

"Photodimerization of Anthracene: A $[4\pi_s + 4\pi_s]$ Photochemical Cycloaddition."
Breton, G. W.; Vang, X. *Journal of Chemical Education*, 1998, 75, 81-82.

Abstract: The Diels-Alder cycloaddition is an often exemplified reaction in organic laboratory courses because it is an important synthetic procedure, and it also serves as a basis for discussion of orbital symmetry rules.¹ Symmetry rules dictate the plausibility of many organic reactions, including cycloadditions, electrocyclic reactions, and sigmatropic rearrangements. An often discussed – but rarely demonstrated – aspect of orbital symmetry is the reversal of the allowed or forbidden nature of a given thermal process under photochemical conditions (*I*). Some reactions that are “forbidden” thermally, such as $[4\pi_s + 4\pi_s]$ cycloadditions, are “allowed” under photochemical conditions. Although such processes are a fascinating extension of thermal reactions, they are often avoided in laboratory courses, presumably as a result of the perceived need for costly photochemical equipment (quartz glassware, Hg lamps, etc.). The photodimerization of anthracene (**1**) is an interesting photochemical $[4\pi_s + 4\pi_s]$ cycloaddition reaction that requires only common laboratory equipment.² We have performed this reaction in our Advanced Organic Chemistry course in conjunction with the conventional thermally allowed $[4\pi_s + 2\pi_s]$ cycloaddition of maleic anhydride with anthracene.