Method for disintegrating an elastomer and disintegrator

SUMMARY

In a first aspect, there is provided a method for disintegrating an elastomer, in particular at least one elastomer strand, in which the elastomer is moved in relation to a cutting tool over a base toward the cutting tool, the cutting tool having a cutting wedge with a cutting edge and a rake face adjoining the cutting edge, and once the cutting wedge comes into contact with the elastomer, the elastomer is initially at least partially compressed only by the rake face between the rake face and the base, before the cutting edge cuts through the elastomer.

In a second aspect, there is provided a disintegrator for disintegrating an elastomer, in particular an elastomer strand, in particular for carrying out the method as defined herein, having a cutting tool for cutting off slices from the elastomer, the cutting tool having a cutting wedge with a cutting edge and a rake face adjoining the cutting edge, and an advancing device for moving the elastomer over a base toward the cutting tool, the advancement of the advancing device and the geometry of the cutting tool being made to match one another in such a way that, once the cutting wedge comes into contact with the elastomer, the elastomer is intially at least partially compressed only by the rake face between the rake face and the base, before the cutting edge cuts through the elastomer.

DETAILED DESCRIPTION

The present invention relates to a method for disintegrating an elastomer and to a disintegrator for

disintegrating an elastomer, with the aid of which an elastomeric item, in particular an elastomer strand produced from chloroprene rubber, can be disintegrated into slices that are as thin as possible, in order that the disintegrated elastomer has a surface area that is as large as possible, if for example it is to be dissolved in a solvent, in order for example to produce an adhesive.

It is known to disintegrate an elastomer with the aid of a disintegrator, in which the elastomer is moved with the aid of an advancing device over a base to a cutting tool in the form of a peripheral miller, so that the cutting tool can cut off individual slices from the elastomer with the aid of a cutting wedge. A disadvantage of such a disintegrator and such a method for disintegrating an elastomer is that the elastomer can deform when the cutting wedge is in contact with the elastomer, whereby the elastomer may evade the cutting edge of the cutting wedge. This has the effect that a certain minimum thickness has to be provided for the slices that are cut off, in order that a properly planned disintegration of the elastomer can be achieved at all. In the case of a twisted elastomer strand, a minimum thickness of about 1.8 to 2.2 mm is therefore required.

There is a constant need for disintegrating elastomers into pieces that are as small, and in particular thin, as possible without great effort, in order that for example a specific surface area, that is to say outer area per unit of weight, that is as large as possible can be achieved for subsequent processes. The large

Claims

1. A method for disintegrating an elastomer ~~(20)~~, in particular at least one elastomer strand, in which

the elastomer ~~(20)~~ is moved in relation to a cutting tool ~~(12)~~ over a base ~~(22)~~ toward the cutting tool ~~(12)~~, the cutting tool ~~(12)~~ having a cutting wedge ~~(14)~~ with a cutting edge ~~(30)~~ and a rake face ~~(32)~~ adjoining the cutting edge ~~(30)~~, and

once the cutting wedge ~~(14)~~ comes into contact with the elastomer ~~(20)~~, the elastomer ~~(20)~~ is initially at least partially compressed only by the rake face ~~(32)~~ between the rake face ~~(32)~~ and the base ~~(22)~~, before the cutting edge ~~(30)~~ cuts through the elastomer ~~(20)~~.

2. The method as claimed in claim 1, characterized in that the movement of the elastomer ~~(20)~~ and the movement of the cutting wedge ~~(14)~~ are adapted to one another in such a way that slices that are cut off from the elastomer ~~(20)~~ have a thickness t of $t \leq 1.5$ mm, in particular $t \leq 1.2$ mm, preferably $t \leq 1.0$ mm and particularly preferably $t \leq 0.8$ mm.

3. The method as claimed in claim 1 or 2, characterized in that the elastomer ~~(20)~~ has a cut end ~~(28)~~ facing the cutting tool ~~(12)~~, an oscillation between a bottom dead center, assigned to the base ~~(22)~~, and a top dead center, remote from the base ~~(22)~~, being imparted to the cut end ~~(28)~~ of the elastomer ~~(20)~~ by the cutting of the cutting tool ~~(12)~~, and the cutting wedge ~~(14)~~ contacting the elastomer ~~(20)~~ substantially whenever the cut end ~~(28)~~ is substantially at the top dead center, the contact of the cutting wedge ~~(14)~~ with the elastomer ~~(20)~~ in particular taking

place with respect to the top dead center of the cut end~~(28)~~ with a phase shift φ of $\varphi \leq \pm 15°$, in particular $\varphi \leq \pm 8°$ and particularly preferably $\varphi \leq \pm 2°$.

4. The method as claimed in one of claims 1 to 3, characterized in that an angle α between the rake face~~(32)~~ and the base~~(22)~~ at the point in time of the beginning of the contact of the cutting wedge ~~(14)~~ and the elastomer~~(20)~~ is $15° \leq \alpha \leq 40°$, in particular $20° \leq \alpha \leq 35°$ and preferably $25° \leq \alpha \leq 30°$.

5. The method as claimed in one of claims 1 to 4, characterized in that the cutting of the elastomer ~~(20)~~ with the aid of the cutting edge~~(32)~~ commences at a pressure p below a pressure p_k for the beginning of strain crystallization of the elastomer~~(20)~~, where in particular $0.20 \leq p/p_k \leq 0.95$, preferably $0.50 \leq p/p_k \leq 0.90$, more preferably $0.6 \leq p/p_k \leq 0.85$ and particularly preferably $0.7 \leq p/p_k \leq 0.80$.

6. The method as claimed in one of claims 1 to 5, characterized in that the rake face~~(32)~~ of the cutting wedge~~(14)~~ comes into contact with the elastomer~~(20)~~ on a peripheral surface~~(34)~~ of the elastomer~~(20)~~.

7. The method as claimed in one of claims 1 to 6, characterized in that the cutting edges~~(30)~~ of two successive cutting wedges~~(14)~~ are at a distance D, where, with respect to the effective diameter d of the elastomer~~(20)~~, the distance D is $1.0 \leq D/d \leq 8.0$, in particular $1.5 \leq D/d \leq 6.0$, preferably $2.0 \leq D/d \leq 4.0$ and particularly preferably $D/d = 3.0 \pm 0.5$.

8. The method as claimed in one of claims 1 to 7, characterized in that the cutting edge ~~(30)~~ of the cutting wedge ~~(14)~~ has a circumferential speed v of $1.0\ m/s \leq v \leq 50.0\ m/s$, in particular $10.0\ m/s \leq v \leq 35.0\ m/s$, preferably $20.0\ m/s \leq v \leq 30.0\ m/s$ and particularly preferably $25.0\ m/s \leq v \leq 27.0\ m/s$.

9. The method as claimed in one of claims 1 to 8, characterized in that the cutting tool ~~(12)~~ rotates about a center point, the center point being offset in relation to a center line of the elastomer ~~(20)~~ substantially perpendicularly to the direction of movement of the elastomer ~~(20)~~ by a distance s, where in particular the distance s with respect to the effective diameter d of the elastomer ~~(20)~~ is $0.4 \leq s/d \leq 1.0$, preferably $0.45 \leq s/d \leq 0.6$ and particularly preferably $0.5 \leq s/d \leq 0.55$.

10. The method as claimed in one of claims 1 to 9, characterized in that the rake face ~~(32)~~ is inclined in the circumferential direction by an angle β in relation to a radius of the cutting tool ~~(12)~~ running through the cutting edge ~~(30)~~, where in particular $20° \leq \beta \leq 40°$, preferably $25° \leq \beta \leq 35°$ and particularly preferably $\beta = 30° \pm 2.5°$.

11. The method as claimed in one of claims 1 to 10, characterized in that an elastomer film, in particular chloroprene rubber, is twisted into a strand before the cutting.

12. A disintegrator for disintegrating an elastomer ~~(20)~~, in particular an elastomer strand, in particular for carrying out the method as claimed in one of claims 1 to 11, having

a cutting tool ~~(12)~~ for cutting off slices from the elastomer ~~(20)~~, the cutting tool ~~(12)~~ having a

cutting wedge ~~(14)~~ with a cutting edge ~~(30)~~ and a rake face ~~(32)~~ adjoining the cutting edge ~~(30)~~, and

an advancing device ~~(16)~~ for moving the elastomer ~~(20)~~ over a base ~~(22)~~ toward the cutting tool ~~(12)~~,

the advancement of the advancing device ~~(16)~~ and the geometry of the cutting tool ~~(12)~~ being made to match one another in such a way that, once the cutting wedge ~~(14)~~ comes into contact with the elastomer ~~(20)~~, the elastomer ~~(20)~~ is intially at least partially compressed only by the rake face ~~(32)~~ between the rake face ~~(32)~~ and the base ~~(22)~~, before the cutting edge ~~(30)~~ cuts through the elastomer ~~(20)~~.