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Impact of Soybean derived chemical additive on the morphology of asphaltenes extracted from virgin asphalt, polymer modified asphalt and recycled asphalt pavement extracted binder through small-angle X-ray scattering by solids and solids in solution

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Abstract:

Recent work has shown that epoxidized plant oil materials work well as rejuvenators in recycled asphalt pavement (RAP). At the end of the 2017 construction season, a field trial mix with 30% RAP (total recycled binder content of 30.3%) was produced and placed in Northwest Iowa on US-18, east of Sheldon, Iowa. The rejuvenator (SR) was used at a rate of 0.125% by total mix weight. The mix design for the control section used a PG 58-34H. Due to Iowa DOT specification (recycled binder content greater than 20%) a grade bump was needed for the binder in the SR trial section (PG 52-40H). With 0.125% SR by total mix weight the grade bump was achieved. To better understand the chemistry behind this rheological improvement two chemical characterization methods will be explored (SAXS/USAXS, and IM-MS) on the asphaltene portion of SARA fractions of several binders (PG 52-34, RAP, PG 52-34 w/polymer (PG 58-34H), PG 52-34 w/SR, PG 52-34 w/RAP, RAP w/SR, PG 58-34H + SR, PG 58-34H + RAP, PG 52-34 w/SR + RAP, and PG 58-34H + SR + RAP).