

Recyclability of Reclaimed Asphalt Pavement Materials

With increasing importance of recycling the asphalt pavement to conserve the natural resource and moving toward sustainable practice, the reclaimed asphalt pavement (RAP) needs a defined idea to get recycled with virgin asphalt pavement materials. Since the RAP was exposed to several years of thermal, ultraviolet degradation and environmental weathering, the material is aged, changed physical and chemical behaviors. The change of these behaviors are differed in modified bitumen with type of polymer used for modification. Present research work investigates the recycling potential (recyclability) of bituminous materials modified with different polymer types. A 60/70 penetration grade conventional bitumen was used in the study. Polymer modified bitumen needed for the study were prepared in the lab by mixing conventional bitumen with (a) an elastoplastic polymer (Three percent Styrene Butadiene Styrene) and (b) a thermo-setting polymer (epoxy: Two percent bis-phenol A). All three bitumen types were aged in the laboratory using thin film oven (TFO) and air oven for different time periods to simulate aging during the service life of pavement sections. Physical characterization of bitumen is carried out by using penetration, softening point, ductility and viscosity test. The chemical characterization is done using Fourier Transform Infrared (FTIR) spectroscopy and Electrospray ionization (ESI) mass spectroscopy. The study focuses on relating the changes occurring in physical properties of different bitumen types during aging and recycling processes to chemical and compositional changes incurred by these materials during these time periods. Observations suggest that polymers interact differently with bitumen components and the stability of these reaction products define the recyclability of polymer modified bitumen.