A New Chemical Actinometer for UVB Radiation – *p*-Hydroxyphenacyl Phenylacetate (*p*HPPA)

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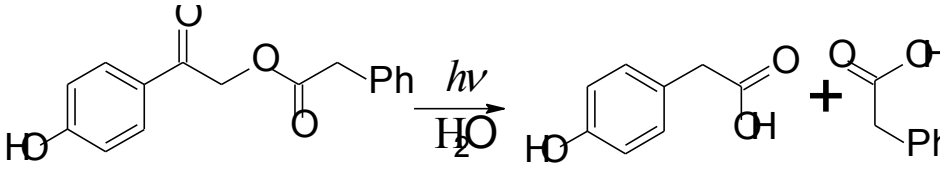
Chemical actinometry is used to access the number of incident photons, which is often an important characteristics. There is a plenty of chemical actinometers summarized in IUPAC recommendation [1], but we found only a few of them correctly characterized, well performing and reliable. We want to introduce a new standard chemical actinometer for UVB radiation, which would be not sensitive to daylight (like ferrioxalate, uranyl oxalate, azobenzene and others [1]) and would be easily evaluated from UV-vis spectrophotometric measurements. The *p*-hydroxyphenacyl phenylacetate actinometer is based on the photo-Favorskii rearrangement to *p*-hydroxyphenylacetic acid and phenylacetic acid. The photoproducts absorb only below 290 nm (*p*-hydroxyphenylacetic acid) and 280 nm (phenylacetic acid), what make *p*HPPA potentially usable without correction on photoproducts at low conversions. The quantum yields were found to be independent of the temperature (at 15 – 35 °C range) and irradiation wavelength. As the photo-Favorskii reaction is pH dependent we recommend using *p*HPPA at pH 2 (0.01 M HCl) where the QY = 0.45. The great advantage of this newly proposed actinometer in comparison to previously recommended is the simplicity and precision of spectrophotometric detection of reaction progress without the need of further chemical workup or other analytical tools. We also developed the script for the evaluation of photon fluxes from measured UV-vis spectra.



[1] H. J. Kuhn, Chemical Actinometry (IUPAC Technical Report), *Pure and Applied Chemistry* **2004**, *76*, No. 12, p. 2105 - 2146