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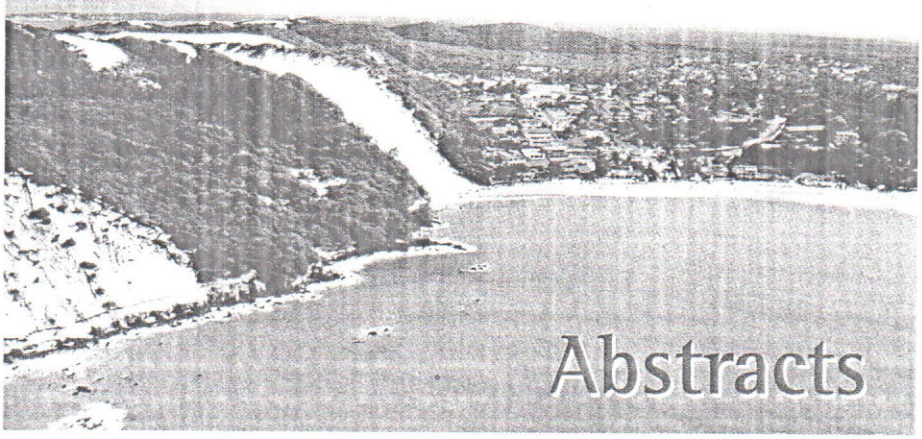

Abstracts

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Preliminary study on the effect of the maturation time on the properties of RRIM 600 clone rubber

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Abstract - The effect of maturation time on the properties of natural rubber (*Hevea brasiliensis*), from RRIM 600 clone, was investigated by standards methods (Wallace Plasticity (P_0) and Plasticitiy Retention Index (PRI)) and Fourier Transform Infrared Spectroscopy (FTIR). The results show that maturation time affect the rubber properties. The progressive hardening that occurs in natural rubber on prolonged storage under ambient conditions leads to a considerable decrease in PRI. This is a complex phenomenon involving crosslinking reactions due to abnormal groups on the rubber chains.

Rubber hydrocarbon was presumed to be composed of isoprene units almost 100% in the *cis*-configuration and very small amounts of so-called abnormal groups such as aldehyde and epoxide. These components were presumed to be responsible for storage hardening. In this paper, the effect of maturation time on the properties of natural rubber, from RRIM 600 clone, was investigated by standards methods (P_0 and PRI) and Fourier Transform Infrared Spectroscopy (FTIR). The natural rubber (NR) samples were supplied by the Plantations Edouard Michelin (PEM), situated in Itiquira-MT. The latex was collected in cup lump form (natural latex coagulation in the field). The coagulum was divided in eight equal parts, each one stored in plastic boxes for the corresponding maturation time of: 2, 4, 6, 8, 10, 12 and 16 days. The PRI analyses of the samples were determined according to standard ISO 2930 [1]. The FTIR spectra were obtained at the resolution of 4.0 cm^{-1} in attenuated total reflectance mode (FTIR-ATR) using zinc selenide crystal.

The PRI reflects the susceptibility of the product to thermo-oxidation. Thus, as higher the PRI is, higher is the resistance of the analyzed NR to thermal oxidation. According to the Table 1, the samples with 2 and 16 days of maturation have higher and lower value of PRI, respectively.

The infrared spectra obtained for the samples are shown in Figure 1.The main difference among them is observed in 1760-1670 cm^{-1} region. The samples with 10, 12 and 16 days of maturation showed a new band at 1738 cm^{-1}, which is assigned to the carbonyl groups [2], that can be responsible for rubber crosslinking, involving abnormal groups. The Wallace plasticity increase with crosslinking and consequently the PRI decrease.

Table 1: P_0 and PRI for the samples studied.

Samples (days)	P_0	PRI
2	42.3 ± 0.9	80.6 ± 1.3
4	47.7 ± 1.0	75.1 ± 1.3
6	44.5 ± 1.0	80.1 ± 1.1
8	46.9 ± 0.5	77.0 ± 1.3
10	44.5 ± 1.0	66.5 ± 1.0
12	45.0 ± 0.4	61.5 ± 1.3
16	47.9 ± 0.8	57.4 ± 1.4

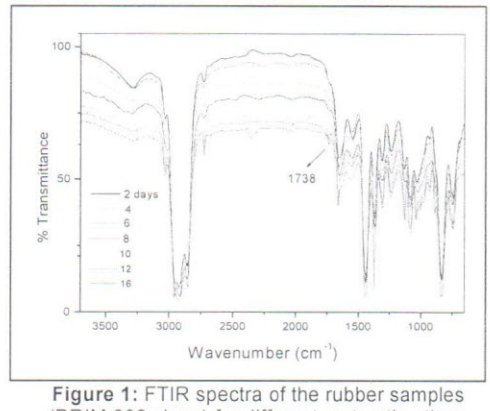

Figure 1: FTIR spectra of the rubber samples (RRIM 600 clone) for different maturation time.

References

[1] Standard ISO 2930, Raw NR- Determination of Plasticity Retention Index (1995).
[2] Hsu, S.L. and Lu, F.J.. Rubb. Chem. Technol., 60, (1987), page 647.