3 MATERIALS AND METHODS

3.1 Overview

The castor oil is purchase from Sigma-Aldrich. Mussel shell waste is collected from the City Times Hotel, Kuantan, Pahang and one of the cafe from University Malaysia Pahang. The chemical used for biodiesel are potassium hydroxide, ammonia, hydrochloric acid, and methanol.

3.2 Materials

i. Castor oil

Figure 3-1 Castor oil

ii. Potassium hydroxide

Figure 3-2 Potassium hydroxide pellet
iii. Ammonia

Figure 3-3 Ammonia solution

iv. Methanol
v. Hydrochloric acid

Figure 3-4 Hydrochloric acid

3.3 Apparatus

i. Universal bottle
ii. Hot plate with magnetic stirrer
iii. Filtration funnel
iv. Beaker
v. Condenser
vi. Flask two neck
vii. Stopper
viii. Measuring cylinder
ix. Retort stand
x. Blender
xi. Sieve tray
3.4 Overall methodology

- Raw material, Chemical and Equipment Preparation
- Raw Material Analysis
- Analysis of castor oil - FFA > 1%, need pre-treatment until FFA < 1%
- Catalyst Preparation and Characterization
- FAME synthesis from castor oil
- Yield Analysis of FAME
- Determination of FAME Properties

Parameter:
- Time: (1, 2, 3, 4, 5) hours
- Temperature: (40, 50, 60, 70, 80)°C
- Catalyst: (CaO, CaO/KOH)
- Catalyst loading: (1, 2, 3, 4, 5) wt%
- Catalyst recyclability: (1, 2, 3, 4, 5) cycle

Figure 3-5 Overall flow chart of FAME synthesis from castor oil.