

**EFFECT OF MIXING METHOD ON NATURAL
RUBBER/ACRYLONITRILE BUTADIENE RUBBER
BLEND COMPOSITES REINFORCED WITH
SILICA EXTRACTED FROM RICE HUSK ASH**

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ABSTRACT

Acrylonitrile butadiene rubber (NBR) is a specialty rubber used in the products required swelling resistance. Natural rubber (NR) can be blended with NBR for synergism of properties. Rubber blends were prepared as phase mixing and pre blending methods at cold temperatures using open two roll mill to study the effect of blending method on properties. Silica extracted from rice husk ash (RHAS) used as the filler. RHAS extracted by sol-gel technique were characterized using X-ray diffractogram showed amorphous nature of it while Fourier Transform Infrared Spectroscopy proved chemical compatibility with commercial silica. Blends were prepared keeping NR to NBR ratio at 0:100, 20:80, 40:60, 60:40, 80:20 and 100:0 according to phase mixing and pre blending methods. Then curing, physical and swelling properties of blends filled with RHAS at 25 parts per hundred parts, were evaluated. Compounds prepared using American Standard Testing Method (ASTM) reference formulation for oil seals was used as the control. Results revealed that there was no significant difference between mixing method on properties. Blends having high NBR amounts showed higher crosslinking density while all blends showed acceptable scorch and cure times. Tensile and tear strength showed comparatively lesser values in all blends to the control while elongation properties were compatible with control. Compression set varied from 1 to 6% while control showed 4.3%. Hardness ranged from 45 to 60 IRHD, control was higher (73 IRHD). Equilibrium swelling (%) of control in toluene is 82%, but all blends showed values from 80 to 150%. Equilibrium swelling (%) of control in hydraulic oil and engine oil was below 2% while high NBR content, showed lower swelling. Equilibrium swelling (%) ranged from 1% to 16% in hydraulic oil and 1% to 12% in engine oil. Overall, these blends can be used in preparation of non-marking stationary sealing articles and there is a potential to use RHAS in NR/NBR blends for reinforcement.

Keywords: Natural rubber, Acrylonitrile butadiene rubber, pre blending, phase mixing, rice husk ash silica