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## Patent Search

Invention Title	"A GREEN PROCESS OF SYNTHESIS OF GLYOXAL-BASED FORMALDEHYDE-FREE BENZOXAZINES AND PRODUCT THEREOF"
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### Abstract:

ABSTRACT The present invention discloses a green process for synthesizing glyoxal-based benzoxazine monomers with oxazine-oxazine linkage. The present invention involves the condensation reaction of a compound of Formula (a) with an amine of Formula (b), resulting in an intermediate compound of Formula (C) via Schiff base. compound (a) is selected from salicylaldehyde, o-vanillin, and cardanol. The reaction with primary amine (b) occurs in a RETSCH jar, followed by ball milling, adding al slowly adding alkali metal borohydride. This mechanochemical mixing at a predetermined frequency and time yields intermediate 1, Formula (C). The organic reduce Formula (C) is separated and subjected to condensation with glyoxal to yield glyoxal-based benzoxazine monomers. This greener solvent-based process uses mechar at room temperature. Figure: 1

### Complete Specification

Description:A GREEN PROCESS OF SYNTHESIS OF GLYOXAL-BASED FORMALDEHYDE-FREE BENZOXAZINES AND PRODUCT THEREOF

#### FIELD OF THE INVENTION

The present invention relates to the field of polymer chemistry. Specifically, the present invention relates to an alternative to traditional formaldehyde-based therm More particularly, the present invention relates to a green process for the synthesis of glyoxal-based benzoxazine monomers with oxazine-oxazine (bi-oxazine) linka the benzoxazine monomers.

#### BACKGROUND OF THE INVENTION

Polybenzoxazine (PBZ) thermosets are distinguished by their exceptional properties, largely due to the extensive hydrogen and covalent bonding that occurs during oxazine ring-opening polymerization (ROP) of the monomer. The versatility of benzoxazine (BZ) chemistry offers molecular design flexibility by varying starting mate such as phenol, amine, and formaldehyde—which in turn enables precise modulation of the polymer properties. BZ composites, often combined with various epoxy were used to produce curable compositions for diverse applications, including electrical components as noted in patents such as US Pat. Nos. 4,607,091 (Schreiber), 5,021,484 (Schreiber), 5,200,452 (Schreiber), and 5,443,911 (Schreiber), as well as US Pat. Publ. No. 2018/0030264 (Wang et al.).

Recent developments are observed including low-temperature curable hybrid composites, achieved by co-curing cardanol benzoxazine-epoxy pre-polymers with hy functionalized cyclophosphazenes. IN201941009030, Selvaraj et al., disclosed benzoxazines that are encouragingly finding the potential in a variety of applications r from composites. coating materials for electronics and electrical appliances. dielectric materials. flame-resistive materials and aeronautics. etc

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