Indian Journal of Chemistry
Vol. 64, April 2025, pp. 399-410
DOI: 10.56042/ijc.v64i4.16270

Innovative syntheses of benzoxazines with improved thermal and mechanical performance

Doaa Jalil Al-Taie

College of Agriculture, University of Al-Qadisiyah, Iraq

E-mail: doaa.jalil@qu.edu.iq

Received 07 January 2025; accepted (revised) 26 March 2025

Thermosetting resins are a type of material that is widely used in the industry, especially due to their high mechanical strength, flame retardant qualities and thermal stability. One such type of thermosetting resin is Benzoxazines. The conventional method of synthesis requires catalysts and solvents which makes the process complex. The goal of this research was to develop a modernized solvent free method for the synthesis of various types of benzoxazines *via* a Mannich reaction, and also examining the linkage between serotonin levels and factors such as the population characteristics of an individual when diagnosing colorectal cancer. In this study, two benzoxazines monomers are used, containing Schiff bases and bulky hand groups. These monomers are created *via* a copolymerization process with amine, phenol and paraformaldehyde. The chemical structures of the resulting compounds were characterized using Fourier Transform Infrared (FTIR) spectroscopy, as well as ^{1}H and ^{13}C Nuclear Magnetic Resonance (NMR) spectroscopy. The structural conversion accompanied by the enhancement of the thermal and mechanical properties of the benzoxazine structures was visualized by the distinct absorption band located at 1709 cm^{-1}. Moreover, the benzoxazine displayed a greater yield than what was obtained previously confirming the successful process structure formation. The novel solvent devoid synthesis process for benzoxazines aids in making the manufacturing good more straightforward and also enables the creation of material with specific properties enhanced for various engineering purposes. Further investigations into serotonin physiology in tumors may give new ideas for treatment of colorectal cancer.

Keywords: Benzoxazine, Pyridine heterocyclic group, Schiff-Base, Mannich reaction, Aromatic aldehyde