

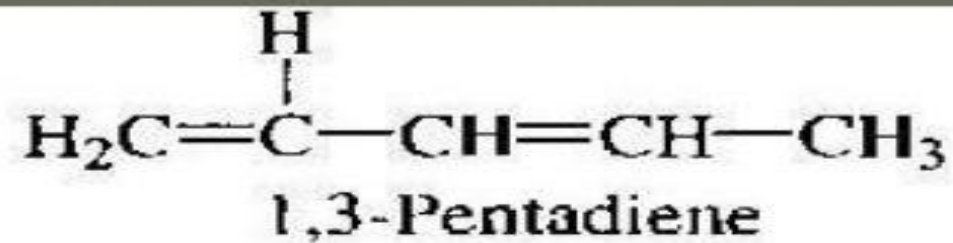
ALKADIENES

- Acyclic acid or unbranched hydrocarbons having two carbon-carbon double bonds.
- Many compounds contain two or more double bonds and are known as alkadienes, alkatrienes, alkatetraenes, and so on, the suffix denoting the number of double bonds.
- General Formula: C_nH_{2n-2}

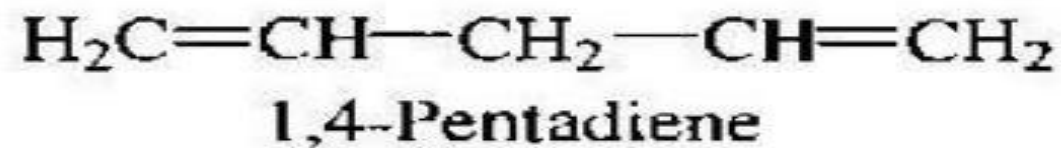


- Alkadienes are classified into three categories on the basis of location of two double bonds.

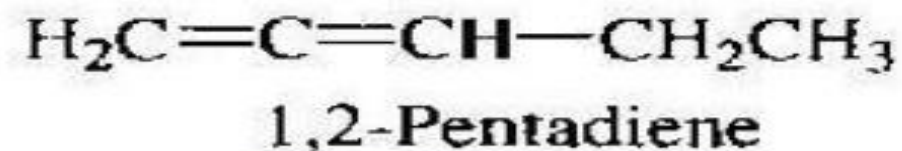
Conjugated



Isolated



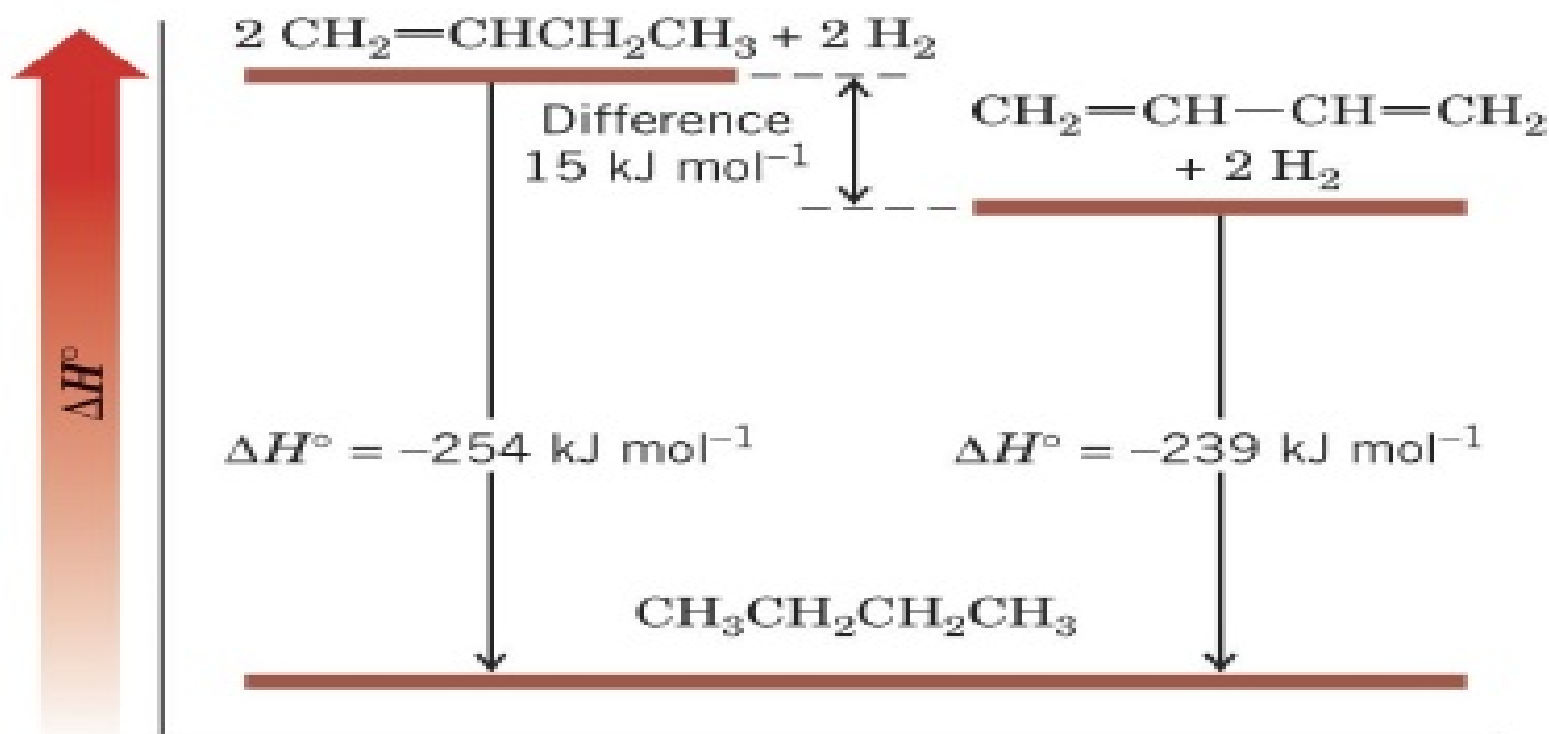
Cumulated



Stability of alkenes

Heats of hydrogenation of alkenes and alkadienes II

heats of hydrogenation of 2 moles of 1-butene and 1 mole of 1,3-butadiene



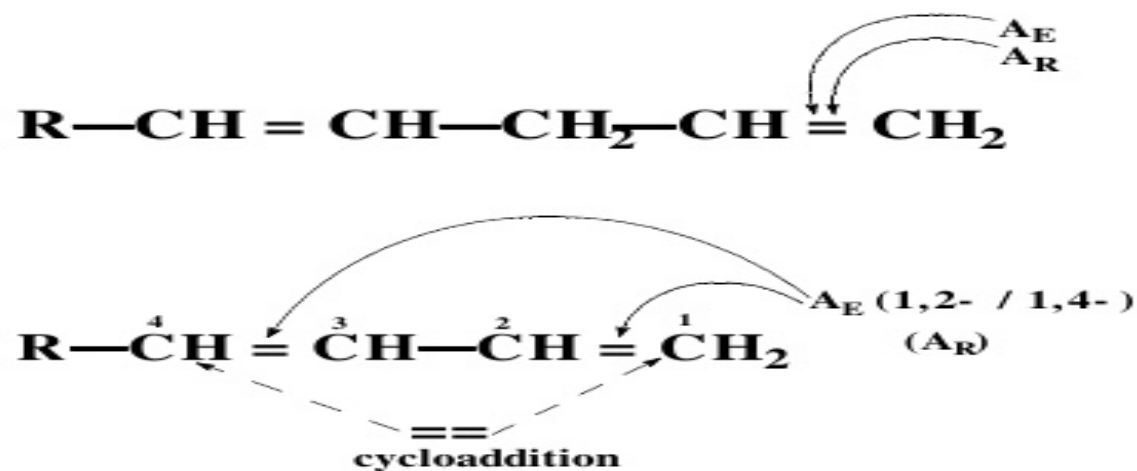
The difference of 15 kJ mol^{-1} a **conjugation energy**

Heats of hydrogenation of alkenes and alkadienes

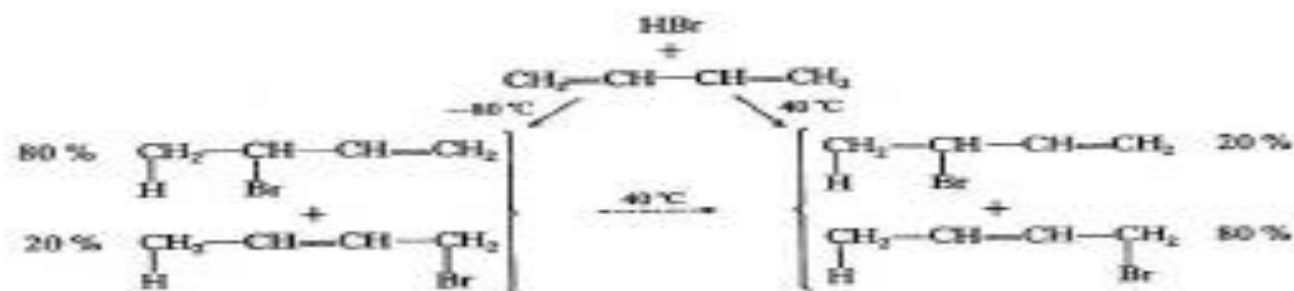
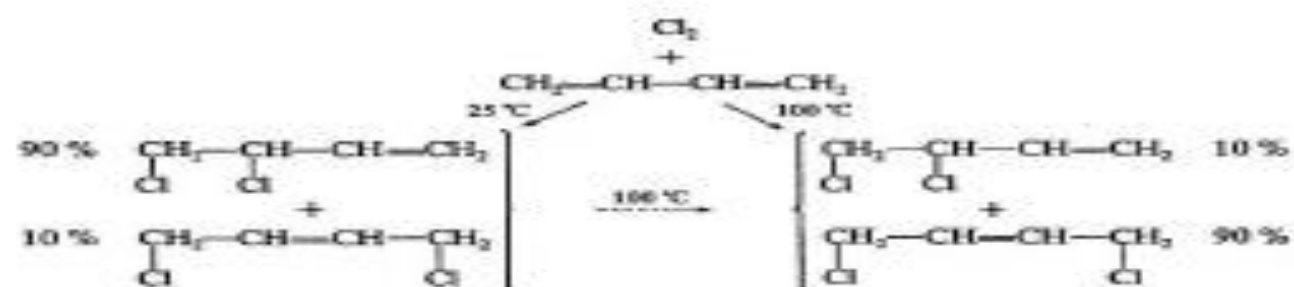
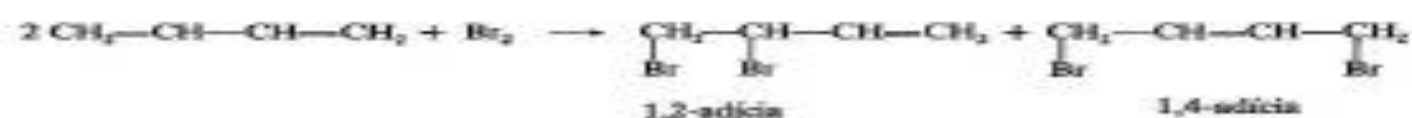
Compound	H ₂ (mol)	ΔH° (kJ mol ⁻¹)
1-Butene	1	-127
1-Pentene	1	-126
<i>trans</i> -2-Pentene	1	-115
1,3-Butadiene	2	-239
<i>trans</i> -1,3-Pentadiene	2	-226
1,4-Pentadiene	2	-254
1,5-Hexadiene	2	-253

Reactions of alkadienes: follows electrophilic addition by 1,2 and 1,4 addition

The reaction scheme of alkadienes

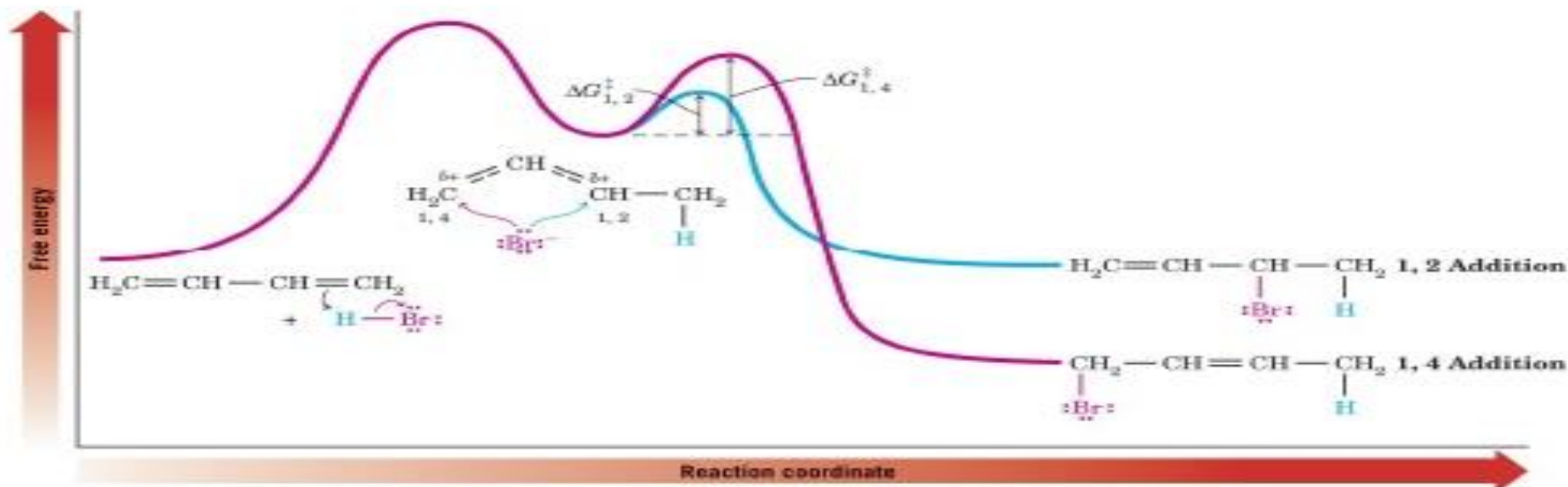


Regioselectivity of addition reactions on conjugated 1,3-alkadienes



Kinetic vs. thermodynamic controlled reactions

An importance of ΔG^\ddagger vs. ΔG° energies



$$\Delta G_{1,4}^\ddagger > \Delta G_{1,2}^\ddagger$$

$$\Delta G_{1,2}^\circ > \Delta G_{1,4}^\circ$$

Diels-Alder reactions

(4+2) π 1,4-cycloaddition reactions

