SUMMARY

There are several varieties of surface coating which are known as decorative coatings, protective coatings, automotive coatings, industrial coatings, powder coatings etc. Decorative and protective coatings are mainly based on unsaturated oils (linseed oil, soyabean oil, tung oil) and natural resins (shellac, rosins and kuari gum). Alkyd resin was based on modified natural oils, became important part of the coating industries. The renewable resources, such as vegetable oils, which are Non-toxic, bio-degradable, Non-polluting relatively harmless to the environment could offer significant advantages over fossil fuel derived products. Today plant oils are the most important renewable raw material for the chemical industry and are heavily used as raw materials for surfactants, cosmetic products, and lubricants and especially in oleo chemical productions. Moreover, the long fatty acid chains of vegetable oils impart desirable flexibility and toughness to some brittle resin systems such as epoxy, urethane, alkyd and polyester.

Alkyd resins with respect to their structures and properties they can be synthesized easily with excellent film forming properties and possess outstanding elasticity, adhesion, gloss and durability in outdoor exposure and have been extensively used to produce polyurethane for surface coatings.

Another area of surface coating is UV-curable coating. The UV curable coatings is comparatively new technique of reducing VOC (volatile organic contain) from the coatings, is fast gaining popularity and use due to its multiple advantages such as low time consuming drying, low volatile organic contain and good toughness and other specific application. The increase in the demand of these UV-curable coatings is mainly due to their faster cure time and subsequent higher production rates, high gloss, zero
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solvent emissions, cutting of production waste, no solvent retention, low energy requirements and many other advantages.

On bases of these the whole work of this thesis comprise, Synthesis of UV-curable Poly (urethane acrylates) surface coating formulated from coconut oil based alkyd resin and to study their thermal properties (TGA and DMA) and Physio-Mechanical properties.

A brief note on surface coatings, UV curing system and mechanism, Advantages and disadvantages of UV curable coatings, Objectives and illustrating of the present work are summarized as introduction.

The synthesis and characterization of Polyurethane acrylate oligomers from coconut oil based alkyd resin was carried out.

![URETHANE ACRYLATES OLIGOMER](image)

Where $R' =$

1. TDI
2. IPDI
3. HMDI
4. MDI

All samples were designated and were characterized by, NCO content, Color and Clarity, Non Volatile Content, and IR Spectroscopy.
The preparation of UV curable coating compositions were prepared by blending of above synthesized polyurethane acrylate oligomers with other additives. Other compositions were also prepared by selecting 1.50 NCO/OH mole ratio having compositions and blending with three different vinyl monomers methyl metacrylate, ethyl acrylate, and butyl acrylate as co-monomers. All the composition added with compatibility by 5% and 10% nano silica. The physical properties of all the compositions were monitored.

Thermal properties of all the UV-curable films were studies through Thermo Gravimetric Analysis (TGA) and Dynamic Mechanical Analysis (DMA).

The application and characterization of UV- cured coating films. UV-cured coatings were carried out on clean MS (Mild Steel) plates by using all the compositions. Ultra Violate radiation [Medium Pressure Mercury Vapour Lamp (200 Watt/inch) (280-360nm)] employed various mechanical tests like Scratch hardness, Pencil hardness, Impact strength, Flexibility, and X-hatch adhesion were measured. The cured films were also tested for Chemical resistance and characterized through IR spectroscopy.