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Synthesis and physiochemical investigations of imidazolium 4-hydroxybenzoate (I4HB) for nonlinear optical applications

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The slow evaporation approach has been used to produce and develop imidazolium 4-hydroxybenzoate (I4HB), a novel organic proton-transfer chemical substance. Through single-crystal X-ray diffraction, detailed study shows a monoclinic crystal structure with the centrosymmetric space group $P2_1/n$. Vibrational modes have been investigated using FT-IR and FT-Raman spectroscopy. The chemical structure of the molecule has been thoroughly validated using ^{1}H and ^{13}C NMR analysis. UV-Vis-NIR absorption spectra have been used to investigate electronic transitions. Thermal parameters such as a melting point of 215°C and breakdown phases have been investigated using TG-DTA analysis. Third-order nonlinearity has also been confirmed using Z-scan analysis.

Keywords: X-ray diffraction, NMR spectral analysis, TG-DTA analysis, Z-scan