

## **Reinforcement Effect of Nano Silica on some Mechanical properties of Side wall Tire Batch**

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**Abstract:**The aim of this research it is to get the best pulp of the side wall as tire of the terms of the mechanical properties by using nanosilica. This is done by precipitation from water glass by adding hydrochloric acid.

Many tests are conducting on nano silica such as the (XRD, SEM). The results of the tests nano silica prepared that it forms a spherical irregular, which has a high surface area of roughly sizes less than 100 nm exactly in the range of (48-91)nm are confirmed by SEM. With purity of silica is 100% and density of 0.3511 g/cm<sup>3</sup>. SEMs -amorphous structure at ( $2\theta = 21^\circ$ ) is obtained by XRD and after being modified by a coupling agent (APTS) a crystalline peak appears.

Nano silica which is used as filler using the following percentages of (0.02,0.04,0.06,0.08,0.1,0.2,0.4,0.6,0.8,1)pphr to the rubber recipe consisting of styrene butadiene rubber(SBR)/ Natural Rubber(RSS) with the optimum constant percent of carbon black (50pphr). Get a perfect blend of nano silica with rubber, it was added modified nano silica worker couplings on the same percentage of nano silica, which protects the surface of the polar silica and reacts with the rubber matrix.

Achieve the effect of nano-silica on some mechanical properties of the side wall tires (hardness, Sp. Gravity, fatigue, Resilience, compression) are Required. Each percent of the addition of nano silica and modified nanosilica act as a filler and it increases the rigidity and flexibility recipe, and then concluded that the specific gravity property and hardness will increase. At 0.02pphr Nano silica, and an increase in the compression starts after that to decrease with nanoparticles increase to 0.04 pphr but at the addition amounts 0.8 pphr of modified nano silica give the good compression loss. At 0.02pphr of nanosilica, increase in the resilience appear then begins to decrease with nanoparticles increase to 0.04 pphr. At 0.8 pphr of nano silica increase the resistance to crack growth up to 1783 cycles. As the amount of Increase result in increased pressure in the recipe which creates cracks.

**Key Words:** composite materials, Mechanical Properties, silica.