3 MATERIALS AND METHODS

3.1 Chapter Overview
This chapter presents the materials and the methods that are used to determine the reduction of COD, OG and BOD₅ concentration, pH and temperature reading in spent caustic wastewater from KTU tank.

3.2 Introduction
In this study, spent caustic wastewater samples were obtained and the COD, OG and BOD₅ concentration, pH and temperature reading of the untreated wastewater samples were determined. After that, the samples have undergone adsorption method where the reduction of COD, OG and BOD₅ concentration, pH and temperature reading were analysed after the treatment.

3.3 Chemicals
High Range (HR) COD Digestion Vials for COD determination, hydrochloric acid solution with 37 % purity, anhydrous n-hexane with 95% purity and powdered sodium sulphate for OG determination were ordered and obtained from Faculty of Chemical Engineering and Natural Resources Lab, University of Malaysia, Pahang. Magnesium sulfate, calcium chloride, ferric chloride and acid and alkali solution for BOD₅ determination were obtained from Faculty of Chemical Engineering and Natural Resources Lab, University of Malaysia Pahang. Powdered aluminium sulphate, sodium carbonate (soda ash), and ferum sulphate as flocculants agent for the treatment of spent caustic wastewater were also obtained from Faculty of Chemical Engineering and Natural Resources Lab, University of Malaysia, Pahang.

3.4 Additional Adsorbents
Clay and activated carbon for the treatment of spent caustic wastewater were obtained from Faculty of Chemical Engineering and Natural Resources Lab, University of Malaysia, Pahang. Clay and activated carbon was used in this study are shown in Figure 3-1.
3.5 Natural Products
Charcoal and coconut husk were provided from Kampung Baru Gong Halt, Temerloh, Pahang. Charcoal and activated carbon from coconut husk was used in this study are shown in Figure 3-2.

3.6 Spent Caustic Wastewater Samples
The wastewater that contains spent caustic from the KTU was obtained from the wastewater storage tank at PETRONAS Penapisan (Terengganu) Sdn. Bhd., Kerteh, Terengganu. The wastewater samples were collected in plastic bottles and were stored in cold storage at 4°C for preservation (Franson, 2005). Figure 3-3 shows the spent caustic that has been obtained.
3.7 Analysis of Wastewater Samples

There are five analyses of spent caustic wastewater samples that are carried out in this study, which is the determination of COD, OG, BODs, pH and temperature. The analysis of the wastewater is carried out two times that is before and after treatment.

3.7.1 Chemical Oxygen Demand

COD concentrations of the wastewater are analysed by using spectrophotometer DR2800 type, with the aid of High Range (HR) Cod Digestion Reagent Vial HR that can measure up to 15 000 mg/L COD concentration and are heated in the COD digestion reactor ("Determination of Chemical Oxygen Demand (COD) in water and Wastewater", n.d.). The COD digestion reactor and spectrophotometer used in this study can be found in Figure 3-4.