CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Since today, researchers vigorously seek an invention to the concrete. One of them was using oil palm shell as a replacement of coarse aggregate in concrete. Oil palm shell (OPS) is a waste material that was obtained by crushing the palm nut in the palm oil mills during the extraction of palm oil. It can be found abundantly in South East Asia and Africa. OPS have been used as lightweight aggregates (LWAs) to produce a lightweight concrete (LWC) which is called oil palm shell lightweight aggregate concrete (OPSC) and many researchers have been working in this area. In the recent investigation, it shows that the use of crushed OPS in a concrete can produced medium and high strength concrete (U. Johnson Alengaram et al., 2013). The use industrial waste material helps to produce a sustainable material. An OPS has a better impact resistance compared to the normal weight aggregate (J. L. Clarke, 2005).

1.1 PROBLEM STATEMENT

This research is done to investigate the effects of water to cement ratio to the mechanical properties of oil palm shell lightweight concrete where the oil palm shell is used to replace the coarse aggregate used in the concrete. Various natural waste materials can be used in our surrounding. Therefore, many researchers have proposed many ways to maximize the use natural waste materials into useful things and one of them is replacing the OPS as coarse aggregate in a concrete. The types of materials used give different results either high or low strength. In this research, replacing oil palm
shell in a concrete can identify the mechanical properties with different water to cement ratio used.

1.2 RESEARCH OBJECTIVE

The objectives of this research are:

i. To investigate the effects of water to cement ratio to the mechanical properties of oil palm shell lightweight aggregate concrete.

ii. To determine the optimum water to cement ratio used for the production of the oil palm shell lightweight aggregate concrete.

1.3 SCOPE OF STUDY

The scopes of this study are:

i. Type of concrete grade: 20 N/mm²

ii. Type of concrete: Oil palm shell lightweight aggregate concrete

iii. Percentage of coarse aggregate replacement to OPS aggregate: 100%

iv. Specimens: Cube (width= 100 mm, length= 100 mm, height= 100 mm)
   : Cylinder (diameter= 150 mm, height= 300 mm)
   : Prism (width= 100 mm, height= 100 mm, length= 350 mm)

v. Type of tests: Compressive Strength Test
   : Splitting Tensile Strength Test
   : Flexural Strength Test
   : Elastic Modulus Elasticity Test
CHAPTER 2

LITERATURE REVIEW

2.0  INTRODUCTION

Concrete is an important material used in the construction industry. It contains of hydraulic cement, water and aggregates. In a concrete, aggregates occupies nearly 60%-80% from concrete volume. The aggregates can be classified as coarse aggregates (with particle size more than 4.75 mm) and fine aggregates (with particle size less than 4.75 mm). Those aggregates are either obtained from natural sources or manufactured. Normally, concrete can be classified into normal concrete and lightweight concrete. These concretes are explained in further sections.

2.1  CONCRETE CLASSIFICATION

2.1.1  Normal concrete

Normal weight concrete known as the concrete contains common compositions of aggregates, water and cement. It has a setting time of 30 - 90 minutes depending upon moisture in atmosphere, fineness of cement. The development of the concrete strength usually starts after 7 days where the common strength value is 10 MPa (1450 psi) to 40 MPa (5800 psi). At 28 days, 75 - 80% of the concrete total strength is attained. Some of the properties for normal concrete are it is strong in compression and weak in tension, having air content of 1 - 2 % and it is not durable against severe conditions e.g. freezing and thawing.