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ABSTRACT

Today bitumen is the most widely used as paving material. The characteristics and properties of bitumen should meet international standard and specification. The testing and grading of bitumen has progressively been improved to meet the demanding needs for quality standard of bitumen. This study investigated the rheological and morphological properties of 80/100 penetration grade bitumen obtained from various sources which were from PETRONAS and SHELL refinery process. One of PETRONAS bitumen was manually blended in refinery that gives much different of properties compared to normal refinery process. The fundamental characteristics of bitumen has been determined using conventional tests such as Penetration, Softening Point, Ductility, Solubility in Trichloroethylene, Specific Gravity, Spot Test, Water in Bitumen and Flash Point. Rheological properties of the sample bitumen are analyzed by use of bitumen tests such as Brookfield Viscosity, Rotational Viscosity (RV), Loss on Heating and Dynamic Shear Rheometer (DSR). Morphology properties are analyzed by use of bitumen tests such as Atomic Force Microscopy (AFM), Field Emission Scanning Electron Microscopy (FESEM) and X-Ray Diffraction (XRD). In addition, the short and long term ageing properties of bitumen are analyzed, with the ageing process simulated by the Pressure Ageing Vessel (PAV). The results indicate the fundamental properties and morphology of the bitumen is dependent on the type of bitumen content. The results reveal that bitumen with manually blended is the hardest compared to bitumen from normal refinery process. PETRONAS bitumen show that they exhibit higher vapor content compared to SHELL bitumen. In addition, SHELL bitumen exhibit better ageing properties as compared to PETRONAS bitumen.