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Utilization of recycled polyurethane foam and ground tire rubber for asphalt modifications: Basic and rheological properties

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Today's one of the major problems in the world is the environment pollution created by either industrial or human huge landfill disposal of polymer waste materials such as expired automobile tires, plastics and polyurethane foams wastes. Recycled polymers applied to asphalt binder used in road pavement construction is considered the best choice to overcome such environmental problem by reducing the large quantities of such wastes and improve the engineering properties of the asphalt binder. This study investigates the feasibility of using scrap polyurethane foam (PUF) and ground tire rubber (GTR) separately. The modified asphalt blend samples were initially prepared in a molten state: in one time as singular additives composed GTR and PUF and in another time as multiple additives composed GTR/PUF. The influence of ternary blends composed of GTR/PUF at two different weight fraction of (50/50) and (75/25) respectively in dose percentages of 5%, 10% and 15% by asphalt weight were studied as follow: PUF was added to the asphalt mixture first at 210oC and a high-speed mix of 6000 rpm for 30 min. Next, the temperature was reduced to 180oC and the speed was lowered to 2000 rpm. Only then, the GTR was added to the asphalt mixture for 90 min. Basic and rheological properties of final modified asphalt samples were investigated. The results and data obtained showed those investigated properties of the virgin asphalt were improved by the addition of all additives in the order: (75% GTR/25% PUF) > (GTR) > (50% GTR/50% PUF) > (PUF), with very good correlation factors of higher thane 0.95. The addition of PUF to the asphalt mixture at high temperature and high speed showed a very good distribution and a complete melting into the asphalt matrix.

Biography

M Sulyman has completed his MSc degree in 2008 from Academy of Graduate Studies and BSc degree in 2000 from Al-Mergheb University in the field of Chemical Engineering in Libya. Currently, he is a PhD student at Polymer Technology Department, Gdansk University of Technology in Poland. His interests of research are environmental and polymer engineering. His main research is asphalt polymer blend using polymer waste materials. Additional interest work includes wastewater treatment using green adsorbents prepared from agricultural by-products/wastes.

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