

RHEOLOGY BEHAVIOUR OF BIODEGRADABLE MATERIALS: POTATO THERMOPLASTIC STARCH/ NATURAL RUBBER/ EPOXIDIZED NATURAL RUBBER BLENDS

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In the plastic industry, the rheological behaviour is presumed to important role in affecting processability, properties of final products, and more scientific research possibilities. This study systematically evaluated the rheological behaviour of unvulcanized natural rubber (NR) and epoxidized natural rubber (ENR) mixing with thermoplastic potato starch (TPS). These materials were prepared from renewable sources, which are crucial for the development of eco-friendly materials today. The effect of rubber content and temperature on the rheological behavior was evaluated by the flow characteristics in the temperature range (100 - 135 °C) which matches that used in the processing. Four experimental techniques were systematically evaluated the rheology behavior of the materials: 1) Apparent viscosity, 2) RPA frequency and strain sweep, 3) Mooney viscosity, 4) Melt flow index. It was confirmed that our materials are easy to flow at the temperature range of 100 – 135 °C, especially 135 °C. The presence of rubber improves the fluidity of TPS. The lower rubber concentration of the blends has higher chain flexibility. TPS and ENR have poor elastic behavior, but the combination of ENR and TPS improve the elasticity of the materials significantly. The flow is pseudo plastic in nature in this type of materials characterized by a reduction in the apparent viscosity at high shear rates. The rising of the temperature to lower the apparent viscosity and ease the flow does not seem to be very effective. The evaluation can be a reference for the further investigation and for industrial processing of materials based on TPS and unvulcanized rubber combinations.

Acknowledgments:

This work was co-supported from the grant of Specific university research – grant No.: A1_FCHT_2022_004 and A2_FCHT_2022_005 in the project application number from IGA and by the ESF in OP RDE – project No.: CZ.02.2.69/0.0/0.0/19_073/0016928.