SYNTHESIS AND CHARACTERIZATION OF NANOFILLERS BASED ON MODIFIED CLAY MATERIALS

S. Albeniz*, M.A. Vicente**, R. Trujillano**, S.A. Korili*, A. Gil*

* Department of Applied Chemistry, Building Los Acebos, Public University of Navarra, Campus of Arrosadía E-31006 Pamplona, Spain.
** Department of Inorganic Chemistry, Faculty of Chemical Science, Square of Merced, University of Salamanca, E-37008 Salamanca, Spain

The development of nanoscience and nanotechnology has allowed a new interest on clay materials. This interest is based on the size of the clay layers, as well as in their interlayer spacing size, being able to act as nanomaterials. Moreover, clays have the ability to incorporate in their interlayer spaces other molecules, giving rise to a large number of new materials with a variety of applications [1].

The main aim of this work is to synthesize materials based on clays that can be used as nanofillers of plastic matrices. It is intended to improve the properties of new materials with the presence of the nanoclay on the plastic matrix, such as mechanic properties, fire resistance or gas permeability, and that can acts as a screen effect against UV radiation.

The most common clay materials and polymers that constitute plastic matrices are not miscible. Therefore, it is necessary to find organic molecules, as well as the conditions and the ratios, which allow the compatibility of the two materials. In this work, a clay supplied by *The Clay Science Society of Japan* has been used. The organic molecules used as surfactant have been: Arquad 2HT-75 (Fluka), octadecylamine (Aldrich), 3-aminopropyltriethoxysilane (Aldrich), trimethyloctadecylammonium bromide (Aldrich) and tetraethoxysilane (Alfa Aesar). In presence of organic molecules, it is achieved the reduction of clay surface energy and the increase of the interlayer space. Thus, it is achieved the well dispersion of silicate layers into the plastic matrix [2,3].

The techniques used to characterize the synthesized materials have been: X-ray diffraction, thermogravimetric analysis, infrared spectroscopy, chemical analysis and scanning electron microscopy. In this work, the most important results found will be presented and discussed.

References

[1] D. Zhang, C.-H. Zhou, C.-X. Lin, D.-S. Tong, W.-H. Yu. Synthesis of clay minerals. Applied Clay Science, 50 (2010), 1-11.

[2] N.G. Shimpi, S. Mishra. Studies on effect of improved d-spacing of montmorillonite on properties of poly (vinyl chloride) nanocomposites. Journal of Applied Polymer Science, 119 (2011), 148-154.

[3] M. Moghri, M. Akbarian. Effects of nanoclay and additives on the fusion characteristics and thermal stability of poly (vinyl chloride) nanocomposites. Journal of Vinyl and Additive Technology, 15 (2009), 92-98.