Mineral fillers for active packaging ☑

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Mineral fillers for active packaging

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Short Description (maximum 2500 characters)

Mineral fillers have a long history in many applications including automotive, consumer products, packaging materials and many other applications. Since years mineral fillers are used in thermoplastic compounds not only for reduced material costs but also to improve properties such as stiffness, impact strength, hardness, volumetric shrinkage, heat distortion temperature and electric conductivity.
A very interesting mineral filler is natural zeolite, having a highly regular structure of pores and chambers that allows some molecules to pass through and causes others to be either excluded or degraded. It is in many ways the inorganic equivalent of organic enzymes, as many of them also have specific sized chambers that trap chemicals within our bodies, holding them and either degrade them or react with specific chemicals. This mineral is also able to store nearly 40 wt% of its dry weight as water, which is released during heating without destroying the mineral structure.
Based on these properties natural zeolite is used for active polymer packaging applications to realize interaction between the packaged good and the packaging, for example indication of decomposed vegetables.
The filler size and particle size distributions are one of the most important impacts onto the mechanical properties of the compound. On the other hand, for improved processibility of thermoplastic compounds, the used zeolite in this project was coated with silane. This modification also improves the bonding between the filler and the polymer matrix.
The objective of this research was to investigate the influence of various amounts of coated and uncoated milled zeolite and for comparative reasons talc as well onto the mechanical and permeation properties of polyolefin compounds. In addition, the rheological properties, which are related to the processibility of the filled polyolefin compounds were measured. Additionally the zeolite was doped with different chemicals to realize active packaging applications. The chemical concentration acceptance were detected by gas chromatography and mass spectroscopy, gravimetric and infrared analysis.