In-vivo study of genotoxic and inflammatory effects of the organo-modified Montmorillonite Cloisite® 30B

Because of the increasing use of clays and organoclays in industrial applications it is of importance to consider the toxicity of these materials. Recently it was reported that the commercially available Montmorillonite clay, Cloisite® 30B, which is surface-modified by organic quaternary ammonium compounds, was genotoxic in vitro. In the present study the in-vivo genotoxic and inflammatory potential of Cloisite® 30B was investigated as a follow-up of the in-vitro studies. Wistar rats were exposed to Cloisite® 30B twice 24 h apart by oral gavage, at doses ranging from 250 to 1000 mg/kg body weight [indicate duration of treatment; Ed.]. There was no induction of DNA strand-breaks in colon, liver and kidney cells and there was no increase in inflammatory cytokine markers in blood-plasma samples. In order to verify the possible absorption of Cloisite® 30B from the gastrointestinal tract, inductively coupled plasma mass-spectrometry (ICP-MS) analysis was performed on samples of liver, kidney and faeces, with aluminium as a tracer element characteristic to clay. The results showed that aluminium could be detected in faeces, but not in the liver or kidneys. This indicated that there was no systemic exposure to clay particles from Cloisite® 30B. Detection and identification of free quaternary ammonium modifier in the highest dose of Cloisite® 30B was carried out by high-performance liquid chromatography coupled with quadrupole time-of-flight mass spectrometry (HPLC-Q-TOF-MS). This analysis revealed a mixture of three quaternary ammonium analogues. The detected concentration of the organomodifier corresponded to an exposure of rats to about 5 mg quaternary ammonium analogues/kg body weight.

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