OPTICAL PROPERTIES OF BLOWN FILMS OF PA6/MMT NANOCOMPOSITES

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The optical properties of blown films, such as haze, gloss, clarity or transparency and transmittance are critical factors in determining the final use of the product, especially for applications in the packaging area. The scattering of visible light can occur due to the presence of superficial or internal crystalline structures, and its extent depends on the size of such structures: if they are in a similar range to that of the wavelength of light (between 400 and 700 nm), the phenomena of diffuse reflection, refraction and scattering occur considerably, resulting in increased turbidity. The inclusion of nanoparticles to improve mechanical and permeation behaviors of polymers has been extensively studied in recent years and, depending on its geometry, size and state of dispersion/distribution, the optical properties can also be changed. In this work blown films of polyamide 6 (PA6) nanocomposites were produced in different processing conditions, with the addition of montmorillonite (MMT), pure and surface modified by an organic salt. The films' optical properties were evaluated according to ASTM D-1003-07 and the results correlated with the crystallinity index, MMT's dispersion state and processing conditions. It can be seen that the smaller the film thickness, the lower the opacity and higher the clarity, due to fewer amount of internal scattering structures in the direction of the incident light. No significant variations in crystallinity were observed, demonstrating that the change in opacity could be correlated with surface roughness and the presence of MMT. The PA6 films with the unmodified MMT showed the lowest clarity values, due to the nanoparticles' agglomeration. The organic modification of the MMT led to its exfoliating thru the PA6 matrix, resulting in an optimization of the films' optical properties when compared to the behavior of the pure PA6 films.