

Investigation of Injection-Molded Test Specimens Made from Riverine Plastic Waste

Author: Szabolcs Kövesi (Grade 11)

**Budapest XIV. District
Teleki Blanka Secondary Grammar School**

Supervisors:

Dr. Dániel Gere, Csenge Dremák

Budapest University of Technology and
Economics (BME), Dept. of Civil
Engineering

Supervisor from the school:

Dr. Jarosievitz Beáta

Ph.D. degree in Education
(Educational Research)



Szabolcs Kövesi (Budapest, Hungary)

21.05.2026. Madrid

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Introduction, motivation

Plastic

- Synthetic materials
- Polimerization, policondensation
- Types: Polyethylene, polypropylene, polyester, polysaccharide

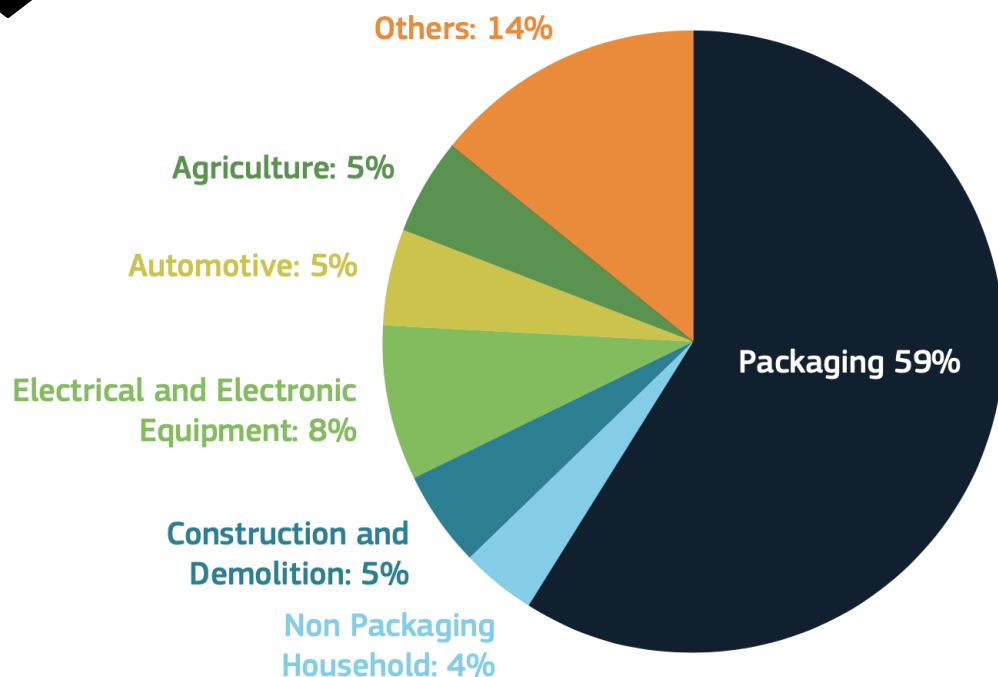
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Introduction, motivation

- Widely used
 - Cost-effective
 - Easy to shape
 - Low-density
 - Long-lasting

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Introduction, motivation



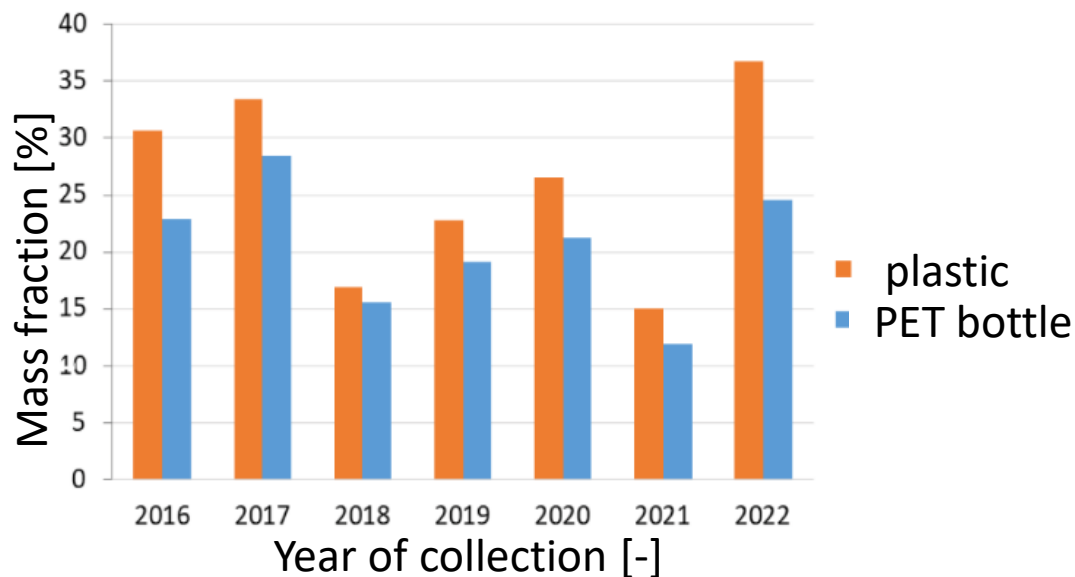
Distribution of plastic waste

Source: Eunomia, European Commission

- Distribution
 - Packaging
 - Construction
 - Electrical
 - Automotive

1

Introduction, motivation



- Plastic waste in waterways
- It harms wildlife
- Global problem
- Most of it is PET

Amount of PET bottles collected from the Tisza River

Source: PET Kupa Association

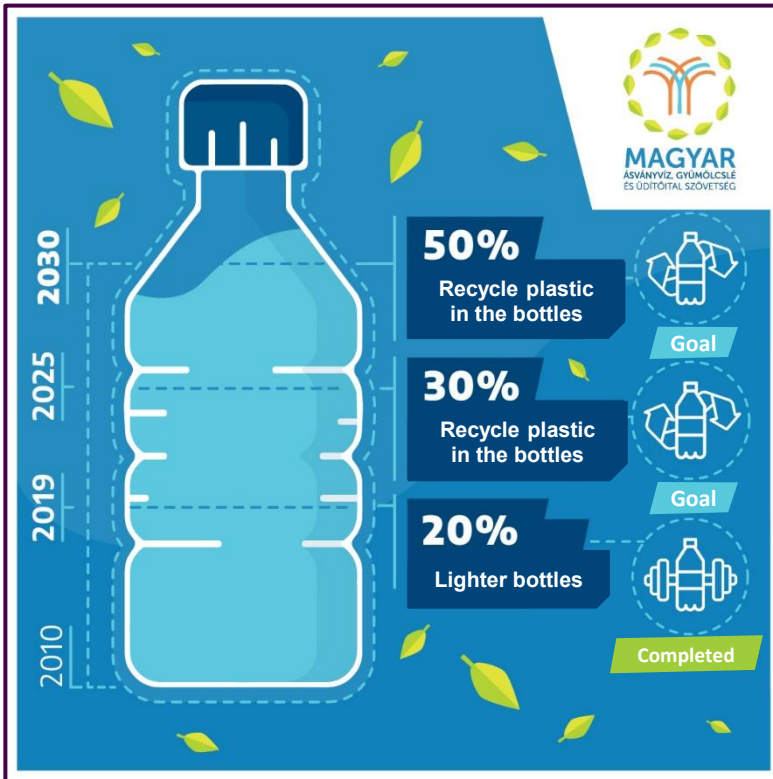


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Introduction, motivation



Source: MAGYÜSZ

- Recycling:
 - Advantages:
 - Protect nature
 - Reducing greenhouse gas emission
 - Difficulties:
 - Waste collection
 - Degradation

1

Introduction, motivation

- Problem to be solved:
 - Plastic pollution in river
 - And recycling
- Objective:
 - Determine the recyclability of riverine PET through injection molding

2

Experimental setup preparation

Material used



PET collection on the Tisza River

Source: PET Cup Association

- Tisza PET flakes (PET Cup Association)
- Original PET
- Selectively collected PET flakes (Jász-Plasztik Ltd.)

2

Experimental setup preparation

Washing, drying



2

Experimental setup preparation

Drying



2

Experimental setup preparation

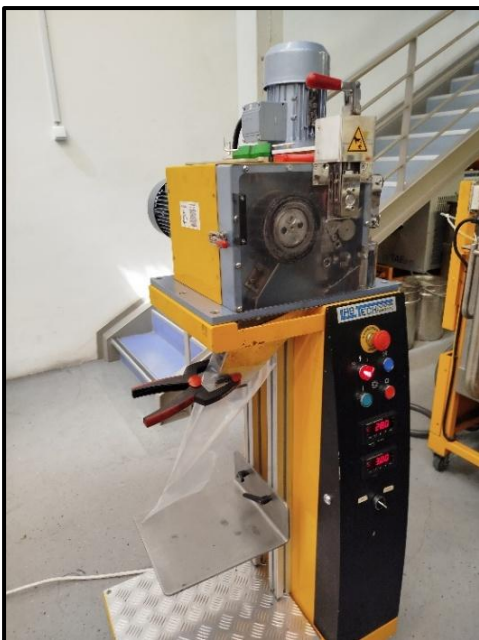
Grinding



2

Experimental setup preparation

Extrusion



2

Experimental setup preparation

Injection Molding

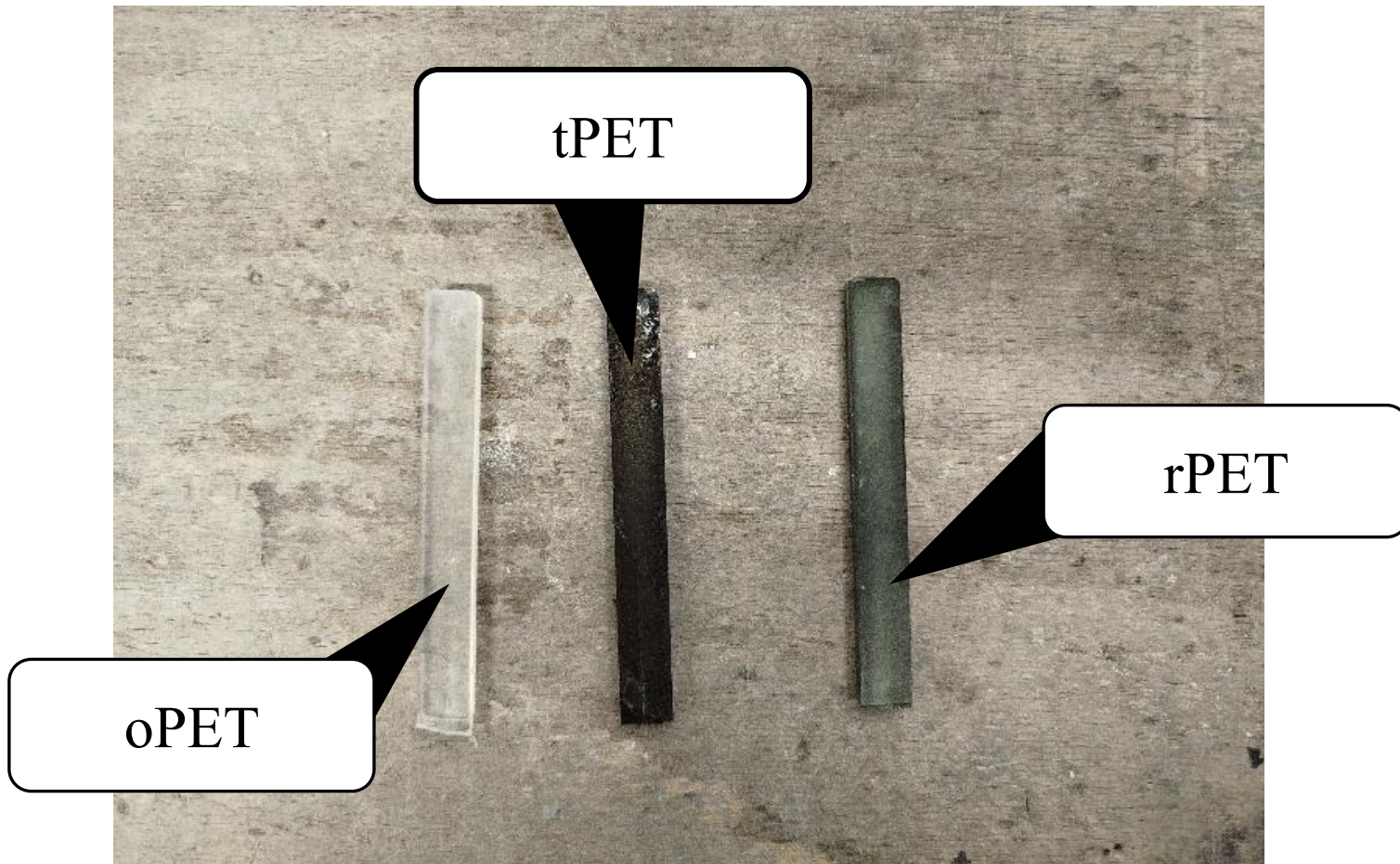


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3

Examination of specimens



3

Examination of specimens

Charpy Impact Test

10 Rectangular
test specimens



3

Examination of specimens

Tensile Test

5 dumbbell-shaped
test specimens

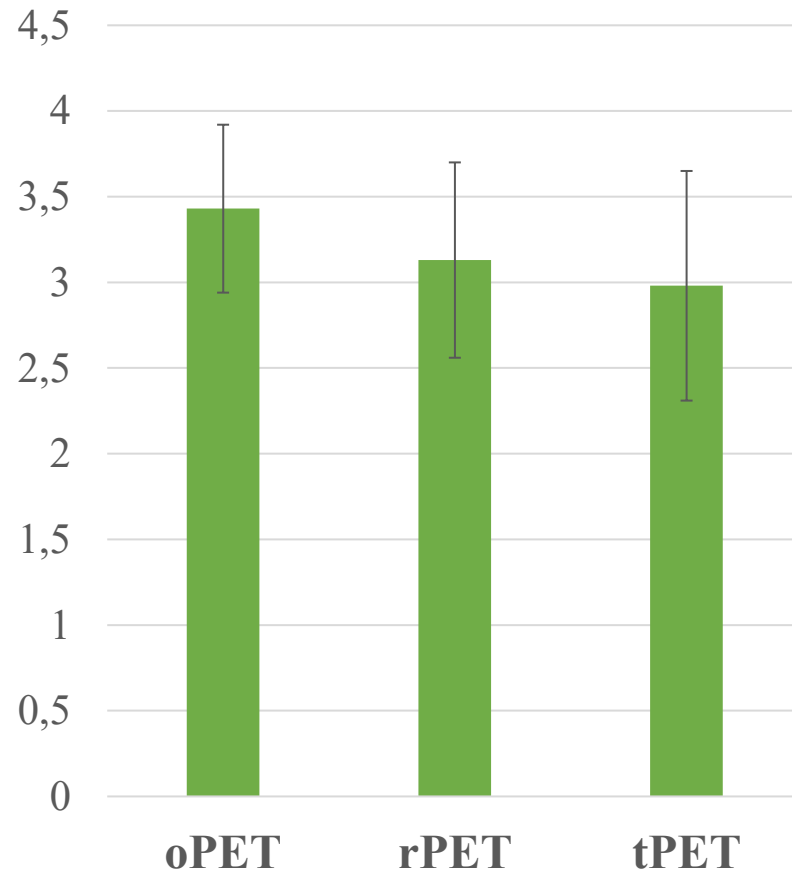


4

Results

Charpy Impact Test

Charpy impact test [kJ/m ²]	Average	Dispersion
oPET	3,43	0,49
rPET	3,13	0,57
tPET	2,98	0,67

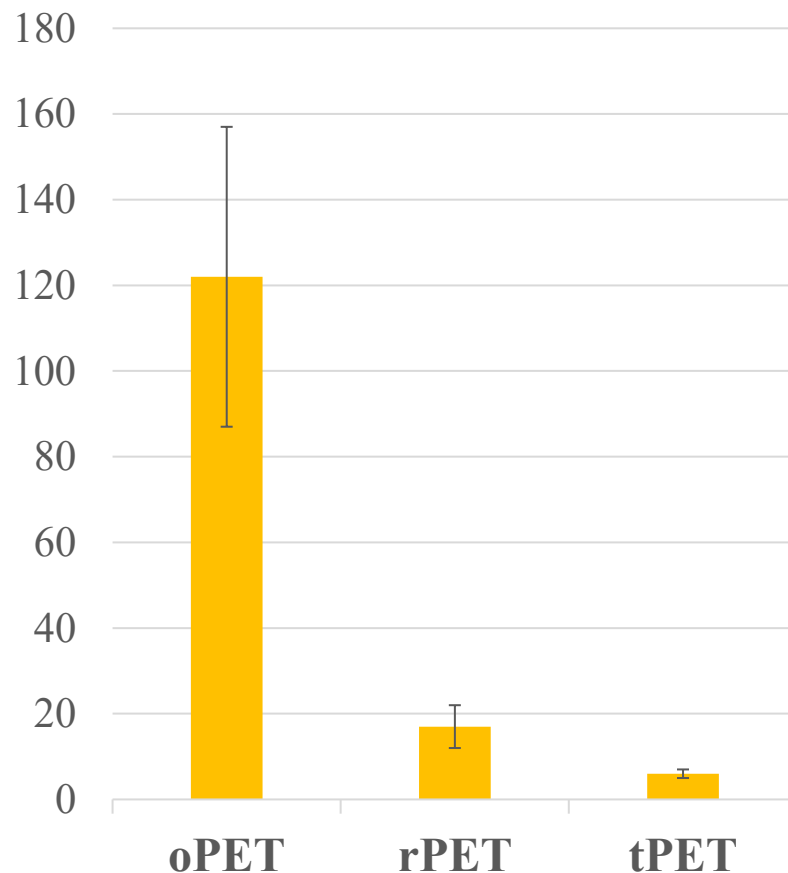


4

Results

Elongation at break

Elongation at break (%)	Average	Dispersion
oPET	122	35
rPET	17	5
tPET	6	1

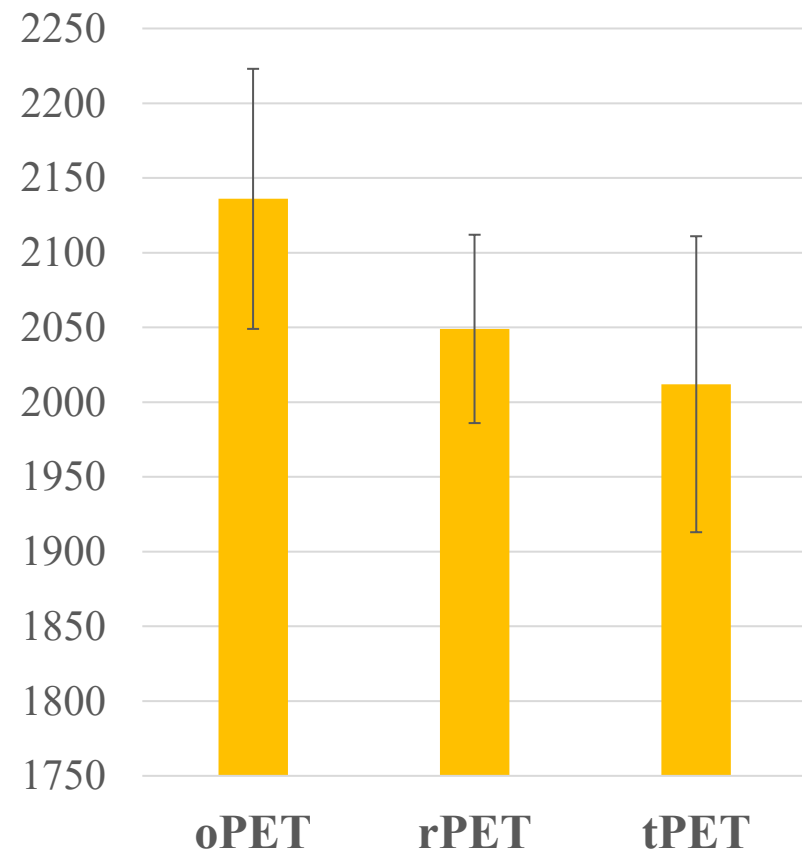


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Results

Tensile modulus of elasticity

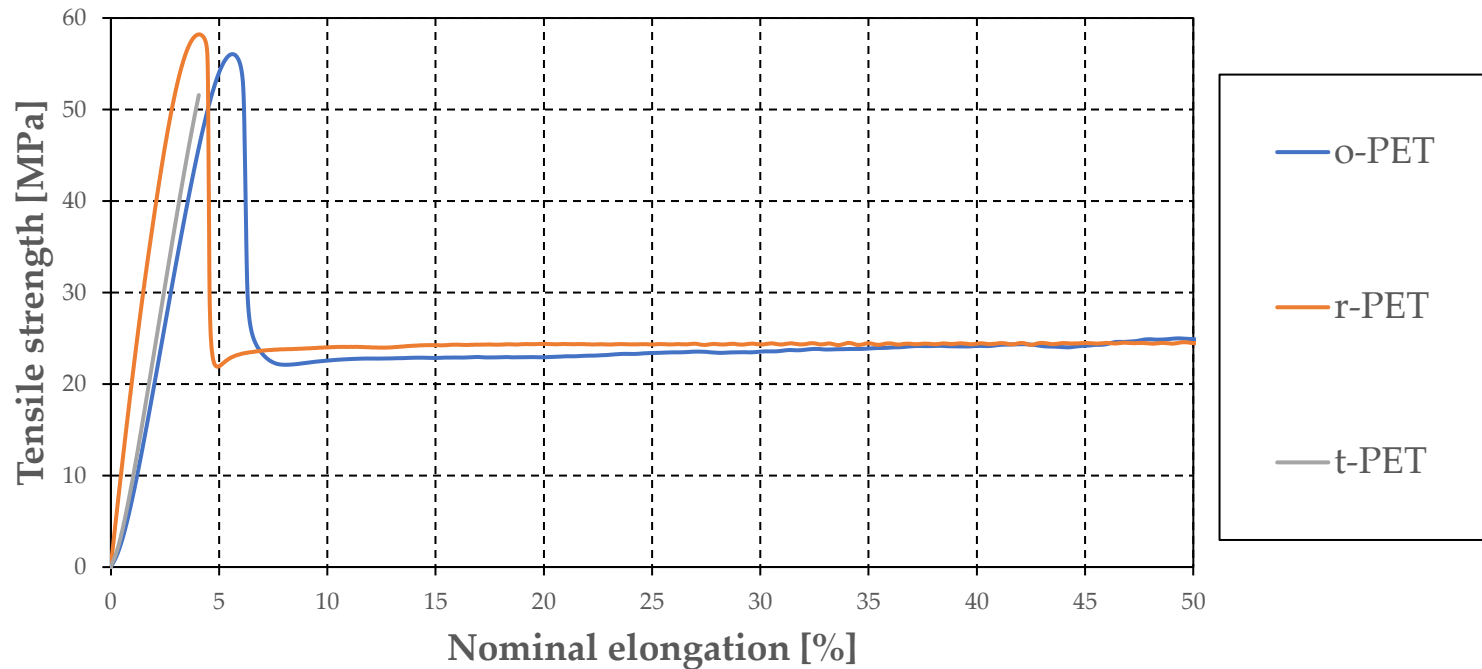
Tensile modulus of elasticity (Mpa)	Average	Dispersion
oPET	2136	87
rPET	2049	63
tPET	2012	99



4

Results

Tensile strength

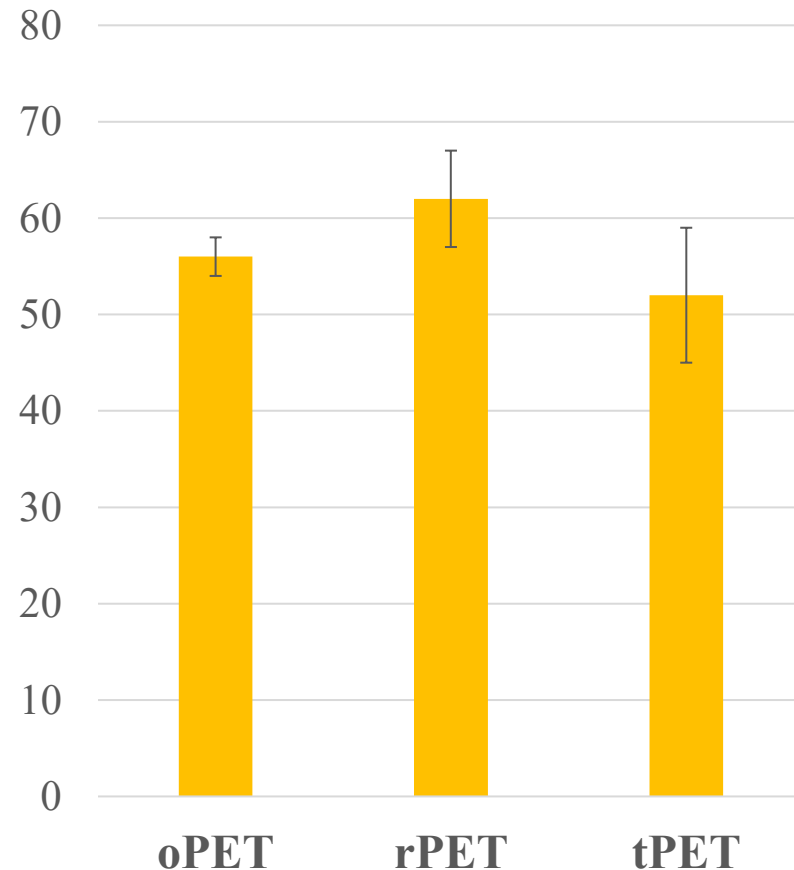


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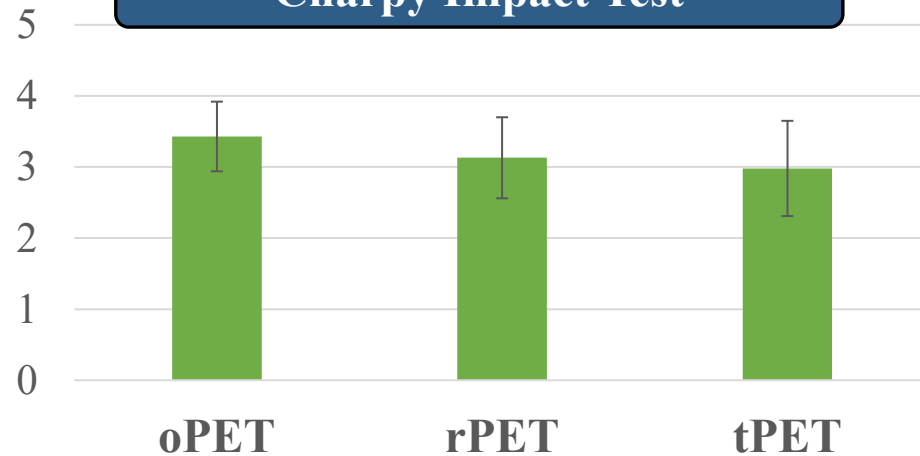
Results

Tensile strength

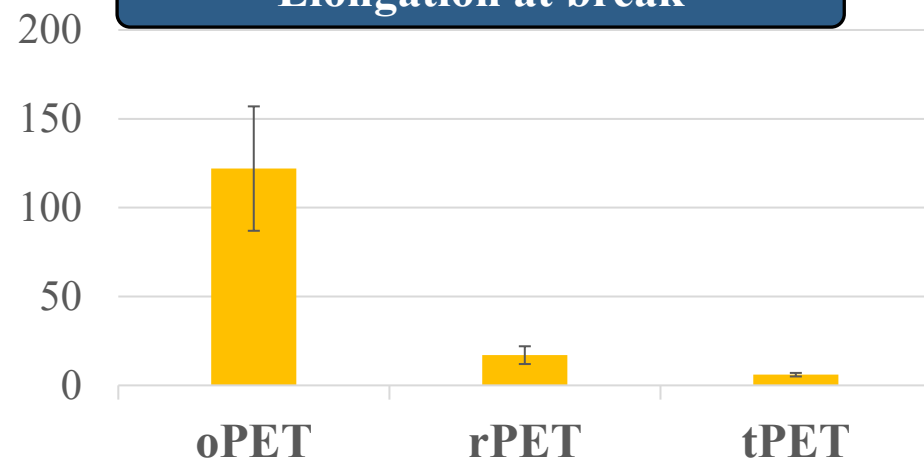
Tensile strength (MPa)	Average	Dispersion
oPET	56	2
rPET	62	5
tPET	52	7



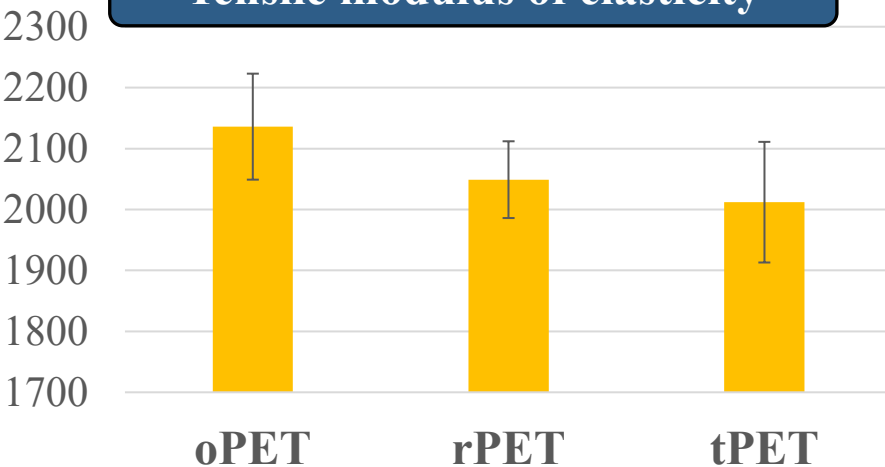
Charpy Impact Test



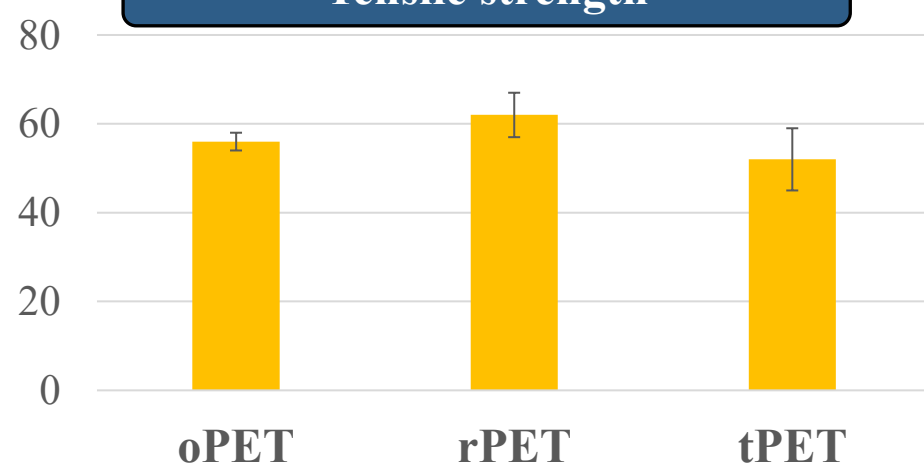
Elongation at break



Tensile modulus of elasticity



Tensile strength



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Summary

- tPET is the worst in every measurement
- There was no significant difference between rPET and tPET
- tPET is just as recyclable as rPET
- Suitable for making certain products
 - If there is no heavy load, deformation
 - For example: Polyester fabrics, decorative elements

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Acknowledgement



Thank you for your attention!



Szabolcs Kövesi (Budapest, Hungary)

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