

EXERCISE NO. 3

Exercise subject: Material recycling of polymer materials

1. Exercise objectives:

- theoretical: studying recycling methods of polymer materials with particular emphasis on material recycling;
- practical: getting acquainted with devices used in the material recycling of polymer materials and the influence of the multiple processing on the properties of the polymer.

2. Theoretical issues:

recycling, polymer materials degradation, devices used in the material recycling, density, types of density, melt flow rate (MFR, MVR).

3. Literature:

- 1) Azapagic A., Emsley, Hamerton I.: "Polymers, the Environment and Sustainable Development", John Wiley Et Sons Ltd, Chichester 2003, England.

4. Exercise execution:

a) testing apparatus:

- low-speed mill (26 rpm), equipped with 2 crushing blades and 3 milling cutters, with the efficiency of 3 kg / h);
- gravimetric pneumatic feeder, with a tank capacity of 3 L, efficiency of 150 kg / h
- set of sieves: 2.5 mm, 4 mm, 7 mm.
- device for measuring bulk density of plastics (PN ISO 60:1998 Plastics. Determination of bulk density of the material passing through a specified funnel.

b) plastic recycling system characteristic:

- plastic samples, delivered by the lecturer, such as PMMA, PVC, PS, PU, PE, PP, etc., after being weighed and dimensioned (determine the dimensions characteristic for recycled samples) need to be milled in a low-speed mill.
- determine the process efficiency and the mill productivity (kg / h).
- determine the bulk density of the obtained repro pellets.
- carry out sieve analysis of the repro pellets.
- determine the bulk density of the obtained fractions.

5. Results reporting:

Describe the exercise performance method and submit the results of measurements. Present the relationship between bulk density and the size of individual fractions of repro pellets and repro pellets mixture as a bar chart.

6. Safety rules:

- I. All technological processes and measurements occurring in the exercise must be carried out in accordance with the instructions and in a presence of the teacher.**
- II. Read the instruction manual of the applied apparatus before starting the exercise.**

7. Attachments:

- a) Safety data sheet: polyethylene Malen E FABS 23D022.
- b) Safety data sheet: polypropylene Moplen HP456J.