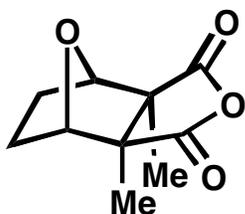


Notes for Lecture #13

Cycloaddition Reactions – The Diels-Alder Reaction

Molecule of the Day

cantharidin

Cantharidin is a powerful **irritant** isolated from *Cantharis vesicatoria*, a.k.a. the "blistering beetle" or "Spanish fly", and is found in the eponymous, alleged aphrodisiac. Several chemistry research groups have prepared cantharidin by total synthesis, and in many of these a **Diels-Alder reaction** was a key step.

Cycloaddition: A pericyclic reaction in which 2 **separate** conjugated, overlapping arrays of orbitals **combine**. Cycloadditions proceed by way of a **cyclic transition state**, and 2 **sigma bonds** are formed during the course of the reaction.

A **suprafacial** process ("s" in the table below) is one in which the bonds made or broken lie on the **same face** of the orbital array undergoing reaction. In an **antarafacial** process ("a"), the newly formed or broken bonds lie on **opposite faces** of the reacting orbital array.

Woodward-Hoffmann Rules for Cycloadditions

# Electrons	Stereochemical Course	
	Thermal Mode	Photochemical Mode
$4n + 2$	[s + s]	[s + a]
$4n$	[s + a]	[s + s]