A Kinetic Analysis of Thermal Decomposition of Polyanilin/ZrO_2 Composite

S.-X. Wang[1,S], Z.-C. Tan[1,2,C] , Y.-S. Li[1] and L.-X. Sun[2]

[1]*College of Environmental Science &Engineering,Dalian Jiaotong University,Dalian, China*

[2]*Thermochemisty Laboratory,Dalian Institute of Chemical Physics, Chinese Academy of Science, Dalian, China*
tzc@dicp.ac.cn

Conducting polymer composites are intimate combinations of one or more inorganic nanoparticles with a polymer so that unique properties of the former can be taken together with the existing qualities of the latter. Over the last few years, conducting polyaniline composites have attracted much attention because they can improve the applicability of polyaniline in different fields, e.g., electrodes of batteries, display devices, immunodiagnostic assay, etc. A lot of literatures have reported their preparation methods, formation mechanism and conductivity property [1-4]. Few concerns have been made on their stability, especially on their kinetics of thermal decomposition.

Synthesis, characterization and thermal analysis of PANI/ZrO_2 composite and PANI were reported in our early work [5]. In this present, the kinetic analysis of decomposition step for these two materials were performed under non-isothermal conditions. The activation energies were calculated through Friedman and Ozawa-Flynn-Wall methods, and the possible kinetic model function has been estimated through the multiple linear regression method. The results show that the kinetic models for the decomposition processes of PANI/ZrO_2 composite and PANI are all D_3. The correlated kinetic parameters are Ea = 112.7 ± 9.2 kJ/mol, ln A = 13.9 and Ea = 81.8 ± 5.6 kJ/mol, ln A = 8.8 for PANI/ZrO_2 composite and PANI, respectively.

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