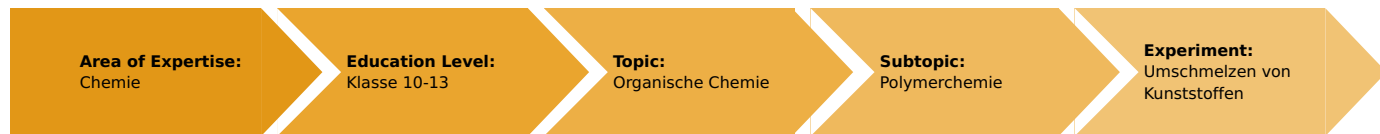


Re-melting of plastics (Item No.: P7182400)

Curricular Relevance



Difficulty



Intermediate

Preparation Time



10 Minutes

Execution Time



20 Minutes

Recommended Group Size



2 Students

Additional Requirements:

Experiment Variations:

Keywords:

polymers, recycling, remelting of plastics

Task and equipment

Information for teachers

Learning objectives

- Thermoplastics which have a melting range at relatively low temperatures can be easily recycled into usable plastics when remelted.
- Unmixed plastics keep largely their properties, however, specially the sorting of smaller waste constitutes a problem.

Notes on set-up and procedure

Suitable are plastic rods from the provided plastic set, however, the use of self-made plastics is particularly motivating.

Remarks on the students' experiments

Make sure that the heating is carried out gently, otherwise decomposition occurs too quickly. Point out that only the lower third of the test tube is to be heated, so that the evolving vapours do not become inflamed.



Hazards

- Unpleasant-smelling vapours, which can become inflamed, are formed when strongly heated! Heat gently. Carry out the experiment under a fume cupboard whenever possible!
- Wear protective glasses!

Notes

The remelting process of the unsorted and contaminated plastic waste is an important research area due to the increasing volume of plastic waste. The goal is the reusability of materials as starting materials for consumer goods such as garden benches among others.

Suitable for the remelting process are all thermoplastics. When the re-melting material is unmixed the properties of the starting materials remain largely intact, however, after repeated remelting the changes of the chain length become noticeable.

Remarks on the method

The use of plastic waste which has been originated from the self-performed experiments is particularly motivating. The comparison between the starting material and the re-melting material is easier in this experiment, since the starting materials are usually unstained.

Waste disposal

The plastic remains can be treated as normal waste.

Re-melting of plastics (Item No.: P7182400)

Task and equipment

Task

How can plastics be recycled? (1)

Remelt plastic waste.



Equipment



Position No.	Material	Order No.	Quantity
1	Test tube holder, up to d 22mm	38823-00	1
2	Test tube, 180x18 mm,100pcs	37658-10	1
3	Test tube rack for 12 tubes, holes d= 22 mm, wood	37686-10	1
4	Protecting glasses, clear glass	39316-00	1
5	Knife, stainless	33476-00	1
	Butane cartridge CV 300 Plus, 240 g	47538-01	1
	Butane burner f.cartridge 270+470	47536-00	1
	Sample set for study of plastics, 60 pcs. of each species	31730-00	
Additional material			
	Jam jar lid		1
	Nippers (Pincers or side-cutter)		
	Fume hood		

Set-up and procedure

Set-up

Hazards

- Unpleasant-smelling vapours, which can become inflamed, are formed when strongly heated! Heat gently. Carry out the experiment under a fume cupboard whenever possible!
- Wear protective glasses!



Procedure

Procedure

1. Cut the plastic materials into small pieces (Fig. 1).



Fig. 1

Put a type of plastic sample in a test tube each (filling level about 5 cm). Heat the content of the test tube gently in the burner flame until it has been completely melted (Fig. 2).



Fig. 2

Pour then the molten mass in a jam jar lid, and let the plastic cool down in it (Fig. 3).



Fig. 3

Proceed in the same way also with the other little plastic pieces contained in the other three test tubes. Compare the cooled molten mass with the starting materials.

Waste disposal

The plastic remains can be treated as normal waste.

Report: Re-melting of plastics

Result - Observations

Write down your observations in general form.

- a) Test tube 1 (Polyamide):
- b) Test tube 2 (Polystyrene):
- c) Test tube 3 (Polymethyl methacrylate):
- d) Test tube 4 (Cellulose acetate):

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Evaluation - Question 1

Draw conclusions from your observations.

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Evaluation - Question 2

What is the result of the comparison between the starting materials and the molten masses?

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Evaluation - Question 3

To which plastic class do the plastics used in this experiment belong to? Why can't polyurethane be remelted?

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Evaluation - Question 4

Name the disadvantages of this recycling process.

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