

## On the use of magnesium hydroxide towards halogen-free flame-retarded polyamide-6/polypropylene blends

### Abstract:

Metal hydroxides have long been considered as abundant and low cost fillers towards the development of halogen-free flame-retarded polymers. In this study, magnesium hydroxide (MH) flame-retarded polyamide 6/polypropylene (PA6/PP) composites with various MH contents (20-50 wt%) were prepared and flame retardancy, thermal degradation, morphological, mechanical, thermal and thermo-mechanical characteristics were discussed. Mass loss calorimeter analysis revealed that the addition of MH provided improvements in flame retardancy through reduced heat release and mass loss rates along with delayed ignition. Limiting oxygen index and UL-94 tests also suggested enhancement in flame retardancy with increasing MH content. Substantial flame retardancy was obtained with the addition of MH at a loading level greater than 30 wt% in the resin which was explained by the formation of intact, consolidated and thick residue structures on the surface of MH filled samples. The addition of MH lowered the thermal stability of PA6/PP blends and PP particles are densely covered by MH particles adversely affecting the compatibility of blend constituents. Degree of crystallinity of blend constituents was reduced with the incorporation of MH. While the stiffness of PA6/PP/MH composites was improved, impact strength was deteriorated with increasing MH content. Due to the stiffness effect of MH particles, damping behavior of PA6 in PA6/PP/MH composites was reduced at high temperatures.