

## **Improvement of an on-line ultra violet radiation (UV/Py-GC/MS) system and its application for photo Fries rearrangement**

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The physical and chemical performance of most polymeric materials gradually degrades due to external effects such as heating, photo radiation, oxidative atmosphere, humidity and mechanical stress. During the degradation process, both the volatile degradation compounds formed and the structural changes of the polymer itself are important pieces of information. This information, may lead the way to formulate the advanced materials by suggesting modifications to the polymer's molecular structure and/or selecting appropriate additives. Recently, we presented the fundamental technologies of a new analytical instrument which combines an on-line micro-ultra violet (UV) irradiator, a multi-functional micro-furnace pyrolyzer (Frontier Laboratories, Japan), and a high performance metal capillary column with GC/MS (UV/Py-GC/MS). The system was shown to be useful for the analysis of the volatile, degradation products emanating from polymeric materials during photo, thermal and oxidative exposure. The residual irradiated polymer was then characterized using evolved gas-MS analysis and Py-GC/MS.

In this report, the effects of using a newly designed capillary column connection between the pyrolyzer and the GC split injector are presented. The new interface eliminates the contamination in the flow path between the sample cup and the inlet of the capillary column. This small, but important modification underscores the need to evaluate each component in the overall system. The sensitivity improvement of the UV/Py-GC/MS system is presented. Furthermore, the use of a specific cutting filter less than 280nm for the application of Fries rearrangement of phenylsalicylate which is commonly used as UV absorbers is discussed.