

Title : A rapid and large volume synthesis of mono-, di-, tri-, and tetra-substituted imidazole derivatives via ultrasonic radiation-driven technique

Author Names : Mohd Sayeed Shaikh, Mayura A. Kale, Mehrukh Zehravi, Aziz Unnisa, M. Akiful Haque, Kusuma Praveen Kumar, Sharuk L. Khan, Syed Sarfaraz Ali Falak A. Siddiqui, Mayeen Uddin Khandaker

Abstract: Sonochemistry under controlled conditions has proven effective in medicinal chemistry and drug development. It can substantially shorten reaction timelines from days or hours to minutes. A convenient one-pot synthesis of 2,4,5-trisubstituted and 1,2,4,5-tetrasubstituted imidazole derivatives catalyzed by PTSA and benzenesulfonic acid in ethanol as solvent, under ultrasonic irradiation and without ultrasound irradiation at 50° C has been achieved successfully. These 2,4,5-trisubstituted and 1,2,4,5-tetrasubstituted imidazole derivatives synthesis were also accomplished using different solvents viz., Methanol, Ethanol, DCM, DMF, Acetonitrile and THF and PTSA as the catalyst. This method yielded the highest % synthesis of 2,4,5-trisubstituted and 1,2,4,5-tetrasubstituted imidazole derivatives with PTSA as the catalyst in solvent ethanol. These reactions were also optimized for % of PTSA catalyst required to obtain the maximum yield of 2,4,5-trisubstituted and 1,2,4,5-tetrasubstituted imidazole derivatives with and without ultrasound irradiation at 50° C. Synthesis of 2,4,5-trisubstituted Imidazole derivatives reaction follows first-order rate kinetics while that of 1,2,4,5-tetrasubstituted Imidazole derivatives reaction follows the second-order rate kinetics. Furthermore, sonochemistry has higher yields, lower cost, easier workups, and higher purity than conventional thermal organic synthesis, which has lower yields, tedious workups, longer reaction periods, lower purity, and numerous byproducts.

- **Keywords:** Ultrasonic, imidazole ,reaction kinetic, green chemistry, sulfonic acid, PTSA

<https://doi.org/10.1080/10420150.2023.2294026>

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