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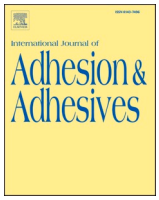

Hydrolytic, thermal and radiation stability of modified urea-formaldehyde composites: Influence of montmorillonite particle size

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ABSTRACT

Urea-formaldehyde (UF) composites with a formaldehyde/urea (FA/U) ratio = 0.8 and different particle sizes of montmorillonite (MMT), namely UF/KSF and UF/K10 were synthesized. The hydrolytic stability of modified UF composites was determined by measuring the content of the liberated formaldehyde of modified UF composites after acid hydrolysis. The synthesized modified UF composites were irradiated (50 kGy) and the effect of γ–irradiation was evaluated on the basis of these thermal behaviors. The thermal behavior was studied by non-isothermal thermo-gravimetric analysis (TG), differential thermo-gravimetry (DTG), and differential thermal analysis (DTA) supported by data from Fourier transform infrared spectroscopy (FTIR). The minimum percentages of free (0.4%) and liberated (1.2%) formaldehyde were obtained in the UF/KSF composite. The modified UF/KSF composite shows better radiation resistance than the modified UF/K10 composite. The shift of temperature values for the selected mass losses (T_5%) to higher temperatures indicates an increase in the thermal stability of the UF/K10 composite after γ–irradiation. γ–irradiation causes a decrease in the absorption intensity of bands in the FTIR spectrum of a modified UF/KSF composite and an increase in the absorption intensity of bands in the FTIR spectrum of a modified UF/K10 composite.

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