# Development of conflagration Safe sSBR Based Green Compounds with LPCA and HPCA

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***Abstract* - The flash point of a volatile liquid is the lowest temperature at which it can vaporize to form an ignitable mixture in air. Measuring a liquid's spark point requires an ignition source. At the spark point, the vapor may cease to burn when the source of ignition is removed. The flash point is not to be confused with the auto ignition temperature, which does not require an ignition source. The fire point, a higher temperature, is defined as the temperature at which the vapor continues to burn after being ignited. Neither the spark point nor the fire point is related to the temperature of the ignition source or of the burning liquid, which are much higher[1-2].**

***keywords* - low PCA oils, Polycyclic Aromatics, Carcinogenesis, PAH, Risk Assessment**

## INTRODUCTION

The spark point is often used as a descriptive characteristic of liquid fuel**,** and it is also used to help characterize the fire hazards of liquids. "Spark point" refers to both flammable liquids and combustible liquids. There are various standards for defining each term. spark and shoot point is one of the key criteria for determining the process protection while handling the rubber compound during mixing, calendaring, extrusion etc. Higher spark and shoot point of oils always indicates good practice safety. High spark and fire point of oils may be due to presence of carbonyl groups, alkaloids groups. In this work, general study will be carrying out with One Regular oil and Two eco-processing oils (low poly cyclic aromatic). The effect of these processing oils in Solution SBR base compounds will be also studied like[3-5]. To study Physico-chemical Analysis of Oils will be according to ASTM or ISO.

## MATERIAL AND METHODOLOGY

Oils are used in compounding rubber to maintain a given hardness when increased levels of carbon black or other fillers are added. They also function as processing aids and improve the mixing and flow properties. In this research work, study has been carried out with three oils, which have shown encouraging compound properties

A sparkpoint is the temperature at which a fluid generates enough vapor to be ignited spark. There are common test methods: ASTM D92 ,ASTM D93 . Oils are organic substances added to polymers to improve their flexibility and processability. They increase the softness, elongation and low temperature flexibility and decrease the concentration of intermolecular forces and the glass transition temperature, $T_g$ of polymers. High content of polycyclic aromatic hydrocarbons (HPCA) are widely used as aromatic process oils for the manufacturing of oil-extended natural or synthetic rubber also in finished tyres. Rubber process Oil, RPO (Regular oil Sample No.1) and two low polycyclic aromatic oils (Sample No-2,3) were collected from oils Wanders. [5-10].

Oil is the most popular filler added into the rubber compound due to its ability to enhance the strength properties of rubber vulcanized as compared to gum vulcanized. Generally, there are tree types oils used in the rubber compound such as one HPCA and two LPCA However, the choice of oil grades for any given rubber formulation must take into account the desired physical properties of the end products, processing methods and costs [16-22]. Mixing of rubber compound with different oils were carried out using a two-wing rotor laboratory Banbury mixer (Stewart Bolling, USA) in three stages (master batch remill and final batch) and the material used as SBR having regular aromatic oil, SBR having low PCA oil, Oil No.1,2,3 Filler N339 black, ZnO, Stearic Acid, 6PPD, MC Wax, and MS 40[11-16].

## RESULT AND DISCUTION

The spark/ fire point, results are shown in Figure. 1 All the oils show spark and fire point higher than 200°C, whereas LPCA oil No 2 show higher than HPCA oil (Oil No.1). Spark and fire point is one of the important criteria for determining the process safety while handling the rubber compound during mixing, calendaring, extrusion etc. Higher spark and fire point of oils always indicates good process safety. High spark and fire point of oils may be due to the presence of carbonyl groups, alkaloids groups etc. Such groups are absent in the case of oils No2 , where major groups are long chain alkyl type.

The flash and fire point results are shown in Table 1

**Table 1: Flash and fire point**

| Name of oils | Flash and fire point (°C) |
|---|---|
| Oil No.1 | 233 |
| Oil No.2 | 241 |
| Oil No.3 | 229 |

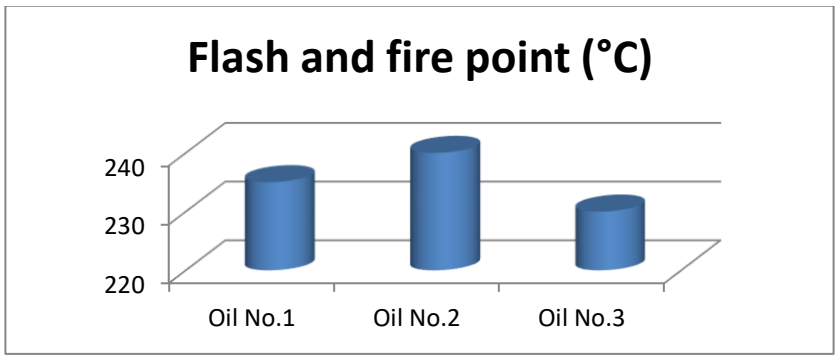


**Figure 1: Flash and Fire point**

It can be concluded that LPCA oils can be used in a natural rubber, sSBR compound at the level of 2 to 5 phr (per hundred gram of rubber) with adjustment in cure package. LPCA oils can be alternative of HPCA oil, any effort of using the same will give rise to benefit of cost as well as environment protection.

## CONCLUSION

All the LPCA oils shows relative values for The spark/ fire point . LPCA oils can be substitute of HPCA oil, any exertion of using the LPCA will give rise to profit of outlay as well as atmosphere fortification. This study gives an insight on how spark and fire point specific of oils influence to help characterize the fire hazards of liquids use in tyre.

## ACKNOWLEDGEMENT

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## CONFLICT OF INTEREST

LPCA oils base materials have been improving and develop new LPCA oils base polymers, which possess environmentally approving properties.

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