

## CHAPTER V

### CONCLUSION AND SUGGESTION

CNSL, the waste from processing cashew nut, was used as a starting material for the synthesis of cardanol sulfonate and hydrogenated cardanol sulfonate. The cardanol sulfonate was synthesized from CNSL using a two-step process. Decarboxylation of CNSL with calcium hydroxide at 120 °C in toluene followed by sulfonation of cardanol with chlorosulfonic acid to give a cardanol sulfonate in 61.34 % yield by mole.

The hydrogenated cardanol sulfonate was synthesized from CNSL by first decarboxylation of CNSL with calcium hydroxide at 120 °C in toluene. Then the cardanol was hydrogenated using the pressure reactor in the presence of 10% palladium on activated charcoal using agitation of 600 rpm, at 200 °C for 8 hours. The sulfonation of hydrogenated cardanol was carried out with chlorosulfonic acid to give 71.67 % yield by mole of product.

The physical properties of cardanol sulfonate and hydrogenated cardanol sulfonate were compared with dodecylbenzene sulfonate. As resulted, C.M.C. of dodecylbenzene sulfonate, cardanol sulfonate and hydrogenated cardanol sulfonate were 0.4304, 0.0936 and 0.0465 mole/l, respectively. The results of percent detergency of cardanol sulfonate and hydrogenated cardanol sulfonate using dodecylbenzene sulfonate as a reference were 87.81% and 94.09% detergency, respectively. These

results were in agreement with ICS standard, which specified that washing powder should have over 80% detergentcy when compared with reference.

Suggestion for further studies:

1. Other catalysts such as Ni, Ag etc. should be used to hydrogenate cardanol to give hydrogenated cardanol in order to make the hydrogenation process commercially feasible.
2. Other sulfonating agents such as sulfuric acid,  $\text{SO}_3$  etc. should be investigated in the sulfonation reaction of cardanol.