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## High value chemicals from palm Biomass: Combustion kinetics of leaflet, rachis and fibers of UAE date palm tree biomass using thermogravimetric analysis

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**Statement of the Problem:** UAE has over 30 million date palm trees. On average approximately a total of 40 kg waste per tree is produced and therefore huge amount of waste is generated (about 1.2 million tons annually). Most of the waste from palm trees is currently turned into compost or burned to generate heat despite their high content of cellulose, hemicelluloses and lignin. Researchers have reported that different date palm biomass can be converted to value added products considering lignocellulose components as a base feed stock. However, to our knowledge UAE's palm tree perspective has not been previously reported. The purpose of this study is to predict the kinetic study of UAE date palm tree using TGA analysis, with an aim of providing an insight on lignocellulose thermodecomposition trend for future production of HVC from the same biomass. Methods & Experimental procedure: Thermogravimetric analysis of biomass in this study (see Figure 1.) was carried out using Q500, TA Instrument, sample weight of 6.0 mg ( $\pm 1.0$ ) and N<sub>2</sub>, 20 mL/min. 10, 15 and 20 °C/min was controlled from 25 to 900 °C.

**Results:** The initial weight was recorded continuously as a function of temperature and time. The derivative (DTG) curve showed the weight loss of sample per unit time against temperature. The DTG curves showed four decomposition peaks ranging from low to high temperature and were assigned to; inherent moisture, hemicellulose, cellulose and lignin, respectively. Increase in heating rates shifted curves slightly towards higher temperature because of thermal energy between sample and surrounding. Kinetic energy and exponential constants of the system were found. Conclusion & Significance: TGA can quantitatively resolve complex biomass because of the characteristic thermal decomposition temperature of each component. Recommendations are made for further characterization for better understanding of palm biomass prior to processing in a bio-refinery

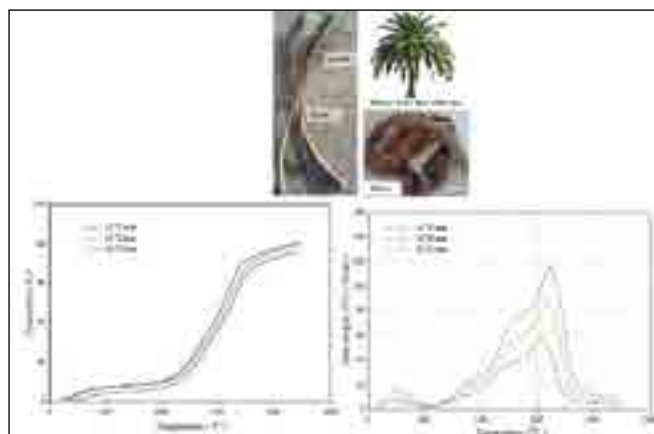


Figure 1: The different components of lignocellulose waste of UAE date palm trees and TGA, DTG results

### Biography

Emmanuel has masters in Energy and Chemical Engineering from South Korea and he worked as a Petroleum chemist with Saybolt international before joining UAE University, where he serves as a research assistant and a PhD candidate in Chemical Engineering under Dr. Ali Al-Marzouqi's supervision. Dr. Ali Al-Marzouqi obtained his B.Sc. in Chemical Engineering from University of Washington, USA and Ph.D. in Chemical Engineering from Oregon State University, USA. He worked as an Instructor in the Chemical Engineering Department of Oregon State University for three years and then joined Chemical and Petroleum Engineering Department of UAE University as an Assistant Professor; he was promoted to Associate Professor and now serving as the Assistant Dean for Research and Graduate Studies. Dr. Al-Marzouqi's research focuses on biomass utilization and the use of supercritical fluid technology in numerous applications including food and pharmaceutical processing, herbal extraction, biodiesel production, extraction and oxidation of oil sludge, and development of nanocatalysts.

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