of cement will go through hydration in order to create a new solid formation with the presence of water.

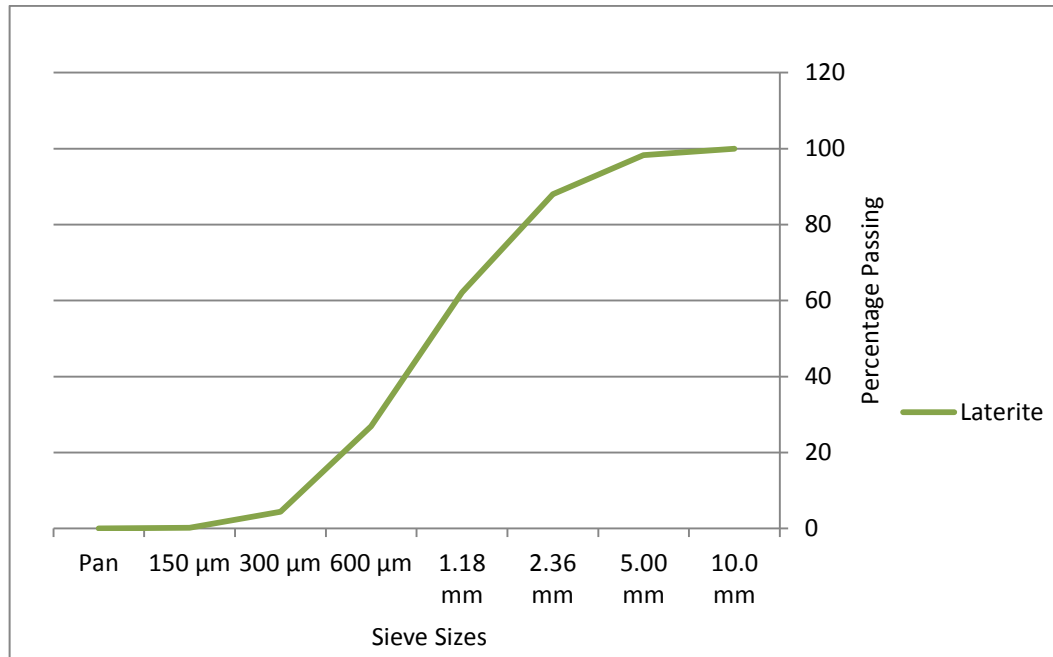
### **3.2.2 Coarse aggregate**

Granite is the coarse aggregate that used in this study as shown in Figure 3.2. There are various size of granite aggregate that available in market. In this study, the minimum size of granite aggregate used is 5 mm while the maximum size is 20 mm. In construction, granite is the main choice to be used as coarse aggregate compared to other types such as basalt and limestone. In addition, granite aggregate is found as one of the best coarse aggregate in the market.

### **3.2.3 Fine laterite aggregate**

Laterite rock formed in wet and hot tropical areas and the climate is humid or subtropical. It was found as the higher weathered soils in classification system. Lateritic rock features that very significant are of their colour, contain high clay (claylike). It also have low exchange capacity of cation. The colour of the laterite soils is depends on the amount of Al and Fe exists. It was in pink colour to grey/brown then to red colour with massive, pisolitic and clayey. Laterite also rich with very wide of various proportions minerals.

The laterite that used for this study was collected from Felda Lepar Hilir 1, Kuantan Pahang. As the laterite was collected in form of rocks and it used as fine aggregate replacement in this study, the laterite rock has been crushed by using Jaw Crusher machine to get the fine sizes. Table 3.1 shows the result from the sieve analysis of laterite collected from the site and Figure 3.3 was the fine laterite aggregate that has been used in the experimental works.



**Figure 3.1 :** Grain size distribution of laterite

**Table 3.1 :** Sieve analysis of laterite

Sieve Size	Mass Retained (g)	Percentage Retained	Cumulative Percentage Passing	Cumulative Percentage Retained
10.0 mm	0	0	100	0
5.00 mm	107.84	9.27	90.73	9.27
2.36 mm	562.06	48.24	42.49	57.51
1.18 mm	191.59	16.46	26.03	73.97
600 µm	95.36	8.2	17.83	91.8
300 µm	60.17	5.17	12.66	96.97
150 µm	51.62	4.43	8.23	101.4
Pan	95.81	8.23		
Total	1164.45		Total	430.92
Fineness Modulus				4.3