CHAPTER-6

CONCLUSION
1.0 Conclusion

Finiteness of fossils based raw materials inspires the researchers to explore novel renewable sources for deriving raw materials required for various value added products.

In present thesis some of the cellulosic wastes and used vegetable oils were successfully explored as basic raw materials for various value added products viz. surface coatings, lubricants and liquid detergents.

Six different types of cellulosic wastes namely mast tree seed waste, water hyacinth, neem tree waste, tobacco stamp waste and rice husk waste, locally available in abundant were collected and identified as cellulose rich biomass containing very high amount of crude fiber (mainly cellulose and hemi cellulose) up to 91 %. Thus all these wastes are potential sources of cellulose which can be used to develop various products. Depending upon the application, different cellulosic wastes were selected, details of which is as follows:

1. PU Coating : Water hyacinth, Mast tree seed waste, Neem tree waste and saw dust waste (easy to liquefy using various Glycols)

2. Bio lubricants: Rice husk waste (High cellulose, low protein, low fat containing material) which can be directly grafted using acrylate monomer.

3. Bioliquid detergent formulations: Tobacco stamp waste (High cellulose, low protein, low fat containing material) which can be directly used for synthesising cellulose betainate.

Liquefaction of different cellulosic wastes comprising of Mast tree seed waste, Water hyacinth, Neem tree waste and Saw dust waste was successfully carried out using PEG’s of different molecular weight.
The liquefaction of these waste results in to low molecular weight hydroxyl functional biopolyols. These biopolyols were used successfully as polymeric precursors to derive polyester biopolyols by esterification with adipic acid. Polyester biopolyols obtained from cellulosic waste materials were used as base to formulate PU resins by reacting it with Isocyanate adduct.

The investigation of Polyurethane coating revealed the competitive performance of these materials as surface coatings thus polyurethane coatings can be derived using various cellulosic wastes.

Tobacco stamp waste was successfully converted in to cationic surfactant by reacting this cellulose rich waste with betainyl chloride. Cellulose betainate thus obtained was used to formulate bio liquid detergent.

Upon evaluation of the various properties it was found that waste cellulose based bio liquid detergent exhibits competitive performance in comparison with standard formulation based on Sodium lauryl sulphate and Alpha olefins sulphonate.

A Rice husk waste was successfully used to produce graft copolymers of cellulose. Grafting of this cellulosic waste was carried out by using acrylate monomers- methyl methacrylate and butyl methacrylate. These graft copolymers of waste cellulose were used as thickeners for used vegetable oils in formulating biolubricants. Biolubricants have exhibited competitive performance.

Thus cellulose being most abundant renewable material can be successfully explored as a source for various value added products. The physical and chemical modifications of various selected cellulosic
wastes can definitely convert them to useful products with competitive performance.

Use of renewable and waste materials as basic raw materials for value added products can give a technical and logical solution to the problems like finiteness of petroleum resources, environmental concerns, waste disposals and high cost of products.