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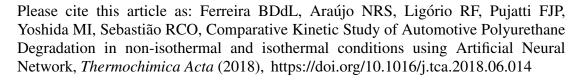
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Comparative Kinetic Study of Automotive Polyurethane Degradation in non-isothermal and isothermal conditions using Artificial Neural Network

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The highlights of this manuscript are:

- Thermal decomposition of automotive polyurethane is investigated by neural network;
- Kinetic of solid thermal decomposition is accurately determined as a combined event;
- Traditional kinetic models are mathematically corrected by the neural network;
- Rn and Dn models are associated by the network in the solid decomposition process;
- Kinetic studies by traditional methods are confronted by the neural network results;

Abstract

Thermal decomposition of automotive polyurethane was investigated by thermogravimetry under non-isothermal and isothermal conditions. For isothermal treatment, a neural network (ANN) was adopted with kinetic models as activation functions for neurons in the hidden layer. In this network architecture, rate constants represent weights between the input and intermediate layer and the learning process occurs by optimizing only the weights in output layer. Polyurethane sample was collected from an automotive intake manifold and the Diffusion and Contraction models were selected for better describe the decomposition as a combined event. Due to mathematical corrections, the accuracy of ANN is greater