Composites with particles tuff on matrix waste polystyrene

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Abstract

Tuff is a natural materials formed after the reproaches weight by volcanoes. Tuffs composed mainly of organic materials linked sillicerous binder. They are characterized by low weight, high hardness, high adhesion to matrix allows for even distribution of particles in the volume of the material. By using it as a filler in polymer composites can be achieved to increase the stiffness and hardness of the final material. An impor-tant characteristic of polymer composites filled tuff is a high melt flow index, which to make easier of formation of articles from the material in the injection moulding. Another advantage is the low price and high availability, so that it can be replacement for expensive other dopants in order to reduce producti-on costs.

The article presents the possibility of producing composites based on polystyrene recyclate with particles tuff in the injection moulding process and carried out basic tests of mechanical properties in wide range of temperatures. An additional aim of the study is demonstrate the possibility of using the particles mineral filler as compatibilizer of waste polystyrene of poor quality. Development of this type of waste from a segregated municipal waste is difficult, due to significant deterioration due to properties caused by the aging characteristics and the heterogeneous composition of the waste.

The composites were made by injection moulding process without and with 10% and 20% of particles tuff in polystyrene matrix. In the experimental part of this thesis basic tests of mechanical properties were carried out, such as tensile strength test, bend test, toughness test. Impact strength was also determined on samples without notch. To analyse adhesion to particles tuff and determine their type, the scanning electron microscope (SEM) was used.

The particles tuff addition had an insignificant influence on the increase in tensile strenght. The increase in modulus of elasticity was proportional with the addition of more particles tuff in all wide range of temperatures tested. The favourable effect that occurred was a increase in flexural strength in high temperature and relatively small decrease in low temperature. The another positive effect was a increase impact strength especially at elevated temperature.

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