

Effect of the processing conditions on the residence times in a twin-screw micro-extruder

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This work focuses on the thermal and mechanical history through residence time measurements during melt compounding of a SBR copolymer using a twin-screw micro-extruder. Twin-screw micro-extruder is a common melt processing device to obtain composite materials at the laboratory scale. The final properties of the composite are connected to the processing conditions. In particular, the residence time in the twin-screw is an essential data to identify the thermal and mechanical mechanisms which drive the dispersion of filler within the composite material. Processing of rubber using a Haake Minilab II® twin-screw micro-extruder was investigated. The system is based on a conical, twin-screw compounder with an integrated backflow channel. Two pressure transducers are integrated in this channel. The system allows compounding in circulation mode (closed route) or extrusion mode (opened route). The residence times were calculated using pressure measurements and using a color tracer. The influence of the compounding mode, the effect of the temperature and the screw rotation speed are discussed. Références : [1] N. Hasegawa and al., Polymer, 44 (2003), 2933–2937 [2] H.R Dennis and al., Polymer, 42 (2001), 9513-9522 [3] J.W. Cho and al., Polymer, 42 (2001), 1083-1094 [4] G.M. Russo and al., Polymer Degradation and Stability, 92 (2007) 1925-1933. Key words: residence time, twin-screw micro-extruder, SBR