SUMMARY

Though polyurethanes polymers are widely used in the fields of daily life due to excellent wear resistance, toughness, mechanical properties and chemical resistance. Due to their properties range from liquid, soft and rubbery solid (thermoplastics) to rigid thermosets the end product can be designed according to the user need. Due to potential large volume of applications combined with high versatility in the properties, these materials require a thorough understanding of synthesis and properties as well as update of knowledge.

The use of non-renewable fossil fuels for chemical feed stocks causes large environmental problems for polymer industry, renewable resources, such as vegetable oils offer a non-toxic, non-polluting, potentially bio-degradable alternative with attendant manufacturing benefits for the chemical industry, the use of vegetable oils as renewable resources for the formation of industrial material and polymers as well as bio-lubricants is well established

In 21st century, preparation of polyols from vegetable oils has been extensively reported in literature. Soya bean oil has been used as raw materials for preparing various resins and coatings such as alkyd resin, epoxy ester, and alkyd resins, among other industrial uses. While the raw materials are economical and user friendly, the current technology has not been able to produce non-yellowing low VOC coatings.

In the world of coatings UV-coatings are arguable better for business compared to conversional coatings, UV-coatings demonstrate the advantages of fast curing and lower energy consumption while totally dispensing the need for a long heating facilities, these in turn translate in to more efficient production
reduced electrically bills and lower capital investment and maintainance costs.

Among the oligomers used for UV-curable coatings, polyurethane acrylate (PUA) oligomers have gained more and more attention and speedy development due to a wide range of excellent properties, such as high impact and tensile strength, abrasion resistance, scratch resistance and toughness combined with excellent resistance to chemicals and solvents.

The brief Literature Survey and review of surface coating, various constitutes of coating, alternative Technologies for Controlling VOCs, UV curing systems and mechanism, Advantage and disadvantages of UV curable coatings, Components of UV Cure Formulation, research gap, objective and illustration of the present work are presented in chapter-1.

Acrylated Polyols were prepared by three steps process. Soya fatty acid was esterifies with different mol.wt polyethylene glycols followed by epoxidation and then by acrylation. The structure of Polyol is

\[ \text{Acrylated Polyol} \]

Epoxy ester was prepared by reaction of commercial epoxy resin (DGEBA) with soya fatty acid. This is shown as follow.

\[ \text{Epoxy ester} \]
Blending of above Polyols was carried out at different composition. These blends were characterized by hydroxyl value, Iodine value, Viscosity and FT-IR spectroscopy. All these data are also included in this chapter.

Acrylate polyols were reacted with aromatic and aliphatic diisocynate viz., toluene diisocynate, diphenyl methane diisocynate, hexamethylene diisocynate and isophorone diisocynate in presence of dibutyltindilaurate (DBTDL) catalyst. All resultant polyurethane were characterized by %NCO, FT-IR spectroscopy and Physical properties. These are summarized in chapter-3.

UV curable coating compositions were prepared by blending urethane acrylate with reactive diluents, Photoinitiator and additives at room temperature. These were applied on MS (Mild Steel) Panel and cured by Ultra Violet radiation (Medium Pressure Mercury Lamp (200 Watt/ inch) (280-360nm) and were characterized Physically, Mechanically (flexibility, pencil hardness, scratch hardness, impact hardness, x-hatch) and chemically (acid resistance, alkali resistance, Solvent resistance) as well as IR spectroscopy. The result are described in chapter-4.

Thermogravimetric (TGA) and Dynamic Mechanical Analysis (DMA) of polyurethane films were carried out. The data Pertinent to TGA and DMA were discussed in terms of structure property in chapter-5.