



## Photo-Calorimetric Systems (UV-DSC) Hyphenated Technology



PerkinElmer DSC 8500 with EFOS® UV curing system.

## HYPHENATED SOLUTIONS FOR YOUR ADVANCED APPLICATIONS.

Interest in the affects of UV radiation on materials is increasing for a number of reasons. UV curing is becoming more common in reducing the amount of volatile organic compounds (VOC) released from coating applications and for the speed at which it aids in binding adhesives used in the electronics industry. Dental resins and lens coatings are often UV cured as well. Other materials degrade when exposed to UV light and understanding this transformation is important. For example, sealant and caulking used in photocells are expected to resist degradation by UV. In pharmaceuticals, photostability studies may be required by regulatory agencies to show that active ingredients in drugs do not degrade.



Figure 1: The PerkinElmer DSC 6000 with EFOS® UV curing system.

PerkinElmer is the only manufacturer to offer the options of either a double-furnace, or power controlled, DSC or a single furnace, or heat-flux, DSC connected with a UV source. These options allow you to choose the instrument that's best for your laboratory needs – a state-of-the-art DSC with true isothermal control for research and development or a less expensive alternative designed for quality control and manufacturing.

## Double furnace hyphenation

The DSC 8000 and 8500 are both double furnace design instruments utilizing our unique approach to calorimetry. Capable of scanning rates on heating and cooling up to 750 °C/min, the instrument also gives true isothermal performance. For photo-calorimetric studies, this means that the heat from the UV source as well as any heat from the reaction are controlled and keep the sample at a true isothermal temperature. This allows the most accurate measurement of kinetics. Similarly in degradation studies, you can safely measure the energy from the UV only and not be concerned with the heating of your sample.

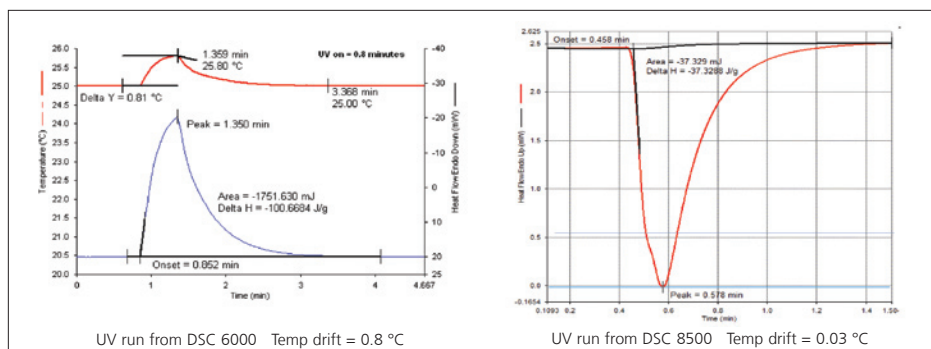


Figure 2: Comparing the change in sample temperature caused by full intensity exposure to UV energy in the DSC 8500 versus a heat flux DSC.

## Single furnace hyphenation

For quality control and reactions where tight isothermal control is not required, a single furnace, or heat flux, DSC is a price conscious choice. The DSC 4000 offers excellent value for these applications. The UV attachment used with both DSC instruments requires dual leg light pipes, or fiber optic cables, which allow some adjustment of the position of the pipes independent of each other. This, combined with the variable iris of the UV source, allows a greater flexibility in tuning the amount of light that strikes the furnace, sample, or sensor to minimize perturbations caused by the UV.

An example of an application of photo-calorimetry is shown in Figure 3 below. A sample of a dental material is shown being optically cured under three different intensities of UV light. From this data you can calculate the kinetics of the cure and determine the best conditions at which to cure the sample.

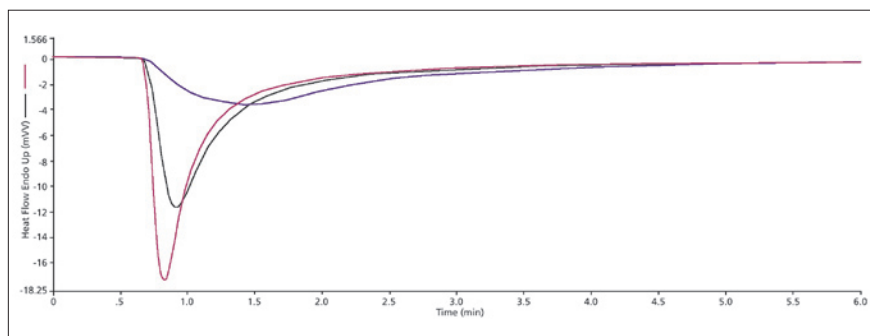


Figure 3: Effect of light intensity variations on a sample of dental material with the EFOS® unit's iris at 5%, 15% and 25% at 30 °C. Data collected from a DSC 8500 with an Intracooler II and nitrogen purge.

To learn more about our UV-DSC or other hyphenated techniques, visit [www.perkinelmer.com/hyphenation](http://www.perkinelmer.com/hyphenation)

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