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# Synthesis, characterization, hydrolytic, and thermal stability of urea–formaldehyde composites based on modified montmorillonite K10

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**Abstract**
In this study, the thermal and hydrolytic properties of composite systems based on the urea–formaldehyde resin (UF) and eco-friendly montmorillonite (K10) as formaldehyde (FA) scavenger were examined. UF resin with molar ratio FA:U = 0.8 was synthesized in situ with inactivated, and activated K10. K10 was activated by sulfuric acid ($H_2SO_4$) with and without magnetic stirring. The samples are marked with $K10_{(H_2SO_4)}$, $K10_{(H_2SO_4)_{ST}}$, $UF/K10_{(H_2SO_4)}$, and $UF/K10_{(H_2SO_4)_{ST}}$, respectively. X-ray diffraction analysis and non-isothermal thermogravimetric analysis, supported by data from Fourier transform infrared spectroscopy and scanning electron microscopy were used to characterize the samples. Based on the measurement of specific surface area (SSA), the degree of activation was determined. Measurement of the SSA shows that higher values were obtained for modified K10 compared to inactive K10. The amount of free and liberated FA was 0.06% and 4.6% for $UF/K10_{(H_2SO_4)}$ and 0.12% and 4% for $UF/K10_{(H_2SO_4)_{ST}}$. This research showed that the $UF/K10_{(H_2SO_4)}$ composite has a lesser amount of free FA (0.06%) in comparison to the $UF/K10_{(H_2SO_4)_{ST}}$ composite (0.12%). The $UF/K10_{(H_2SO_4)_{ST}}$ composite has a higher resistance to acidic hydrolysis. The modified $UF/K10_{(H_2SO_4)}$ composite is more thermally stable than $UF/K10_{(H_2SO_4)_{ST}}$ composite.

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