Effect of Aging on Mechanical Performance and Chemical Characteristics of PG 58–28 Asphalt Binder

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Asphalt properties change throughout its aging process through a physiochemical process. Asphalt needs to be well understood to better utilize its properties in order to extend its mechanical properties through the findings of connections through its chemical properties. Experiments were done on the PG 58-28 asphalt binder to assess the mechanical performance and chemical characteristics of the asphalt binder. Asphalt binder was separated into two groups, aged and unaged asphalt binder. Then the FTIR was done on each to see the chemical compounds such as carbonyl and sulfoxide groups. Then tests such as Hamburg Wheel Rutting test and IDEAL-CT were done to assess the rutting and cracking performance respectively. After data was collected, there was a correlation to FTIR chemical analysis of aged and unaged asphalt to that of its mechanical properties. Aged asphalt had more polar chemicals such as carbonyl and sulfoxide making it more rigid, in result, had a stronger resistance to rutting but prone to cracking. On the contrary, unaged asphalt had lesser polar groups making it more flexible, which in turn, resisted cracking but was more prone to rutting. This data can be better utilized in the future to further ameliorate asphalt binder through the use of chemicals to enhance its mechanical properties. Polymer based modifiers in asphalt can promote chemical enhancement in asphalt binder and the mechanical performance of asphalt. Reused asphalt pavement also known as RAP can be better utilized in asphalt restoration. This reused asphalt can save costs up to $3.3 billion annually.

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