



**STUDY AND COMPARISON OF THERMAL DEGRADATION KINETICS OF THERMOSETTING  
POLYMERS LOADED WITH METALLIC FILLERS**

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Microcomposites were prepared from Epoxy Resins F (ERF) and Urea- Formaldehyde - Cellulose polymer (UFC) loaded with metallic fillers: Al, Sn and Zn respectively. These composites showed very interesting electrical and mechanical properties. In order to complete these studies, the thermal degradation kinetic study was undertaken in accordance with filler's nature, size and contents under different experimental conditions: heating rate heat, exchange gases, etc. The kinetic studies were done by utilizing TGA and DTG under the dynamic conditions in view of comparing the variation in pattern of poly epoxy (ERF) and UFC degradation by the addition of these fillers. The isoconversional methods of Ozawa, Ozawa-Flynn-Wall and Kissinger (modified) were then used to determine the approximate value of apparent effective activation energy of thermal degradation, to estimate the complexity of process and thus to find the most probable kinetic degradation model in each case which, on the other hand, is found difficult by isothermal TGA. This study revealed the fact that the thermal degradation of polymeric matrix and its micro-composites can be fairly described by a simple reaction nth order model and in addition to this, the fillers content seems to improve in the epoxy case and destroy in the UFC case in consequences with thermal resistance. Finally, a simple new model to relate the  $(Ea)_{\text{pure polymer}}$  and  $(Ea)_{\text{composites}}$  and to determine the degradation levels was developed. This model was tested, verified experimentally and then compared to the well known models.