

Investigating the Mechanical Properties and Durability of Asphalt Mixture Modified with Epoxidized Natural Rubber (ENR) under Short and Long-Term Aging Conditions

By Safaeldeen, GI (Safaeldeen, Gailan Ismat) [1]; Al-Mansob, RA (Al-Mansob, Ramez A.) [2]

Free Full Text from Publisher

View Full Text on ProQuest

Full Text Links ▾

Export ▾

Add To Marked List

< 1 of 1 >

Source

POLYMERS

Volume: 14 Issue: 21

DOI: 10.3390/polym14214726

Article Number

4726

Published

NOV 2022

Indexed

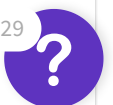
2022-11-27

Document Type

Article

Abstract

Modifiers such as fibers, fillers, natural and synthetic polymer extenders, oxidants & 29 anti-oxidants, and anti-stripping agents are added to produce modified asphalt.



MENU

However, polymers are the most widely utilized modifiers to enhance the function of asphalt mixtures. The objective of this research was to evaluate the mechanical properties and durability of epoxidized natural rubber (ENR)-modified asphalt mix under short- and long-term aging conditions. The physical and rheological characteristics of the base asphalt and ENR-modified asphalt (ENRMA) were tested. In order to evaluate the mechanical properties and durability of the modified mixtures, the resilient modulus of the ENR-asphalt mixtures under unaged, and short- and long-term aging conditions at various temperatures and frequencies was obtained. Furthermore, the resistance to moisture damage of asphalt mixtures was investigated. The findings showed that the stiffness of the ENR-asphalt mixes increased because of the mutual influence of short- and long-term aging on the mixes. In addition, ENR reduced the susceptibility to moisture damage. The stiffness of the mixes was influenced by the temperature and frequencies. By using mathematical modelling via the multivariable power least squares method, it was found that temperature was the dominant factor among all other factors. The results suggested that the durability of asphalt pavements is improved by using ENR.

Keywords

Author Keywords: epoxidized natural rubber; natural polymers; aging; moisture damage; stiffness; durability; multivariable power least square method; asphalt
Keywords Plus: RHEOLOGICAL PROPERTIES; MODIFIED BITUMEN; RUTTING PERFORMANCE; CRUMB-RUBBER; POLYMER; MORPHOLOGY; LATEX; BASE; SBR

Author Information

Corresponding Address: Al-Mansob, Ramez A. (corresponding author)

▼ Int Islamic Univ Malaysia, Dept Civil Engn, Jalan Gombak, Kuala Lumpur 50728, Malaysia

Corresponding Address: Al-Sabaei, Abdalnaser M. (corresponding author)

Thamar Univ, Fac Engn, Dept Civil Engn, Dhamar 87246, Yemen

Addresses :

¹ Northern Tech Univ, Kirkuk Tech Inst, Kirkuk 99W3 XMQ, Iraq

▼ ² Int Islamic Univ Malaysia, Dept Civil Engn, Jalan Gombak, Kuala Lumpur 50728, Malaysia

³ Thamar Univ, Fac Engn, Dept Civil Engn, Dhamar 87246, Yemen

▼ ⁴ Univ Kebangsaan Malaysia, Dept Civil Engn, Fac Engn & Built Environm, Bangi 43600, Malaysia

▼ ⁵ UCSI Univ, Dept Mech Engn, Fac Engn Technol & Built Environm, Kuala Lumpur 56000, Malaysia

[...more addresses](#)

E-mail Addresses : ramizizzi@gmail.com; abdalnaser_mohd@tu.edu.ye

Categories/ Classification

Research Areas: Polymer Science

Citation Topics [7 Engineering & Materials](#)
: [Science](#)

[7.300](#)
> [Asphalt](#)

[7.300.908 Asphalt](#)
> [Mixture](#)

Web of Science

Polymer Science

Categories

Funding

Funding agency

Northern Technical University, Iraq

[View funding text](#)

[+ See more data fields](#)

New

Journal information

POLYMERS

eISSN 2073-4360

Current Publisher MDPI, ST ALBAN-ANLAGE 66, CH-4052 BASEL, SWITZERLAND

Research Areas Polymer Science

Web of Science Categories Polymer Science

5

Journal Impact Factor™ (2022)

0.89

Journal Citation Indicator™ (2022)

Citation Network

In Web of Science Core Collection

4 Citations

[Create citation alert](#)

4 Times Cited in All Databases
[+ See more times cited](#)

53 Cited References
[View Related Records →](#)

Use in Web of Science

4

Last 180 Days

13

Since 2013

[Learn more →](#)

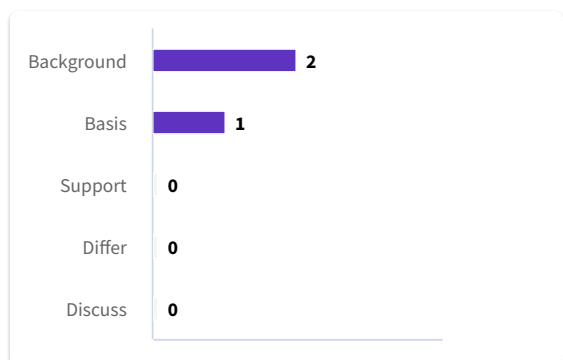
This record is from:

Web of Science Core Collection

29

Citing items by classification New

Breakdown of how this article has been mentioned, based on available citation context data and snippets from 3 citing item(s).



You may also like...

Rajan, VV; Dierkes, WK; Noordermeer, JWM; et al.

[Recycling of NR based cured latex material reclaimed with 2,2'-dibenzamidodiphenyldisulphide in a truck tire tread compound](#)

JOURNAL OF APPLIED POLYMER SCIENCE

Xu, C; Wang, DY; Yu, HY; et al.

[Effect of Lignin Modifier on Engineering Performance of Bituminous Binder and Mixture](#)

POLYMERS

Ashori, A; Nourbakhsh, A;

[Polypropylene Cellulose-Based Composites: The Effect of Bagasse Reinforcement and Polybutadiene Isocyanate Treatment on the Mechanical Properties](#)

JOURNAL OF APPLIED POLYMER SCIENCE

Joohari, IB; Giustozzi, F;

[Hybrid Polymerisation: An Exploratory Study of the Chemo-Mechanical and Rheological Properties of Hybrid-Modified Bitumen](#)

- Science Citation Index Expanded (SCI-EXPANDED)

Suggest a correction

If you would like to improve the quality of the data in this record, please [Suggest a correction](#)

POLYMERS

Li, SY; Lamminmäki, J; Hanhi, K;

[Effect of ground rubber powder on properties of natural rubber](#)

MACROMOLECULAR SYMPOSIA

[See all →](#)

Most Recently Cited by

Chang, ZH; Lyly, LHT; Sum, JY;

[A review on membrane separation in natural rubber processing: Concentration, recovery and treatment](#)

CHEMICAL ENGINEERING AND PROCESSING-
PROCESS INTENSIFICATION

Ansari, AH; Jakarni, FM; Zair, MMB; et al.

[Mechanical performance of cup lump rubber modified asphalt mixtures incorporating polyphosphoric acid](#)

CONSTRUCTION AND BUILDING MATERIALS

[See all →](#)

53 Cited References

[→ View as set of results](#)

Showing 30 of 53

(from Web of Science Core Collection)

© 2024
Clarivate
Training
Portal
Product
Support

Data
Correction
Privacy
Statement
Newsletter

Copyright
Notice
Cookie
Policy
Terms of
Use

Manage cookie
preferences

Follow
Us

