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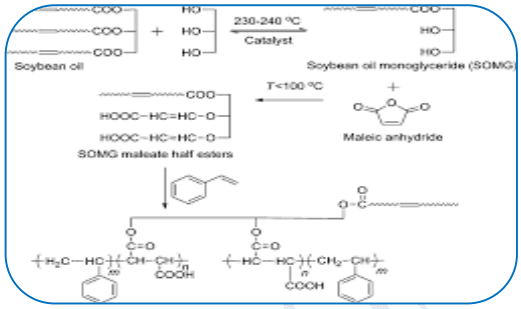
A REVIEW ON SYNTHESIS OF POLYESTER BASED ON VEGETABLE OILS USING NATURAL FIBRES



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ABSTRACT:

This review present the synthesis of polyester based on vegetable oils using natural fibres. Vegetable oil is freely obtainable and inexpensive. It can be chemically improved to yield useful composites and economical. It is used as an ingredient or component in various manufactured products.Polyesterwere prepared from vegetable oil, fumaric acid and phthalic anhydride. The polyesterwere characterised by spectral studies such as FT-IR, NMR, TGA, DTA, DSC, SEM analysis and mechanical properties.

KEYWORDS: *vegetable oil, polyester resin, phthalic anhydride, spectral studies, mechanical studies.*

INTRODUCTION

Polymers and polymeric materials exhibition extraordinary mechanical properties, high corrosion resistance and low assembly costs (Shakina, 2015).Biodegradable polymers have involved much purpose as green materials in biomedical engineering, soft tissue engineering and drug delivery, where cell-seeded constructs are designed to replace damaged or diseased tissues(Malar, 2013). Current interest in cheap biodegradable polymeric materials from readily available, natural sources such as starch, polysaccharides and vegetable oils (Sheela, 2015).

Vegetable oils are high pureness and their comparative functionalisation provides materials. It can also made for their structure with the commonest oils being triglycerides mainly from five fatty acids are oleic acid, linoleic acid, linolenic acid, stearic acid, palmitic acid. These oils containing variable amounts of carbon-carbon double bonds(Clark, 2017). Triglyceride based polymers have been used in various different industrial products such as pressure sensitive adhesives, inks and coatings(Fahimian, 2008).

The natural fibres as reinforcements in composite materials are used as substitute in many applications. It have alternative reinforcement for fibre reinforced polymer composites because of its superior properties such as high specific strength, low weight, low cost, non-abrasive and bio-degradable characteristics(Prasanna, 2017).

POLYESTER BASED ON VEGETABLE OILS

Malar and David (2015) composed studies on polyester elastomers using palm olein for drug delivery using glacial acetic acid and hydrogen peroxide. They characterised by FT-IR, ^{1}H –NMR, thermal analysis, SEM, solubility studies, soil burial method, mechanical analysis and antimicrobial activity. They showed that the best of monomers effect the physical properties of the elastomers so it can potentially meet the requirements of many biomedical applications (Malar, 2015).

Sheela and David (2014) proposed photo and biodegradation of thermosetting polymers from linseed oil using vinyl acetate and benzoyl peroxide. They studied by FT-IR, H^1 NMR, soil burial test, SEM, photo degradation of IR. The results that the photo degradation by direct sunlight in rainy condition is greater than the photo degradation in waterless condition (Sheela, 2014).

Manthey et al. (2012) determined green building materials: hemp oil based biocomposites. The epoxidised hemp oil were prepared by acetic acid and hydrogen peroxide. They studied by FT-IR, SEM, iodine value, oxirane oxygen content, acid value, viscosity, flexural properties, inter-laminar shear strength. To determine the thermo-mechanical properties of the acrylated epoxidised hemp oil bioresin and biocomposite systems (Manthey, 2012).

Liu et al. (2017) prepared biocomposites from hemp fibres and acrylated epoxidised soybean oil based resins. The hemp fibres reinforced acrylated epoxidised soybean oil composites were prepared by using isocyanatoethyl methacrylate. They studied by tensile strength, flexural strength, DMA. Hemp fibre-acrylated epoxidised soybean oil composites as crosslinking and coupling agents (Liu, 2017).

Malar and David (2014) prepared development of novel citric acid based biodegradable polyesters from sesame oil using glacial acetic acid and hydrogen peroxide. They studied by FT-IR, H1NMR, thermal analysis, SEM, swelling and solubility behaviour, mechanical analysis. These polyester have a wide range of controllable mechanical and degradation along with surface affinities (Malar, 2014).

Vaidya et al. (2016) proposed synthesis pathways for biocomposites from vegetable oils. To improvethe products are ecologically acceptable, maintain biological balance and raw materials. Epoxy group of reaction with hydrochloric or hydrobromic acid to produces halogenated polyols. The synthesis routes and pathways to produce for a change of applications (Vaidya, 2016).

POLYESTER BASED ON NATURAL FIBRES

Shukla and Patel (2017) produced synthesis and characterisation of short fibre reinforced biocomposite using 0.5% NaOH. They characterised by tensile testing machine, specimen specification, shore hardness test of banana fibre-reinforced-epoxy biocomposites. The biocomposites strengthened with surface treated biocomposites and their uses (Shukla, 2017).

Johnson and Amritha (2018) developed experimental study on pineapple leaf fibre reinforced RCC beams using with dilute alkali solution. They studied by tensile strength. The natural fibre composites were the poor compatibility between fibre and matrix. Beam with fibre start cracking in higher loads because of higher tensile strength (Johnson, 2018).

Kunuthur and Reddy (2018) determined synthesis and characterisation of jute reinforced composites with wollastonite filler. The polymers were characteristics like low density, good corrosion resistance, low coefficient of friction and good mould ability. They studied by tensile test, flexural test, compressive test, chemical treatment test. The tensile strength, flexural strength, compressive strength have more while compared to all the specimens (Kunuthur, 2018).

Prasanna et al. (2017) developed synthesis, characterisation of banana or glass fibre reinforced epoxy based hybrid composites. The banana fibre treated with alkaline treatment. They characterised by tensile test, flexural test, impact test, water absorption test, hardness test. The rate of moisture absorption increases with increase in both fibre loading and fibre lengths (Prasanna, 2017).

Yada (2018) prepared synthesis, fabrication and characterisation of jute fibre reinforced laminar composites used polyester resin and methyl ethyl ketone peroxide. They studied by tensile test, flexural test, impact strength, compression test, SEM analysis. The fibre plays a major role in the specimen properties (Yada, 2018).

Wazery et al. (2017) determined mechanical properties of glass fibre reinforced polyester composites for a various applications of high specific strength, stiffness and modulus. The E-glass fibre were used as a reinforcing material in the polyester resin. They confirmed by tensile test, bending test, hardness test, impact test. They showed that the polyester resin have improved by a great extent in the presence of glass fibre reinforcement (Wazery 2017).

Experimental and analysis of polyester-jute-hemp fibre reinforced composite have been synthesised by Babu et al. (2017). The natural and manmade fibres reinforced hybrid composite materials were growing in the field of engineering and technology. They evaluated the mechanical properties of tensile test, flexural test and impact test. The comparison of the effect of polyester treated and untreated jute and hemp fibres of hybrid polymer matrix composites (Babu, 2017).

POLYESTER BASED ON NANOCOMPOSITES

Kumar et al. (2015) determined synthesis and characterisation of iron oxide nanoparticles reinforced polyester/nanocomposites using methyl ethyl ketone peroxide. They studied by DSC, Fast Fourier Transform, TGA, tensile modulus, impact properties. Nanoparticles of iron oxide were used as ferrofluids, magnetic resonance imaging, biomedical applications (Kumar, 2015).

Khan et al. (2017) synthesised study the functional properties of polyester fabric functionalised with TiO_2 nanoparticles using ethanol and acetic acid. They studied by SEM, UV. They showed that the nanoparticle deposition process high efficient by reducing the number of steps (Khan, 2017).

Synthesis and characterisation of ZnO nanostructures by polymeric precursor route have been prepared by Razavi et al. (2011). ZnO nanostructure were synthesised by zinc acetate, citric acid and ethylene glycol. The Zinc oxide nanostructure were characterised by XRD, SEM. They showed that the effect of ethylene glycol to citric acid on the morphology and structure of the products (Razavi 2011).

Mehta and Prasad (2017) determined preparation of water borne paint from acrylic based copolymer grafted with sorbitol alkyd resin empolying nanocrystalline $FeCr_2O_4$ as pigment using sorbitol and linoleic acid. The resin were characterised by XRD, FT-IR, NMR, SEM. This showed that the ferric Chromate were synthesised by solution combustion method (Mehta, 2017).

POLYESTER BASED ON DYES

Panchel and Patel (2017) developed studies on synthesis and characterisation of some azo dyes for dyeing polyester fabric. Heteroaryl azo dyes were prepared by diazonium salt of phenyl amine with synthesised imidazole-thiazole compounds. They confirmed by FT-IR, physical properties, absorption spectra, dyeing and fastness properties. These dyes showed the good exhaustion, fixation and uniform dyeing properties (Panchel, 2017).

Etaibi et al. (2014) composed synthesis and applications of new aminothienopyridazines disperse dyes on polyester fabric. The azo disperse dyes were synthesised by aryldiazonium chloride, acetic acid and sodium acetate. They studied by NMR, fastness properties. These dyes were reported by examined against light, perspiration, washing fastness, very good and excellent Fastness (Etaibi, 2014).

CONCLUSION

Polyester contain the ester functional group. The most common polyesters are thermoplastics. They were prepared from similar material the formulation and oil length are different.The oil based alkyds examined as non-drying alkyds are optional to be modified either by blending with other fast drying to decrease production cost, flexibility and to produce a workable application of this resin. Thermal, mechanical and spectral properties discovery wide range of applications.

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