CHAPTER 1

INTRODUCTION

1.1 Introduction

Wastewater is liquid waste discharged by domestic residences, commercial properties, industry, agriculture, which often contains some contaminants that result from the mixing of wastewater from different sources. Wastewater mostly consists of pure water more than 95% and there are numerous processes that can be used to clean up waste waters depending on the type and extent of contamination. Treated wastewater can then be reused as the drinking water after it has been cleared of contaminants. Nowadays, environmental pollution have become the huge issues to the society in this century. This is because the development of the industries and commercial building that mostly affected the sources of pollution. Without the proper wastewater treatment many ecosystems would be severely damaged once the treated water gets recharged back into the environment.

In Malaysia, there are about 28.3 million population based on the Report of Census 2010 by the Department of Statistics. The estimated volume of wastewater generated by municipal and industrial sectors is 2.97 billion cubic meters per year. The proportions of population equivalent (PE) served by the various sewerage systems are shown in Figure 1.1.
Figure 1.1: proportions of population equivalent (PE) served by the various sewerage systems

According to Indah Water Konsurtium which is the country’s main sewerage operator, mostly the dominant wastewater treatment types are preliminary which is removal of rags, rubbish, grit, oil and grease while the example primary are removal of settle able and floatable materials and the last one which is secondary treatment similar to biological treatment which is to remove organic and suspended solids. For this moment time in Malaysia, there is no plan to build the tertiary treatment systems in Malaysia. The focus has been providing a basic standard of preliminary, primary and secondary treatment.

The major constraint to wastewater treatment faced by Malaysia are low sewerage tariff is unable to support the high operation and maintenance costs. Besides, there is non-compliance or mediocre compliance that are mainly caused by the high influent of oil and grease discharged into STP serving industrial and commercial area that do not have grease traps or do not maintain grease traps adequately. Other contributory factors are excessive discharge of soaps, detergents and other cleaning agents into sewerage system. Furthermore, sewerage services collection by operators is not conducive as it is unfortunate that many Malaysians fail to realize the importance of sewage management with regards to a safer environment. In addition, the dynamics of the sewerage industry where sewerage infrastructures are constructed by private developers and handed over to
the public operator opens up the risk factor of quality being compromised which would subsequently have the impact of treatment processes and operations.

The common method methods applied to remove heavy metal from wastewater are in physical or chemical treatment where the process includes chemical precipitation, chemical oxidation, air stripping and adsorption (Renou et al. 2008). This treatment can remove 99% percent of the pollutant from the raw sewage. But, the cost of the treatment is very high including operation, maintenance and construction (Mackenzie et al. 2004). The alternative method to solve this problem are by using lemon peel activated carbon adsorption. These biosorbent materials are characterized being less expensive, metal selective, non-sludge generation, high bio-removal efficiency, possible ion recovery and environmentally sound methodology (Deans, 1992).

1.2 Problem Statement

Industrial processes generate wastewater that are containing heavy metal contaminants. Since most of heavy metal are non-degradable into nontoxic end products, their concentrations must be reduced to level that will be acceptable before it will discharge into environment. (Madhukar J. Phadtare, 2015). At least 20 metal are being classified as toxic, and half of this are emitted into environment in large quantities that pose high risks to the aquatic life. (Kortenkamp et al., 1996). Chromium is one of the major heavy metals that present in the wastewater which has high toxic effect and as the strong oxidizing agent that are capable of being absorbed through human skin. The heavy metals are having the most hazardous effect on the human health can be treated from wastewater by using various physicochemical methods. There are many negative impacts of heavy metals on the plants which are decrease of the seed germination and lipid content by cadmium, decreased enzyme activity and plant growth by chromium, reduction of the chlorophyll production by nickel and plant growth by lead. (Gardea-Torresdey et al., 2005). Besides, the effect of heavy metal on animals include reduced growth, cancer, organ damage and sometimes in extreme cases, death. (Canada Gazette, 2010).

To prevent the negative impact of heavy metals toxicity in wastewater, there are many solution that have been discovered to reduce the amount of heavy metal in