

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Waste product is one of the major factors that cause serious pollution to the environment in Malaysia. The Cambridge Dictionary defined waste product as a substance of no value or use that is made during a process in which something useful is produced. For sustainable development, waste product should be reduce, reuse and recycle as a new production of useful product. However, in spite of the enormous sum and multifaceted nature of the waste delivered, the standards of waste management in Malaysia are still poor (Madaki & Lau, 2013). Thus, the utilization of the waste is a priority today in order to achieve sustainable development.

Eggshell in Malaysia has founded as one of the valuable wastage that not being utilized usefully. Through many research found that Calcium Carbonate (CaCO_3) found in eggshells giving hardness and strength to things. Approximately 94% of a dry eggshell is calcium carbonate and has a typical mass of 5.5 grams. The chemical composition (by weight) of by product eggshell has been reported as follows: calcium carbonate (94%), magnesium carbonate (1%), calcium phosphate (1%) and organic matter (4%) (Yerramala, 2014)

On the other hand, sewage sludge plant industries in Malaysia facing the same problem as they produce 5 million m^3 of sewerage sludge waste per year. The main problem is that this sewage waste can pollute the environment. In recent years sewage waste production has increased alarmingly. One of the most common solid waste disposal means is in controlled landfills. However, space limitations on existing landfill sites and problems of waste stabilization (Monz et al, 2003) have prompted investigation

into alternative disposal routes.

The use of these two waste products, which is eggshell and sewage sludge ash (SSA) in the concrete industry may reduce the cost of the raw materials which treated as alternative partial cement replacement in producing concrete as well as minimize the effect on environmental pollution.

1.2 Problem Statement

Energy plays as important role in growth of the developing countries such as Malaysia. In the context of low availability of non-renewable energy resources coupled with the requirements of large amount of energy for building materials like cement, the importance of using industrial waste was not unable to underestimate. Each year, an estimated 76 billion eggs are consumed and the prior to final consumption, about 24 billion of those eggs are first processed into egg products (Beck et al., 2010). The egg-preparing plants must break those eggs some time recently advance preparing happens. In doing as such, these plants produce an expected 600,000 tons of eggshell waste every year. It is realized that eggshell squander contains profitable natural and inorganic parts which can be used in business items by making new esteem in these waste materials.

Moreover, sewage plant industry likewise confronting an indistinguishable wastage issue from pastry kitchen and sustenance industry in Malaysia (Azmanet al., 2011; Salmiati et al., 2012). The surpassed measure of wastage gives an immense issue in dumping the waste without affecting the earth and contaminated to nature. Of the constituents removed by effluent treatment, sludge is by far the largest in volume, therefore it handling methods and disposal techniques are a matter of great concern. Without a reliable disposal method for the sludge the actual concept of water protection will fail. Usage of sewage sludge as an expansion to development and building material including building blocks, lightweight manufactured totals, and bond like materials is a win-win situation since it changes over the squanders into helpful materials as well as reduces the disposal issues.

1.3 Objectives

This study was conducted to achieve the following objectives:

- i) To identify the suitability of sewage sludge ash (SSA) and eggshell powder (ESP) as partial replacement in eggshell concrete.
- ii) To investigate the durability of eggshell concrete with different percentage of SSA replacement.

1.4 Scope of Study

This research will study the durability of the concrete mixture when it containing various percentage of eggshell powder and fixed percentage of sewage sludge ash as partial cement replacement. The percentage of the eggshell varies from 5%, 10%, 15% by weight. The sewage sludge used was 10% weight, fixed for every sample and sieved before mix with another component.

Some experiment that will be involve in this studies which is acid attack with the use of sulphuric acid (H_2SO_4), sulphate resistance with the use of sodium sulphate (Na_2SO_4) and water absorption. The curing process will be in within 3 days, 7 days, 28 days and 90 days by the water curing process. The typical size of concrete was used in this experiment which is 100mm x 100mm x 100mm.

1.5 Expected Outcome

This study will give knowledge and data of the calcium carbonate contains in the eggshell and the sewage sludge as the fractional cement substitution in concrete. The durability and the effect of the composition will be identified after this study. The result from this study is expected to help reducing the statistic of eggshell and sludge as waste in Malaysia and help in safe environment from pollution. This also will help in decreasing the demand of construction material that more depending on natural resources nowadays.