

**Title: Pyrolysis of municipal solid waste: Kinetics and thermodynamic parameters via Coats-Redfern method**

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**Abstract:** Renewable and sustainable energy resources are the dire need of time for environmental sustainability and to minimize the effects of global warming and climate change. The objective of this study was to investigate the thermos-kinetic parameters of municipal solid waste through pyrolysis. The sample was collected and prepared according to the American standards for test materials. Thermogravimetric analysis showed the three distinct regions, while the maximum degradation occurs in the second region within the temperature range of 230–400 °C. A model-fitting approach using the Coats Redfern model was applied in this region to perform thermo-kinetic analysis. Based on the kinetic analysis, the D3 diffusion model showed the highest regression coefficient with an activation energy of 16–18 kJ/mole among all three diffusion models. Thermodynamic analysis showed that the pyrolysis process is endothermic, the product has more energy and a well-ordered arrangement of molecules confirmed by the positive change in enthalpy values and negative entropy values. The results demonstrate the usefulness of municipal solid waste in the creation of productive methods for converting to energy.

**Key words:** waste pyrolysis Coats Redfern method thermos-kinetic parameters

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