World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:16, No:09, 2022

Slow Pyrolysis of Bio-Wastes: Environmental, Exergetic, and Energetic (3E) Assessment

Authors : Daniela Zalazar-Garcia, Erick Torres, German Mazza

Abstract : Slow pyrolysis of a pellet of pistachio waste was studied using a lab-scale stainless-steel reactor. Experiments were conducted at different heating rates (5, 10, and 15 K/min). A 3-E (environmental, exergetic, and energetic) analysis for the processing of 20 kg/h of bio-waste was carried out. Experimental results showed that biochar and gas yields decreased with an increase in the heating rate (43 to 36 % and 28 to 24 %, respectively), while the bio-oil yield increased (29 to 40 %). Finally, from the 3-E analysis and the experimental results, it can be suggested that an increase in the heating rate resulted in a higher pyrolysis exergetic efficiency (70 %) due to an increase of the bio-oil yield with high-energy content.

Keywords : 3E assessment, bio-waste pellet, life cycle assessment, slow pyrolysis
Conference Title : ICEBDELCA 2022 : International Conference on Exergy-Based Design and Exergetic Life Cycle Assessment
Conference Location : Prague, Czechia
Conference Dates : September 08-09, 2022