



WARSAW UNIVERSITY OF TECHNOLOGY FACULTY OF CIVIL ENGINEERING, MECHANICS AND PETROCHEMISTRY

MODIFIED PETROLEUM RESIDUE FOR ROAD PAVEMENTS

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INTRODUCTION

Environmental protection and energy efficiency are key objectives in both the chemical industry and road industry. Therefore, raw materials and technologies with economic and environmental justification are preferred. A promising alternative material for road pavement construction may be the modified residue from the Visbreaking process, for example, with polymeric materials.

The aim of this study was to evaluate the effect of unsaturated polyester resin (UP) on the physicochemical and rheological properties of visbreaking residue (VBR). Bitumen–polymer blends containing 2.5 – 10.0 wt.% resin were prepared at 105 °C for 30 minutes.

METHODOLOGY

Softening point (T_{PIK})
PN – EN 1427:2015

Penetration at 25°C (P_{25})
PN – EN 1426:2025

Storage stability
PN – EN 13399:2017

Dynamic viscosity
PN – EN 13302:2018

Optical microscopy
(fluorescence attachment, reflected light)

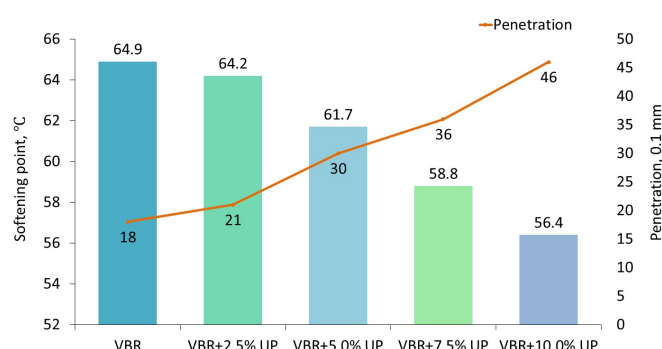
CONCLUSIONS

The results showed that the modification of the residues from the Visbreaking process with unsaturated polyester resin influenced the changes of the physicochemical and rheological properties of the residue, causing its plasticization.

The application of modified residue from the Visbreaking process in road pavement construction may contribute to optimizing the use of raw material resources, which aligns with the concept of a circular economy. This will open new prospects for the sustainable development of the road industry.

RESULTS

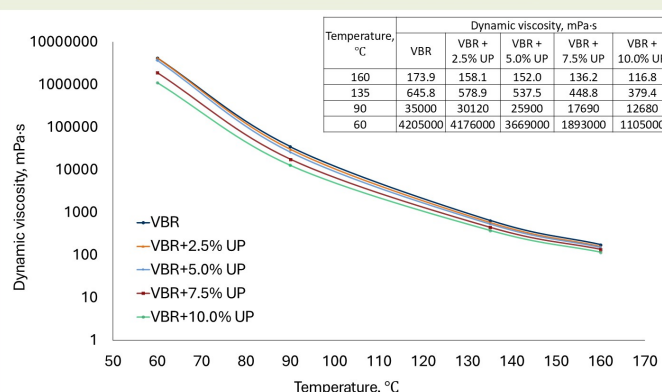
Softening point and penetration



Storage stability

Composition, wt. %	Storage stability	
	ΔT_{PIK} , °C	ΔP_{25} , 0.1 mm
Visbreakat	-	-
Visbreakat + 2.5% UP	0.4	0
Visbreakat + 5.0% UP	0.9	0
Visbreakat + 7.5% UP	1.9	1
Visbreakat + 10.0% UP	5.2	3

Dynamic viscosity



Microscopy images

