CO\textsubscript{2} Cycloaddition to Styrene Oxide Catalysed by ZnBr\textsubscript{2}, Impregnated Rice Husk Ash Silica: Structural and Kinetics Studies


A series of ZnBr\textsubscript{2} impregnated on rice husk ash silica catalysts were synthesised via the wet impregnation method for the CO\textsubscript{2} cycloaddition to styrene oxide reaction. The X-ray diffraction (XRD) analysis indicates that the impregnation resulted in the deterioration of the silica's pore channels. Catalyst with 0.5\% w/w of Zn (0.5 wt\% ZnBr\textsubscript{2}-SiO\textsubscript{2}) was highly active in the CO\textsubscript{2} cycloaddition to styrene oxide. The conversion of styrene oxide (SO) was 89.1\%, with the styrene carbonate (SC) selectivity of 92.1\% under the optimum conditions (130°C, 60 bar, 3 h and solventless). Additionally, the universality of 0.5 wt\% ZnBr\textsubscript{2}-SiO\textsubscript{2} was also studied with other epoxides, and it shows good to excellent activity. The catalytic performance of the 0.5 wt\% ZnBr\textsubscript{2}-SiO\textsubscript{2} remains constant after being reused three consecutive times. The activation energy of the reaction was determined to be 89.06 kJ/mol.