

Rheological Assessment of Neat Paving, Air Rectified Paving & Oxidized Roofing Bitumen

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1. Introduction

Rheology of neat paving, air rectified paving and oxidized roofing bitumens studied to understand chemical changes during oxidation.

Mastercurve analysis and traditional bitumen tests utilized to distinguish air-rectified and oxidized grades.

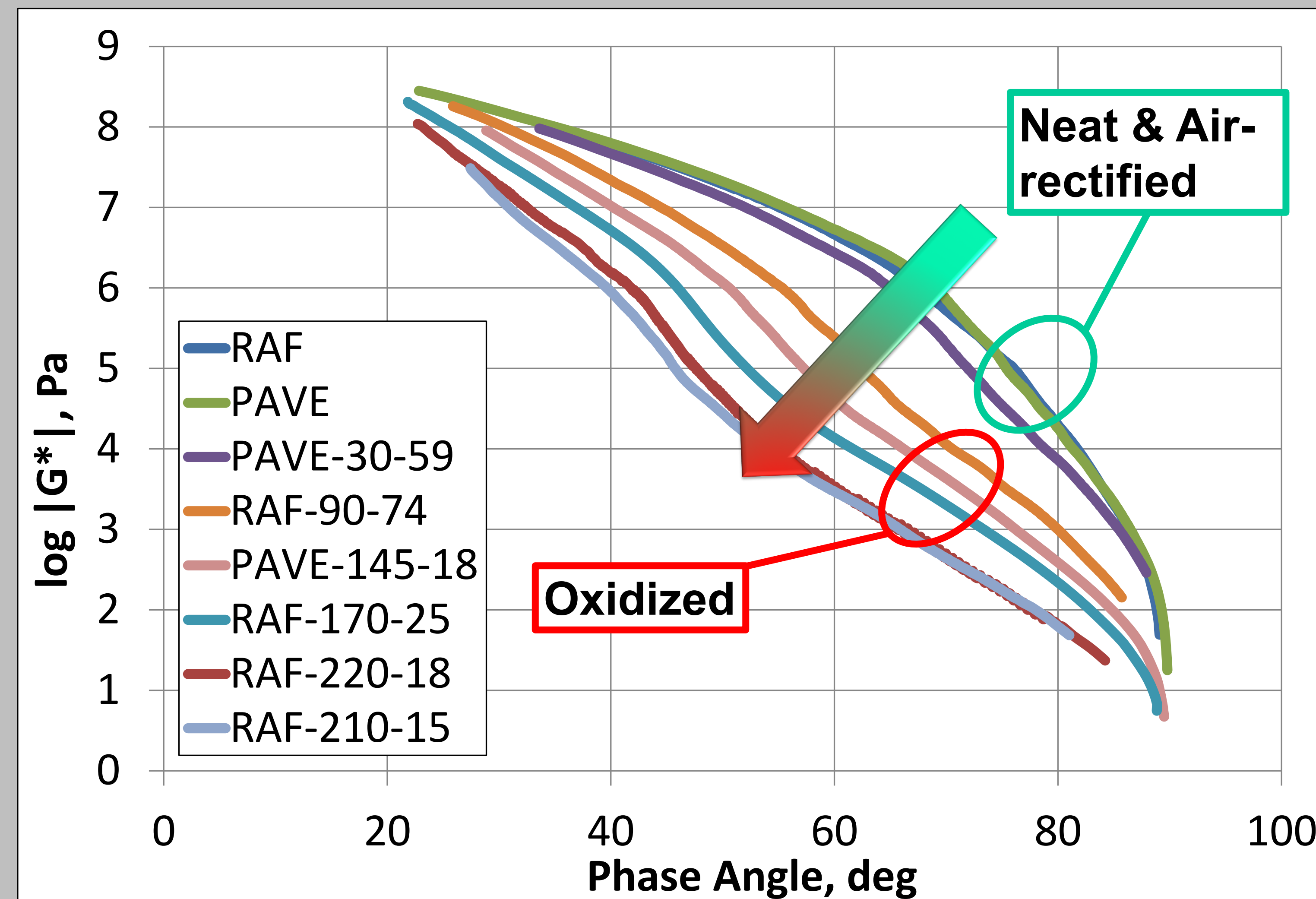
2. Objective

Use rheology to differentiate between air rectified and oxidized bitumen.

3. Methods

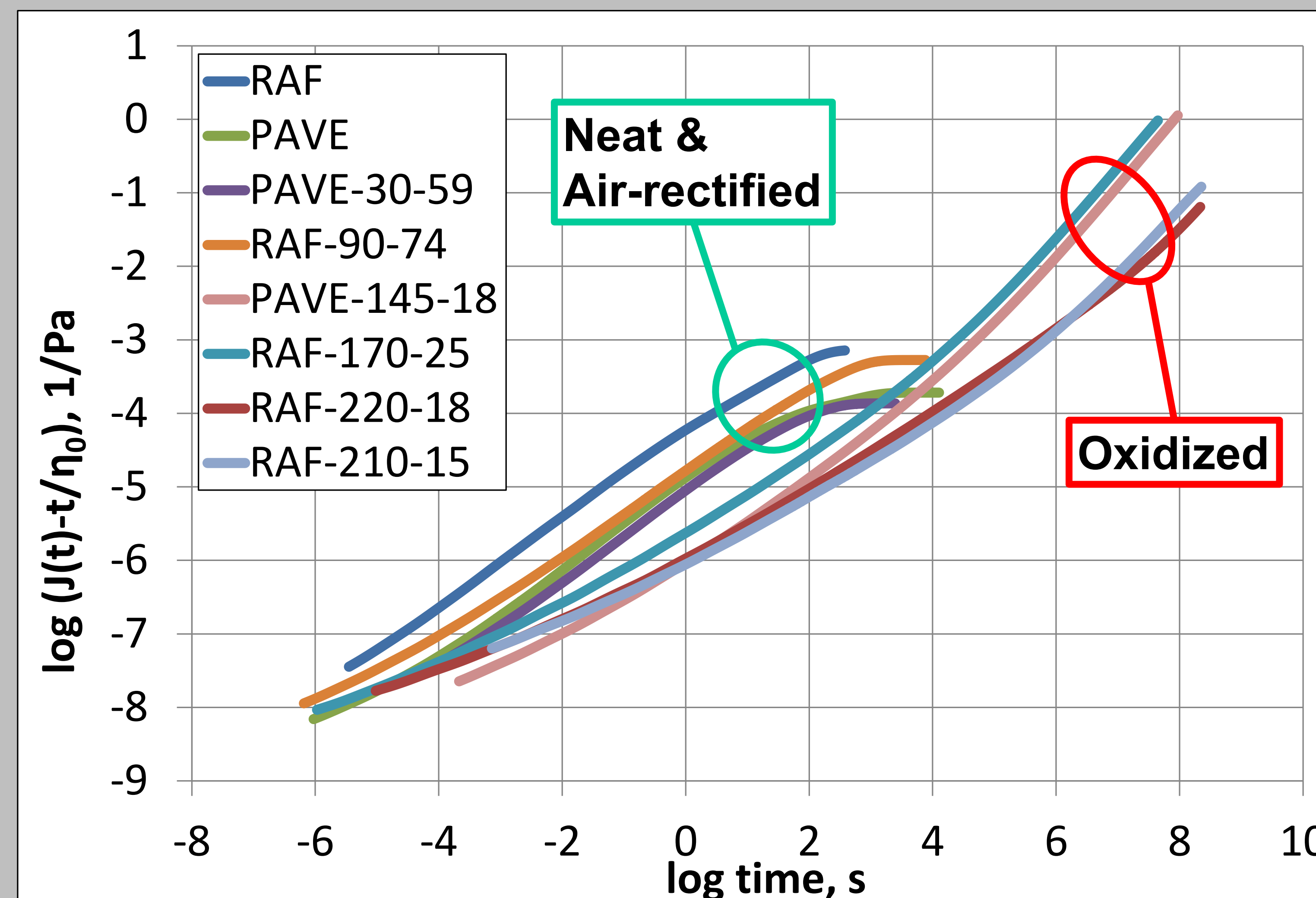
- Straight-run bitumen samples (PAVE – 80/100A, RAF – 300/400A) air-blown at 200, 230, and 260°C to produce air rectified and oxidized products.
- Isothermal frequency sweeps performed at -10 to 150°C. Mastercurves of dynamic material functions constructed.
- ASTM and AASHTO specification parameters determined.

Black Diagram Shows Oxidation Severity Progression



Sample ID = Feedstock – Oxidation time in min – Penetration at 25 °C in dmm.
Oxidation Temperature = 260 °C.

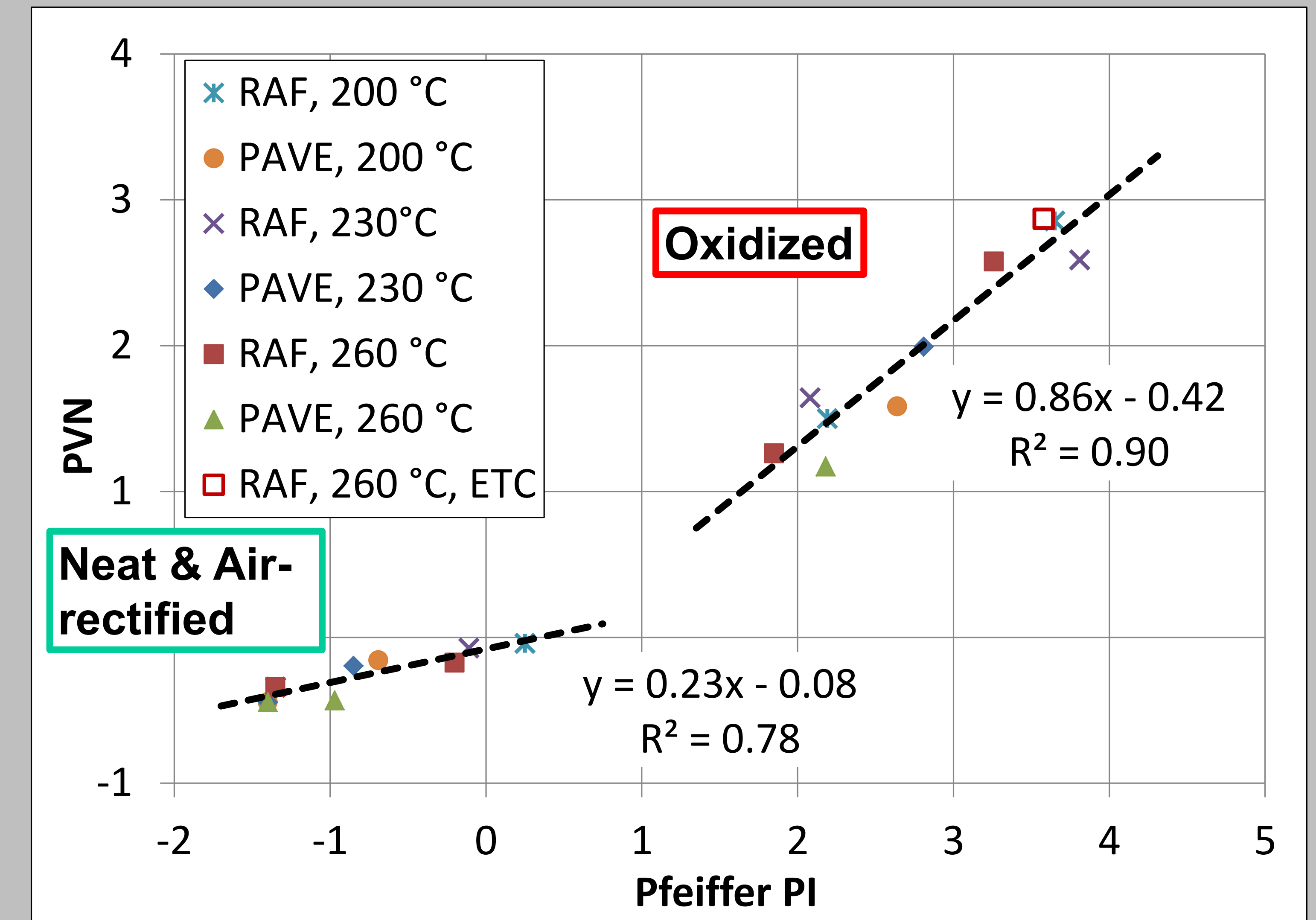
Corrected Creep Compliance Equilibrates For Neat & Air-rectified But Not For Oxidized Bitumen



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Empirical Tests Distinguish Oxidation Severity



PVN = Penetration-Viscosity Number, PI = Penetration Index

4. Conclusions

- Minor differences in rheology of neat and air rectified paving bitumens confirm that air rectification does not significantly alter bitumen composition.
- Corrected creep compliance differentiates air rectified paving and oxidized roofing grades.
- Absence of equilibrium compliance in oxidized roofing bitumen revealed significant compositional changes.
- Bitumen empirical tests supported rheology results.
- PVN vs. PI clearly differentiates air-rectified paving and oxidized roofing grades.