



Performance Evaluation of Modified Bitumen with Replaced Percentage of Waste Cooking Oil & Tire Rubber with Bagasse Ash as Modifier

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Abstract

Flexible pavements are the major type of pavement use in recent days. Bitumen is the main constituent's part of flexible pavement. Bitumen is the by-produce of petroleum. The depleting reserve of petroleum led researcher to look for alternative binder. This research work explicitly aim at replacing certain percentage of bitumen with Tire Rubber powder (TR), Waste Cooking Oil (WCO) in the presence of Bagasse Ash (BA) as a modifier. Physical test were performed to determine optimum percentages of TR, WCO and BA that can be used as a percentage replacement in bitumen. Result shows that up to 20 % of bitumen can be successfully replaced without affecting performance of bitumen. Performance Tests such as Dynamic Shear Rheometer, Rotatory thin film oven, Pressure aging Vessel and Bending Beam Rheometer were performed on modified samples for its physical and rheological properties. Modified bitumen showed good resistance against rutting, skidding and low temperature cracking. The research work directly contribute in developments of alternative binder for flexible pavement which is a leading research trend these days and environmental friendly initiative.

Keywords: Bitumen; Tire Rubber Powder; Waste Cooking Oil; Bagasse Ash.

1. Introduction

Sustainability had become the most important part of the world issue highlighted by many researchers. It includes the rising global environment concern as well as socio-economic issue. The main objectives of sustainable development is to use natural resources in the most optimized way so that, environmental and socio-economic issues are minimized [1]. Road Transportation is an important tool of connecting different cities with in any country. It comprises of facilities such as bridges, highways, tunnels to ensure safe and efficient movement of people and goods within or between the countries. A good and efficient highways network directly contributes in country's economy by increasing GDP Growth [2].

Paved roads are either flexible or rigid type. During construction of flexible pavement bitumen is use as binder in asphaltic concrete. Bitumen is a complex hydrocarbon obtained as residue during the process of fractional distillation of petroleum. Petroleum is a natural resource and its reserves are depleting with the passage of time, causes increase in price which alternatively cause rise in bitumen price as well. Moreover bitumen burns at high temperature during flexible pavement construction produce fumes that are unhealthy to environment. These major issues led researchers to search for alternative binder that can replace fully or partially certain percentage of bitumen without affecting its physical and rheological properties.

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