

"DEVELOPMENT AND CHARACTERIZATION OF LIGNIN BASED ADHESIVES FROM AGROWASTES"

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The thesis entitled, "**DEVELOPMENT AND CHARACTERIZATION OF LIGNIN BASED ADHESIVES FROM AGROWASTES**" incorporates the detailed study on the utilization of lignin from agrowastes for the preparation of adhesives. The thesis has been systematized and compiled into seven chapters, each dealing with specific aspects of the lignin extraction & optimization, characterization, preparation of lignin substituted PF (LPF) adhesives and their characterization.

Chapter 1 entails the detailed literature review on the subject covering the various aspects of the work such as lignins, their structure, chemistry, isolation, properties, and applications; wood adhesives, phenolic resin wood adhesives, their preparation, properties, lignin based wood adhesives and their characterization etc.

Chapter 2 is focused on the characterization of various agrowastes. Different agrowaste such as bagasse, coconut coir & pith, coffee bean shell and eucalyptus bark were taken as source of lignin in the present work.

Chapter 3 presents the details of the isolation of lignin by various methods and optimization of reaction parameters for the isolation of lignin. Isolation of lignin from bagasse was carried out using solvent, acid and alkali methods. Effect of various extraction parameters on alkali delignification was studied in respect to parameters like alkali strength, bagasse/ bark to alkali solution ratio, extraction time and extraction temperature, were studied and optimized.

Chapter 4 incorporates characterization of various lignins extracted under optimized conditions. The extracted lignins were characterized for various properties like solubility, hydroxyl value, elemental analysis, IR, ¹HNMR, DSC and TGA.

Chapter 5 is focussed on the optimization of reaction parameters for the preparation of lignin substituted PF (LPF) adhesives. Various reaction parameters such as lignin concentration, formaldehyde to phenol molar ratio, catalyst concentration, reaction time and reaction temperature were optimized .

Chapter 6 presents the characterization of bagasse and bark lignin substituted phenol

formaldehyde adhesives. The adhesives were characterized in detail for structural, thermal, physico-mechanical, morphological and shelf life studies.

Chapter 7 gives the study on the effect of lignin source on the adhesive properties. Various LPF adhesives using different lignin was compared vis-à-vis control PF adhesive.