TG-MS ANALYSIS OF THE DESORPTION OF ORGANOCATIONS FROM SMECTITES.

BREEN, C., CHARLESWORTH, C., CLEGG, F.

Materials Research Institute, Sheffield Hallam University, Howard St., Sheffield, S1 1WB, UK
E-mail: C.breen@shu.ac.uk

The demonstrated improvements in mechanical and barrier properties together with the increased thermal stability of clay-based nanocomposites has attracted considerable attention.

Clay-based nanocomposites are attracting much attention because of the demonstrated improvement in mechanical and barrier properties, as well as thermal stability. The addition of only 5wt% organoclay in polypropylene raises the mechanical properties to those obtained when 30–60wt% of talc is added. This increase in property is accompanied by a decrease in component weight. An early drawback was a reduction in the time to ignition (TTI) in the nanocomposite compared with that for the virgin polymer which is now remedied by addition of low levels of conventional fire retardants. Even in the absence of conventional flame retardants the maximum in the heat release rate is significantly reduced. This marked improvement in the thermal stability of clay-based nanocomposites has resulted in a number of informative investigations into the thermal stability of the organoclay utilised in their production.

Uptake curves for the adsorption of a selection of organomodifiers, some with vinyl end groups, have been determined together with X-ray diffraction data and variable temperature DRIFTS spectra.

In particular we have used thermogravimetry-mass spectrometry (TG-MS) to identify the decomposition products arising from the thermal decomposition of the organoclays prepared at different loadings on cloisite-Na and other Na-saturated smectities.

In addition to linear alkanes and alkenes, a number of cyclic and/or aromatic compounds were produced by the organoclays. Moreover, the availability of the vinyl end groups is confirmed by the increased quantity of dienes, produced via the Hoffman elimination, present in the evolved gas stream.