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EVALUATION OF DIFFERENT PROCESSING CONDITIONS ON THE IN-LINE TURBIDITY AND COLOR FORMATION OF PP/MMT NANOCOMPOSITES

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The exfoliation of the MMT clay during the preparation of PP/MMT nanocomposites in different melt processing conditions was monitored using an in-line optical detector that follows the light extinction due to changes in concentration, scattering power and particle size of the dispersed phase. On tactoid exfoliation its size is reduced below the minimum particle size to produce light extinction (turbidity) and so the signal intensity reduces as the nanosize composite is formed. The optical detector was calibrated using water suspension of TiO_2 ceramic particles of well-controlled size and showed to follow the Mie Theory. This theory states that the transmitted light intensity decreases for suspension of particles smaller than 500 nm. The off-line color measurements, using CIE Lab scale, has shown that the high values for luminosity was obtained at high screw speed for MMT Na+ and slow screw speed for OM-MMT 15A. The nanocomposites obtained from different process conditions presented negative a* values from -0.4 to -1.5, negative values for coordinate a* represent a green color. All nanocomposites do show a lightly yellow color (positive b* coordinate) which intensity decreases with high shear rate. Also the yellowness indexes of the nanocomposites decrease at high shear rate. The nanocomposites obtained with MMT Na+ clay produces PP/MMT nanocomposites more opacous than OM-MMT 15A. Results from X-ray do follow the same trend as those obtained from the in-line light extinction measurements.