

[Development of a multi-sample micro UV irradiator for accelerated deterioration of polymers](#)

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Abstract:

The authors previously developed a pyrolysis-gas chromatograph/mass spectrometry (Py-GC/MS) system incorporating a micro ultraviolet (UV) irradiator which allowed more rapid deterioration of polymeric materials compared to outdoor exposure tests and various accelerated weathering test methods such as weather meters. The micro UV irradiator, however, could handle only a single sample at a time. To achieve multi-sample deterioration in a short time, herein a new UV irradiator was developed by which up to 18 samples on a rotatable sample cup holder can be simultaneously deteriorated at a desired temperature under UV irradiation. The basic performance of the irradiator is evaluated in terms of the rate and reproducibility of accelerated deterioration by using high impact polystyrene (HIPS) as the test sample. The HIPS samples before and after deterioration are subjected to evolved gas analysis-mass spectrometry (EGA-MS) focusing on the changes in the peak width observed in the thermograms. High precision in the peak width measurements among the samples irradiated at various positions on the rotatable sample cup holder is observed with RSD values less than 4.3%. The newly developed irradiator for multi-samples requires a six times longer period to accomplish a comparable deterioration level than the previously developed irradiator. This lengthening can be attributed to the difference in the light intensities of both irradiators at the sample position. However, the relationship between the peak width and the irradiation time has similar profiles for both irradiators. This similarity indicates a good correlation of data measured by both irradiators.

* Excerpted from online journal website (Click the title)

Frontier Labs Products used:

Multi-Shot Pyrolyzer (EGA/PY-3030D), Multi-Sample UV Irradiator (UV-1048E), Auto-shot sampler (AS-1020E), Vent-free GC/MS adapter, EGA tube (UADTM-2.5N)