

**DETERMINATION OF THE CAUSE FOR AIR
BUBBLES FORMATION IN NATURAL RUBBER
BASED SOLID TIRE TREAD COMPOUND**

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ABSTRACT

Solid tires are used in industrial applications, on big tractors and on trucks susceptible to road and ground risks. There are three parts of a solid tire namely, tread, center and base. Tread is prepared using Natural rubber based compounds. The major issue of this compound is air bubbles formation in tire processing plants. Therefore, the aim of this study is to find causes for air bubbles formation in such solid tire tread compound. Mixer impact, inadequate level of mastication process and insufficient silanization reaction are the main three factors that can affect to air bubble formation in solid tires. In this study three separate experiments were carried out by changing mixer combination (Mixer 1, Mixer 5, Mixer 6, Mixer 7), mastication time in seconds (60, 65, 68, 71), mixing speed in rpm (40, 38, 35, 30). Viscosity, tensile strength, elongation, and dispersion properties of tread compound were observed in each experiment apart from air bubble formation. According to the results, air bubbles formation was observed in experiment 01 and 02. In experiment 03, the number of tires with bubbles were reduced with the reduction of mixing speed due to the reduction of mixing speed facilitated more time for mixing and completing silanization reaction. There was no any effect from mixer combinations, mastication time of mixer and mixer rpm after 145 °C of the mixer on the properties of tread compound. Therefore, incomplete silanization reaction is the cause for air bubbles formation in solid tire tread compound. Overall, the best mixing speed is 35rpm.

Key words: Cycle time, Mastication, Mixing speed, Properties (Dispersion properties, Physical properties, Viscosity), Silanization, Solid tire tread compound