Plastic Beverage Bottles

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Daily while shopping, we as consumers encounter beverages packaged in plastic (polyethylene terephthalate) bottles. The launching of the new packaging material provision clearly influenced the further purpose of the plastic bottles after their use as packaging. We as consumers became aware of this provision, after the implementation of a deposit and the overall return of all plastic bottles to the stores. In the past, a lot of plastic was favoured in the steel and cement industry as a source of energy. With the rise of crude oil prices became - besides the thermal use - also the adaptation to new packaging materials economically interesting. Prerequisite for this is at least the reasonably genuine provision of the plastic materials. For this purpose the return of the beverage bottles by the users is an obvious solution.

The waste manager is now confronted with the task of processing these materials. For this purpose the plastic bottles are shredded. This process creates pieces (so called flecks) of an average size of 3 x 12 mm and also naturally a very fine dust. With a suitable cleaning process, the shredded product is washed absolutely clean. The separation from other plastics, like for example PP (polypropylene) or PE (polyethylene) from which mostly the screw tops are made, is accomplished in the sink and suspension method with a density separation**.** After the drying process the paper labels may also be removed by the blowing off process. The flecks are sold in this state by the recycling firms**.** For further processing the fine share must be extruded and the emerging granulates is then also sold.

The production of higher quality products from this recycled material requires a broad analytical evaluation. For this purpose a comminution of the flecks as well as the granules is necessary. The parameters to be evaluated are among others factors the degree of polymerisation and the colour. A statement about the degree of polymerisation and therefore a mechanical or thermal damage is obtained via the determination of the melt-flow-index.

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This determination is a wide spread method in the field of chemical polymers**.** The measured value depends on the particle size. The colour is determined via the white level measuring. But the measured data is greatly dependent on the reflected light and therewith also on the particle size. Therefore prior to the determination of the melt-flow-index and before the measurement of the white level, the samples always must be prepared in a reproducible manner.

Utilized for the defined preparation of the samples is the Variable Speed Rotor Mill PULVERISETTE 14,

including the impact rotor with 12 ribs and a sieve with 1 mm mesh width. The rotational speed control for the cutting rotor is for the achievement of the reproducible results immensely important. Mostly with polyethylene terephthalate we recommend to work with 16.000 r/pm. Tests by the users in this concrete case lead to the settings of lower rotational speeds. Dependent on products and testing parameters, the optimum rotational speed was set between 10.000 and 14.000 rpm. These low rotational speeds of the rotors minimize the mechanical, respectively the thermal demands during the comminution. Consequently a lower throughput is to be expected. Alternatively, could the material be embrittled and added at higher rotational speeds.

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