

## Thermal Degradation Kinetics of Field-Dried and Pelletized Switchgrass

**Authors :** Karen E. Supan

**Abstract :** Thermal degradation kinetics of switchgrass (*Panicum virgatum*) from the field, as well as in a pellet form, are presented. Thermogravimetric analysis tests were performed at heating rates of 10-40 K min<sup>-1</sup> in an inert atmosphere. The activation energy and the pre-exponential factor were calculated using the Ozawa/Flynn/Wall method as suggested by the ASTM Standard Test Method for Decomposition Kinetics by Thermogravimetry. Four stages were seen in the degradation: dehydration, active pyrolysis of hemicellulose, active pyrolysis of cellulose, and passive pyrolysis. The derivative mass loss peak for active pyrolysis of cellulose in the field-dried sample was much higher than the pelletized. The range of activation energy in the 0.15 - 0.70 conversion interval was 191 - 242 kJ mol<sup>-1</sup> for the field-dried and 130-192 kJ mol<sup>-1</sup> for the pellets. The highest activation energies were achieved at 0.50 conversion and were 242 kJ mol<sup>-1</sup> and 192 kJ mol<sup>-1</sup> for the field-dried and pellets, respectively. The thermal degradation and activation energies were comparable to switchgrass and other biomass reported in the literature.

**Keywords :** biomass, switchgrass, thermal degradation, thermogravimetric analysis

**Conference Title :** ICTAKUMBTA 2022 : International Conference on Thermal Analysis Kinetics for Understanding Materials Behavior and Thermogravimetric Analysis

**Conference Location :** Dubai, United Arab Emirates

**Conference Dates :** October 13-14, 2022