



Master Kinetics Curve Model: A Possible Universal Kinetic Model

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The Master Kinetics Curve (MKC) model is a universal kinetic analysis model developed by our research team. The Master Kinetics Curve of a reaction can be constructed by 3 to 5 sets of experimental data on reaction temperature, reaction time, and reaction percentage. With the MKC, one can predict the results under different heating processes and design the best heating profile for the preparation of the reacted sample. The MKC model has three advantages: (1) easy to use: no assumption of kinetic parameters is needed. The MKC model can predict the activation energy and heating rate without any knowledge of its reaction mechanism; (2) accurate predictions: the curve is derived from experimental data, so it can accurately describe the reaction process; (3) wide applications: the model was developed from a general reaction rate equation so it works for any reaction type. We have already demonstrated the applicability of MKC in a number of reactions, including mineral thermal decomposition, mineral phase transformation, simple chemical reaction, sintering reaction, and kerogen-to-oil conversion. Although the universality of the MKC model has been demonstrated, further exploration is still needed, such as analyzing the kinetic data from the relevant extant literature. The computer analysis software of MKC has also been developed to help users quickly derive the best fit MKC. The MKC model is a promising universal tool for the kinetics analysis in basic geosciences, minerals science, materials science, and other applications. In academia, the MKC model provides a new method to study the kinetics of reactions; in industry, it can optimize the time and cost, while finding the best production procedure.