Comparative study of Tensile Strength for tire trade compound development for Eco-sSBR with Low PCA and High PCA Based Formulation

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***Abstract* - Rubbers, both synthetic and natural, are commercially used to convert into the final products, from a toy to a vehicle. Rubber Process Oils are used during the processing and production of rubber compounds. These help in improving the dispersion of fillers and flow characteristics of the compound during further processing. Certain highly aromatic oils as such are classified as carcinogenic because when tested according to IP method. In our study we are replacing HPCA oils by LPCA oils and study is drawing attention to on economical green tire trade compound development[1-3]**

***Index Terms* - low down PCA Oils, Polycyclic Aromatics, Carcinogenesis, PAH, Hazard Assessment.**

I.INTRODUCTION

In compounding rubber and rubber compositions for use in pneumatic tires, it is common to utilize processing oils to soften and extend the rubber. Aromatic processing oils, having a certain content of poly aromatic compound have been used generally as lubricating agent Tensile strength is an indication related to strength of compound. It is a correlation of product to break easily or not at all the tensile strength will let to know how the object will react to the tensional forces. It is important for bungee cords, rubber tie-downs, drive belts. Some elastomeric compound like Silicone has a low tensile strength making them unsuitable for a dynamic type of use because they can fracture easily[4-6].

II. EXPERIMENTAL

Mixing of rubber compound s SBR having regular aromatic oil and S SBR having low PCA oils are carried out using a two-wing rotor laboratory Banbury mixer in three stages. Master batch mixing was done, setting the Temperature Control Unit (TCU) at 90°C and rotor speed at 60 rpm. After the power integrator (PI) indicated an achievement of 0.32 kWh, the master batch was dumped. The dump temperature of the master batches was found to be within 130 - 160°C. The master batches were sheeted out in a laboratory two-roll mill. Further mixing of the master batches were carried out after a maturing period of 8 hours. [5-6]. For final batch mixing, the TCU was kept at 600C and the rotor speed at 30 rpm. The earlier prepared master batch was mixed with sulfur, accelerator and scorch inhibitor. The batch was dumped at a PI reading of 0.12 kWh. The dump temperature of the batches was found to be within 90 – 100°C. The final batches were also sheeted out on a laboratory two-roll mill [7-11].

III. RESULTS AND DISCUSSION

The following result and conclusions are drawn from the study. Tensile strength for compound-1, values was slightly compare with increase in dosage of LPCA oils no 2,3 and 4 . All other Tensile strength properties of the formulation No. 2,3 and 4, containing the different LPCA oils are parallel with those of the control HPCA oil formulation No 1. The marginal in decries in Tensile strength in the experimental formulation (Oils No. 4) may be due the less contain of aromatic compound. Tensile strength for formulation-2 values was slightly improved by way of dosage of LPCA oils. All other Tensile strength properties of the formulation -2, containing the different LPCA oils are comparable with those of the control HPCA oil formulation No.1 . Tensile strength for formulation -3 values is slightly decries for LPCA oil No 2,3 and 4. All other Tensile strength properties of the formulation -3, containing the different LPCA oils were akin with those of the control HPCA oil.

UNAGED PHYSICAL PROPERTIES@ 160^0C/20 min

Table NO.1 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (M.Pa.)
1	Oil No.1	18.6
2	Oil No.2	17.9
3	Oil No.3	19.3
4	Oil No.4	18.8

Table NO.2 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (MPa)
1	Oil No.1	18.6
2	Oil No.2	17.7
3	Oil No.3	19.4
4	Oil No.4	17.3

Table NO. 3 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (MPa)
1	Oil No.1	18.6
2	Oil No.2	19.7
3	Oil No.3	18.8
4	Oil No.4	18.1

AGED PHYSICAL PROPERTIES @105^0C/3Day

Table NO.4 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (MPa)
1	Oil No.1	15.5
2	Oil No.2	13.7
3	Oil No.3	15.1
4	Oil No.4	14.2

Table NO.5 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (MPa)
1	Oil No.1	15.5
2	Oil No.2	13.9
3	Oil No.3	13.3
4	Oil No.4	13.4

Table NO.6 Tensile Strength (M.Pa.)

S.No.	Compound Formulation-1	Tensile Strength (MPa)
1	Oil No.1	15.5
2	Oil No.2	13.3
3	Oil No.3	13.2
4	Oil No.4	12.6

IV. CONCLUSION

All the LPCA oils 2,3 and 4 base trade formulations shows comparative values for Tensile strength for LPCA oils.

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