

Chapter

Natural Asphalt: A Novel Bitumen Modifier and Asphalt Filler

Mohammad Soleiman-Beigi, Homa Kohzadi and Saeed Toolabi

Abstract

Natural asphalt is a highly valuable material with diverse uses that humans have been utilizing for centuries. Its beneficial qualities, environmental friendliness compared to synthetic alternatives, versatility, and cost-effectiveness contribute to its overall importance as a valuable natural material. It emphasizes the abundance and significance of Iran's natural asphalt, which is known to be one of the largest producers globally. The investigations of the characteristics and analysis methods provide valuable information for further research and utilization in various industries, particularly in road construction and maintenance. The chapter utilizes several analysis methods, including Fourier Transform Infrared (FT-IR), elemental analysis, X-ray fluorescence, thermogravimetric analysis (TGA), and scanning electron microscope (SEM) analysis, to investigate the characteristics of Iranian natural asphalt. These techniques help understand its composition, thermal stability, and properties relevant to its application as a filler and bitumen modifier in asphalt mixtures and it explains how it improves various properties of traditional bitumen, enhancing stability, durability, rutting resistance, and water resistance. This is due to its exceptional traits such as high viscosity, thermoplastic behavior, and robust adhesive properties, making it a valuable modifier and filler in the industry.

Keywords: bitumen, natural asphalt, modifier, filler, softening point

1. Introduction

Bitumen modifiers and fillers play crucial roles in enhancing the performance of bitumen, which is a key component in road construction and pavement materials. These additives improve the durability, stability, and flexibility of asphalt mixtures, making them resistant to various environmental factors, such as heavy traffic, temperature fluctuations, moisture, and aging. The economic significance of bitumen modifiers and fillers lies in their ability to extend the lifespan of roads and pavements. By enhancing the performance of bitumen, these additives reduce the frequency of maintenance and repair works, leading to significant cost savings over the life cycle of a road. When bitumen is properly modified, it reduces the occurrence of cracks, rutting, and other forms of distress, which are common issues in traditional asphalt pavements. These results in longer-lasting roads and decreased maintenance expenses. Moreover, bitumen modifiers and fillers can enhance the performance of bituminous mixtures, allowing for thinner road surfaces. This reduces the overall

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