International Journal of Polymer Analysis and Characterization ›
Volume 28, 2023 - Issue 1

Articles

Synthesis and characterization of new quinolinyl phenol based polybenzoxazine: thermal stability, hydrophobicity and corrosion resistant properties

Roja Chinnamuthu, Priyanka Madesh, Hariharan Arumugam, Balaji Krishnasamy, Latha Govindraj, Mallika Jaganathan & ...show all

Pages 32-47 | Received 24 Jun 2022, Accepted 31 Oct 2022, Published online: 12 Nov 2022

Cite this article https://doi.org/10.1080/1023666X.2022.2143758 Check for updates

Abstract

A new class of quinolinyl phenol-based benzoxazines (QP-a, QP-cha, QP-2eha) were synthesized by using quinolinyl phenol [4-(6-chloro-4-phenylquinoline-2-yl)phenol] with three structurally distinct amines, namely aniline (a), cyclohexylamine (cha), and 2-ethylhexylamine (2eha) through Mannich condensation reaction using an appropriate solvent and reaction conditions. By using FTIR and ^{1}H-NMR spectroscopy methods, the molecular structures of the benzoxazines QP-a, QP-cha, and QP-2eha were identified. From the differential scanning calorimetry (DSC) analysis, the exothermic peak maximum of benzoxazine monomers viz., QP-a, QP-cha, QP-2eha were observed at 218, 202 and 187 °C respectively. The thermogram obtained from TGA studies the amount of char yield obtained for poly(QP-a), poly(QP-cha) and poly(QP-2eha) were found to be 45, 24, and 32%, respectively. The value of limiting oxygen index (LOI) for polybenzoxazines was calculated using the value of percentage char yield obtained from TGA studies infer that these benzoxazines exhibit good flame-retardant characteristics. Data from water contact angle studies ascertain that these samples possess good hydrophobic properties in the range of 129–138°. Results from corrosion studies infer that the mild steel specimens coated with these benzoxazines were found to be more stable and offer better surface protection against corrosion under the conditions studied.

Keywords: Benzoxazine quinolinyl phenol thermal stability flame retardancy hydrophobicity corrosion resistance

Acknowledgment