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Improvement of the physical and mechanical properties of natural asphalt mixes using petroleum bitumen and polyethylene (Article)

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Abstract

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Natural asphalt is found in Syria in two separate and different locations, the first site is in Deir Ezzor city nearby Jabal al-Bishri region, and the other one is in Lattakia city, in the Kufra region. The current use of natural asphalt from these quarries is limited to paving secondary and rural roads with low traffic volume. The estimated reserve for both quarries is 110 million tons, which is sufficient to pave roads in Syria for the next 40 years. In this research, Al-Bishri natural asphalt was used, where the percentage of natural asphalt ranges between 15-22% of the entire mixture weight consisting of asphalt and sand. A six different proportions of Al-Bishri asphalt starting from 20% Al-Bishri asphalt and 80% of aggregates and increasing regularly by 5 % until it reaches 45% Al-Bishri asphalt and 55% of aggregates, i.e. (20-25-30-35-40-45) % of Al-Bishri asphalt and the remainder of aggregates. Petroleum asphalt was added to the Al-Bishri asphalt mixtures that were prepared at rates ranged from 5% to 45%, with an increase of 5%, i.e. 5% petroleum asphalt and 95% Al-Bishri asphalt , and so the higher the percentage of petroleum bitumen , the lower the Al-Bishri asphalt . The modified mixtures were formed from Al-Bishri and petroleum asphalt and polyethylene , in which polyethylene was added in proportions ranging from 0% 1.5%, 3%, 4.5%, and 6% of the percentage of petroleum asphalt added to Al-Bishri asphalt . Experiments have shown that the percentage of Al-Bishri asphalt added to aggregates reached 35% of the total weight of asphalt mixes . The percentage of petroleum asphalt added to the Al-Bishri asphalt reached 30%, and the percentage of polyethylene added to petroleum asphalt is 3% of the weight of petroleum asphalt . These percentages gave the max stability of 1700 kg, the maximum specific gravity of 2.35, and the void ratio of 4 %.

Author keywords

Mechanical Properties | Modified Asphalt | Natural Asphalt | Petroleum Bitumen | Physical Properties

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