

4,4'-Dimethylazobenzene: A New Chemical Actinometer

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Chemical actinometers are an essential tool to measure the photon flux of a light source and carry out quantitative analysis on photoreactions. [1] However, most of the actinometers employed so far show minor drawbacks, such as difficult data treatment, parasite reactions, low stability or impossibility to reset and reuse. We propose herewith the use of 4,4'-dimethylazobenzene as a new performant and handy chemical actinometer. [2] This azobenzene derivative undergoes a highly efficient E/Z isomerization, approaching total conversion upon irradiation at 365 nm. We carefully determined the photoisomerization quantum yields and set up a facile actinometric protocol that requires the sole use of a spectrophotometer to determine the photon flux. Moreover, after full conversion to the Z form, the Z-E photoisomerization can be exploited for actinometry in the visible region. Finally, thanks to the excellent fatigue resistance, after thermal or photo-isomerization (e.g. at 254 nm) the same solution can be reused several times.

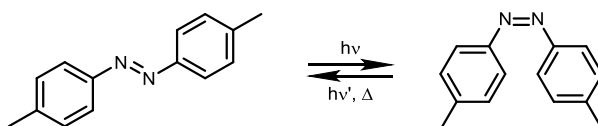


Figure 1. Structure and photoisomerization of 4,4'-dimethylazobenzene.

[1] H. J. Kuhn, S. E. Braslavsky, R. Schmidt, *Pure Appl. Chem.*, **2004**, 76 (12), 2105–2146.

[2] L. Casimiro, L. Andreoni, J. Groppi, et al., *Photochem. Photobiol. Sci.*, **2022** - DOI: 10.1007/s43630-021-00162-3