

OXIDATION INDUCTION TIME OF IRRADIATED POLYOLEFINS

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The oxidation induction time (OIT) of polyolefins is a well-established technique. It is really useful to compare stabilization system of polyolefins due to the simplicity, reliability and low operational cost associated at very fast results. It follows standards like ASTM D 3895– 95 for polyolefins or NBR 14300 (1999) for PE pipes. These procedures need to use melted samples. The temperature is set at 200 C under nitrogen and the apparatus runs isothermally 5 min to reach equilibrium and after the elapsed time oxygen is introduced at such temperature.

OIT, in spite of its usefulness, has been used for polyethylene and polypropylene only at stabilized systems due to the very fast oxidation and consequent fast degradation of pure samples or samples with previous aging. Those samples are frequently found in recycled system where the stabilizers are nearly gone. Another important application is the evaluation of the number of new polyolefins that are being introduced in the market; all very fragile to oxidation unless stabilizers were present.

The experiments were conducted using different procedures, as follow:

- Irradiated PP performed under the standard methodology,
- Irradiated PP performed under lower isothermal set point - 180 C;
- Irradiated PP performed under melting and hold isothermally bellow melting;
- Irradiated PP performed bellow the melting point with solid sample.

Oxidation induction times of the order of 3 to 5 min were achieved using bellow or at fusion temperatures, both isothermally, melted or solid. Those times were found compatible with the OITs found for normal stabilized PP running under the conventional procedure. This methodology showed promising results and will be further exploited using other temperatures and simultaneous DTA and TGA equipment.

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