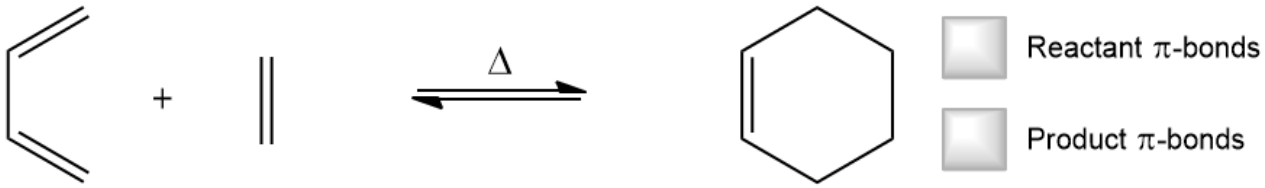
CONCEPT: THERMAL CYCLOADDITION REACTIONS

● Pericyclic reactions in which _____ ***π-bonds*** are destroyed after _____*-activated* cyclic mechanism

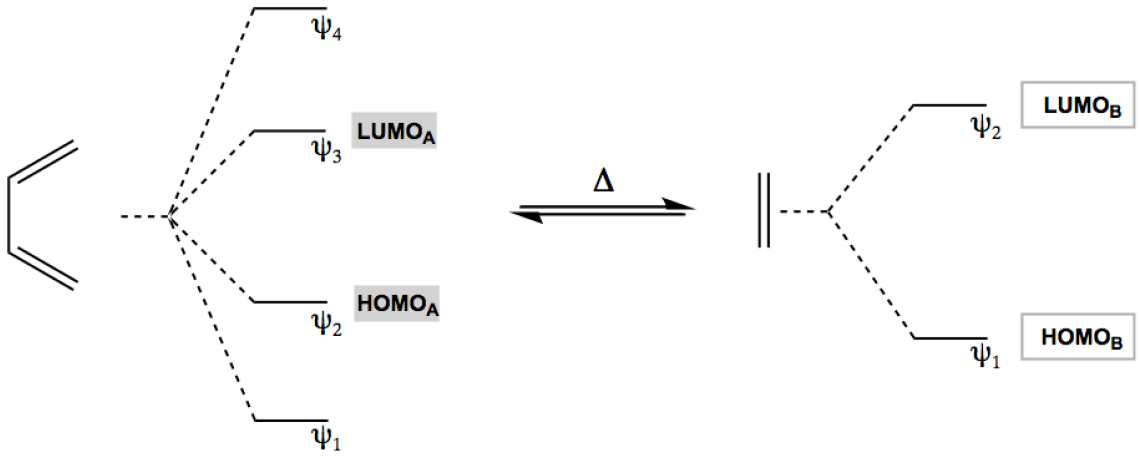
□ The *Diels-Alder reaction* is an example of thermal cycloaddition

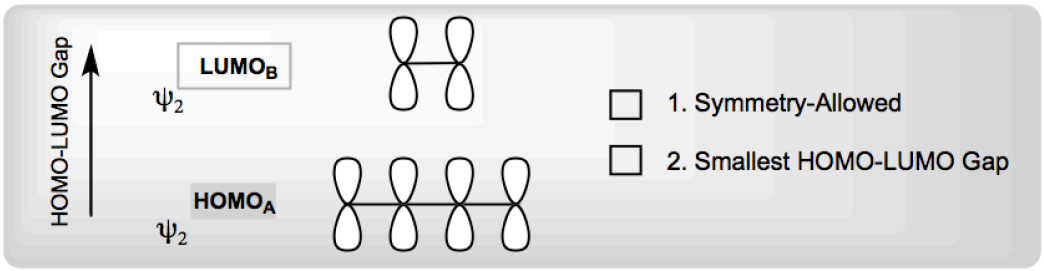


● In cycloaddition, $HOMO_A$ must fill $LUMO_B$.

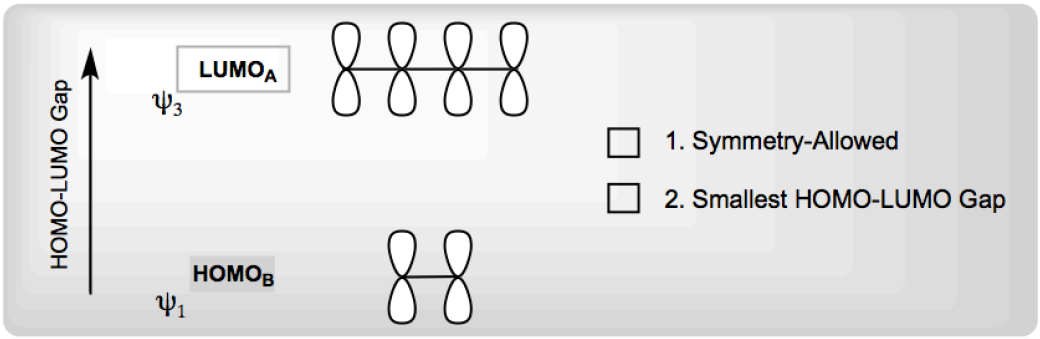
□ According to FMOT, bonding interaction is ***strongest*** when orbital *symmetry* and *energy* _____ closely.

□ 1. Reaction must be *symmetry-allowed* vs. *symmetry-disallowed* 2. Reaction must minimize *HOMO-LUMO Gap*



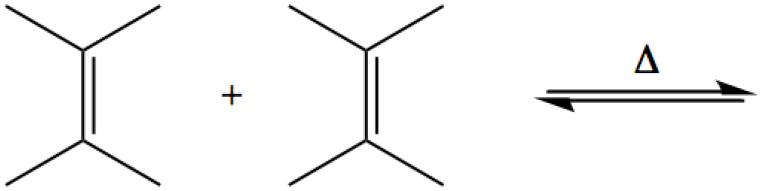


EXAMPLE: Predict the favorability of a bonding interaction between $HOMO_B$ and $LUMO_A$



PRACTICE: Use FMOT to predict the mechanism and products for the following cycloadditions. If no product is favored, write “symmetry-disallowed” in place of the product.

a. $2\pi + 2\pi$ cycloaddition



b. $4\pi + 4\pi$ cycloaddition