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Patent Search

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Abstract:

The present invention deals with the development of facile process route for cardanol based bisphenol-BC, trisphenol-VC, and tetraphenol-TC (card-polyphenols) by reacting sustainable bio-based cardanol with benzaldehyde, vanillin and terephthalaldehyde in the presence of combination of concentrated hydrochloric acid and sulfuric acid in the ratio of 2:1 (v/v) as catalysts at 80°C for 12 hours with yield of bisphenol-BC, trisphenol-VC, and tetraphenol-TC are 88, 85 and 83% respectively. The structural characterization of card-polyphenols was carried out using FTIR, NMR and Mass spectra. The card-polyphenols produced in the present invention are considered as vital precursors for production of industrial resins like epoxies, benzoxazines, cyanate esters, and urethanes for wide range of industrial applications. The card-bisphenol synthesized was converted into benzoxazines by reacting with paraformaldehyde and selected representative amines and their thermal properties were studied. The polymerization (curing) temperature obtained for bisphenol-BC based benzoxazine representative samples namely BBC-a, BBC-aa, BBC-ffa, BBC-imp, BBC-oda and BBC-lfma are 228°C, 254°C, 260°C, 220°C, 253°C and 268°C, respectively. The present invention is considered as cutting-edge concept in the field of utilization of sustainable bio-phenolic cardanol for the possible replacement fossil-based bisphenols in the production of polymeric products for wide range of industrial applications.

Complete Specification

The present invention relates to the synthesis of card-polyphenols (bis-, tris-, and tetra-phenols) by reacting sustainable cardanol with benzaldehyde, vanillin, and terephthalaldehyde respectively in the presence of selected combination of mixture of inorganic and organic acids as catalysts under appropriate experimental conditions. The present invention offers a novel and simple synthetic process route for production of cardanol based poly-phenols in order to utilize them as potential precursors for the development of high-performance epoxies, benzoxazines, cyanate esters, and urethanes for wide range of industrial and engineering applications. The present invention is cutting edge concept in the field of development and utilization of sustainable bio-phenolic cardanol for production of industrially valued polymeric products. Background of the invention

The requirement and competitiveness drive the industries to develop new technology to address high tech demands. The aerospace industries need weight saving to increase the payload and reduction of cost/time of production cycle are imperative targets, for these reasons, aerospace industries, which are traditionally based on the use of metal alloys, have been focusing in the recent past on composite materials. The main advantages of composites are resistant to corrosion and fatigue, and high-performance behaviors which make them suitable for aerospace applications. This necessitates the development of economically competitive technologies. Fiber reinforced composite materials became an integral part in modern aircraft construction. They consist mainly of fibers that are bonded in a resin matrix in the form of prepregs, which serve as primary material for a large variety of compounds. In this context, resins used for making prepregs play a versatile role. For advanced aerospace applications number of resinous materials viz., phenolics epoxies, benzoxazines, cyanate esters, bismaleimides, etc., are used for production of different components.

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