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Chemical and Physical Properties of a Liquid Crystal Polymer with mineral reinforcement

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Abstract –The chemical and physical properties of a commercial liquid crystal polymer Vectra®E-540i were evaluated. In concentrated sulfuric acid the degradation of the polymer occurs but there were no observed reactions with dilute sulfuric acid. In solvent such water, ethyl ethanoate, propanone , chloroform, methanol, heptane and concentrated ethanoic acid there was no solubility of the polymer. In benzene swelling was observed. The samples were exposed to UV light following the ASTM G-154, without degradation and changes in mechanical properties.

Vectra®LCP E-540i (Figure 1) is an easiest flow and high temperature liquid crystal polymer. The grade 540 is 40% mineral reinforced and has a good surface finish. Samples as received were immersed in sulfuric acid 98% and in dilute solutions of this acid (20%, 40%, 60% and 80%) at room temperature. A reaction was observed with the former and after 7 days a black residue of silicium, magnesium, sodium and carbon black were obtained. No reaction was observed with the dilute solutions. Samples were weighed and his solubility evaluated in water during 3 months and in ethyl ethanoate , propanone , chloroform, methanol, heptane, benzene and concentrated ethanoic acid during 7 days. There was no solubility evidence; in benzene swelling was observed. On exposure to flame there was no flammability and thermal degradation was observed when heated at temperatures above 400ºC. At 300ºC the polymer fused showing that it is thermoplastic (Figure 1). The samples were exposed in a chamber of aging brand Q-Lab using UVA fluorescent lamps. The cycle defined in the chamber was: 8 hours under UV light at 60 °C and 4h in dark condensation at 50 °C. The intensity of radiation that reaches the surface of the samples is 0.89 Wm-2, following the ASTM G-154. After 3 months the samples were submit to unnotched impact strength (Izod) @ 23° and no significant change or degradation was observed (the surface were mat).

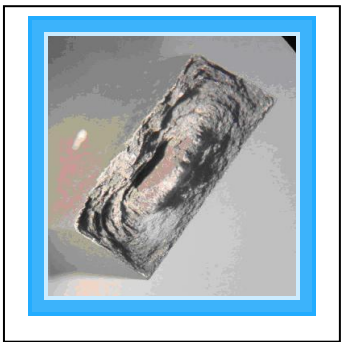

Figure 1: Vectra®LCP E-540i

Figure 2: fusion at 400ºC.

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