World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:18, No:12, 2024

Zeolite-Enhanced Pyrolysis: Transforming Waste Plastics into Hydrogen

Authors : Said Sair, Hanane Ait Ousaleh, Ilyas Belghazi, Othmane Amadine

Abstract : Plastic waste has become a major environmental issue, driving the need for innovative solutions to convert it into valuable resources. This study explores the catalytic pyrolysis of plastic waste to produce hydrogen, using zeolite catalysts as a key component in the process. Various zeolites, including types X, A, and P, are synthesized and characterized through X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), Brunauer–Emmett–Teller (BET) surface area analysis, thermogravimetric analysis (TGA), and scanning electron microscopy (SEM). These techniques are employed to assess the structural and chemical properties of the catalysts. Catalytic pyrolysis experiments are performed under different conditions, including variations in temperature, catalyst loading, and reaction time, to optimize hydrogen production. The results demonstrate that the choice of zeolite catalyst significantly impacts plastic waste conversion efficiency into hydrogen. This research contributes to advancing circular economy principles by providing an effective method for plastic waste management and clean energy production, promoting environmental sustainability.

Keywords : hydrogen production, plastic waste, zeolite catalysts, catalytic pyrolysis, circular economy, sustainable energy
Conference Title : ICCHC 2024 : International Conference on Chemistry and Heterogeneous Catalysis
Conference Location : Rome, Italy
Conference Dates : December 16-17, 2024