Performance Assessment of Composite Plastic Modified and Conventional Polymer Modified Asphalt Mixtures Using the Wet Mixing Method

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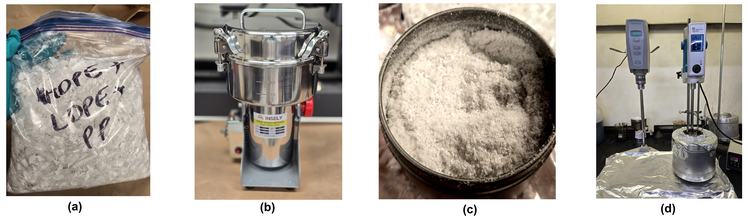
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Background & Goal of the study

- Incorporating recycled plastic into asphalt mixtures for the purpose of road paving presents a promising solution, offering dual benefits of reducing plastic waste and pavement distresses like rutting, fatigue and thermal cracking.
- However, the combined use of composite plastics and stabilizers like Reactive Elastomeric Terpolymer (RET) and has not been thoroughly explored in terms of performance and conventional polymer modified asphalt mixtures.

Goal of the study: To assess whether composite plastic-RET modified asphalt mixtures produced in wet mixing process can deliver the comparable mixture level performance of conventional polymer (SBS) modified mixtures.

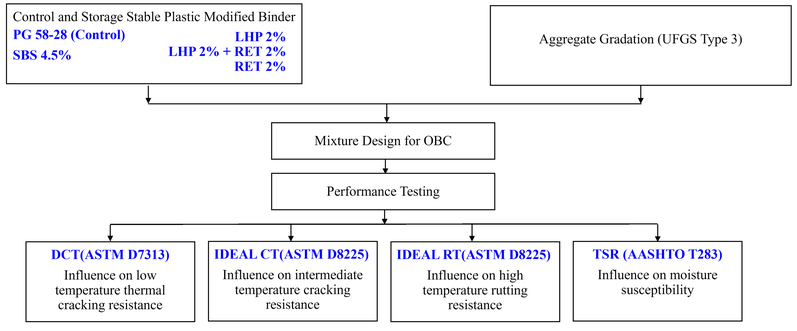
Materials



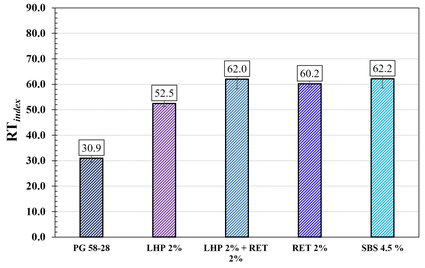
(a) (b) (c) (d)

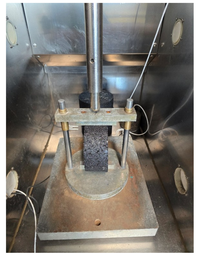
(a) Composite plastic (LHP) (b) Shredding machine (c) Ground Plastics (d) Blending Setup

Experimental Methodology



Results & Discussion: High Temperature Performance

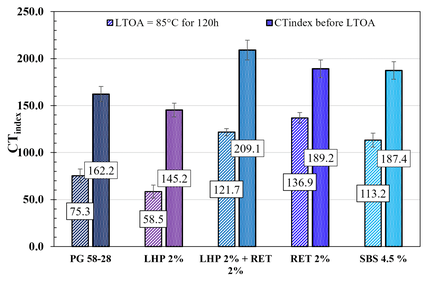


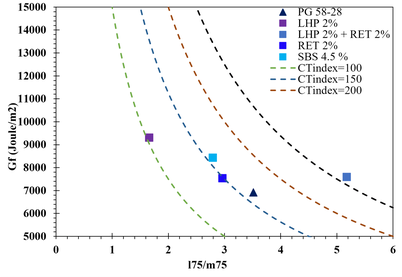




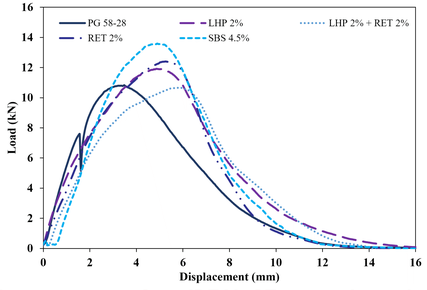
IDEAL-RT results for rutting performance *Testing setup of mixtures for IDEAL CT*

Results & Discussion: Intermediate Temp. Performance



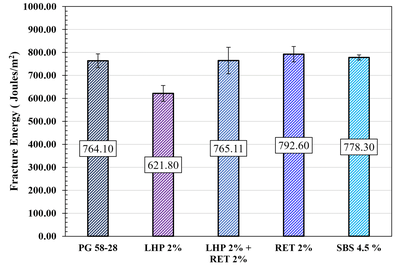


IDEAL-CT test for intermediate temperature cracking resistance at long term oven aged condition



Load vs Displacement curve from IDEAL-CT test to determine crack propagation

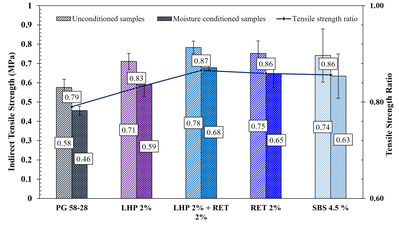
Low Temperature Cracking and Moisture Susceptibility







Fracture energy of asphalt mixtures evaluated at low temperature (-18°C)





TSR and ITS values of control and modified asphalt mixtures

Conclusions

- Composite Plastic-RET modification substantially improved high-temperature rutting resistance, comparable to SBS modified mixtures.
- Plastic alone reduced intermediate-temperature cracking tolerance, whereas the addition of RET increased it by 29% comparing to control.
- All modified mixtures improved resistance to moisture-induced damage relative to the control mixtures.

Acknowledgement

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