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Comparative Study of Abrasion in Green-sSBR with LPCA and HPCA Based Compound

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Abstract: As rubber comes in contact with various surfaces, wear characteristics are critical to predicting ultimate performance of the end product. Abrasion testing can be used to predict overall durability of the material as it may perform in applications. The Rotator Drum Abrasion (Din Abrasion) method measures the volume loss due to the abrasive action of rubbing a test piece over a specified grade of abrasive sheet. The result can be reported as a relative volume loss or an abrasion resistance index.

Keywords: Low PCA Oils, Polycyclic Aromatics, Carcinogenesis**,** PAH**,** Risk Assessment

I. INTRODUCTION

In compounding rubber and rubber composition for use in pneumatic tyre, 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 regulatory as lubricating agent. ASTM D394, the Dupont Abrasion Test Method, consists of a pair of rubber test pieces pressed against a disk of a specified abrasive paper which rotates whilst a pair of moulded test pieces is continuously pressed against it either with a constant force or with a force adjusted to give a constant torque on the arm holding the test pieces. ASTM D1630 describes the rotary-platform, double-head abrader is commonly referred to as the Abrader used on rubber compounds for shoe soles and heels. The abrader uses rotating drums with a specified abrasive paper around them onto which the test pieces are pressed by means of levers and weights, a specified standard reference compound to be used for the calculation of an abrasive index[1-4].

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 remill and final batch). 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 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 60^0C and 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. Abrasion Loss for compound-1, values was slightly compare with increase in dosage of LPCA oils. All other Abrasion Loss properties of the compounds-1, containing the different LPCA oils were parallel with those of the control HPCA oil compound. The marginal in decries in Abrasion Loss in the experimental compounds-1 (Oils No. 3) may be due the less contain of aromatic compound.

Abrasion Loss for compound-2 values was slightly improved by way of dosage of LPCA oils. All other Abrasion Loss properties of the compounds-2, containing the different LPCA oils were analogous with those of the control HPCA oil compound.

Abrasion Loss for compound-3 values was slightly decries for LPCA oil No 2,3 and 4. All other Abrasion Loss properties of the compounds-3, containing the different LPCA oils were akin with those of the control HPCA oil compound.

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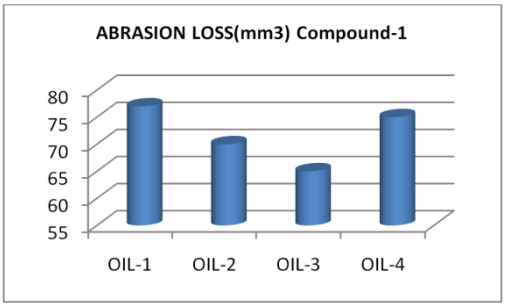

Figure -1: Abrasion Loss

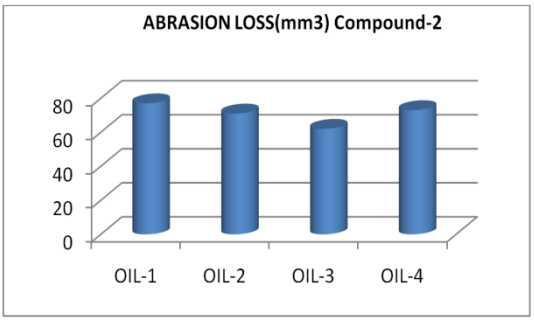

Figure 2: Abrasion Loss

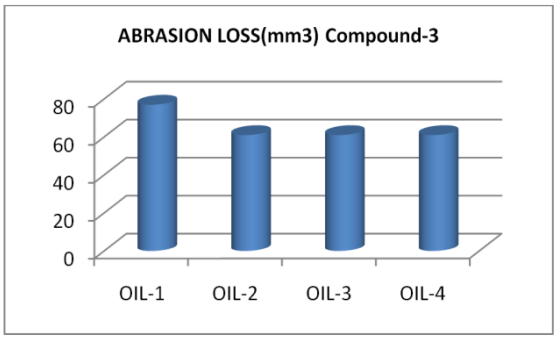

Figure -3: Abrasion Loss

IV. CONCLUSION

All the LPCA oils shows comparative values for abrasion loss. LPCA oils can be alternative of HPCA oil. This study gives an insight on how LPCA of oils influenced the abrasion loss of the rubber vulcanizates in both NR and NR/SBR blends compound.

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