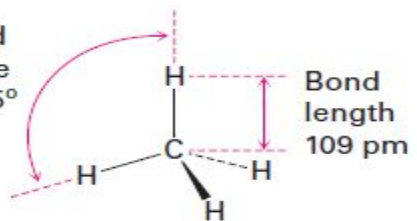


АЛКАНЫ

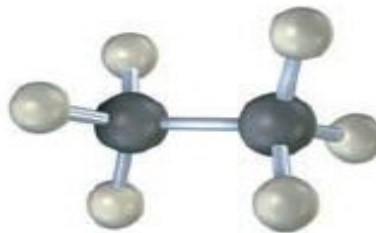
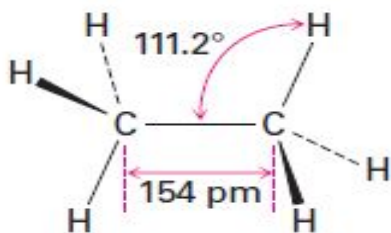
(строение и изомерия)



Bond angle
 109.5°



Bond length
109 pm



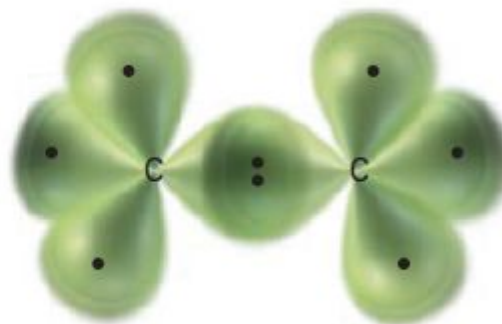
Ethane



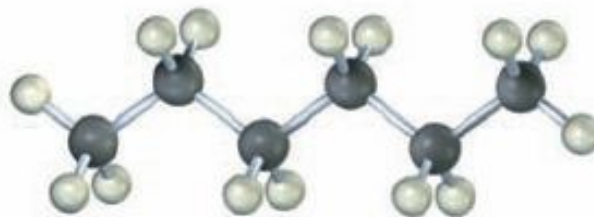
sp^3 carbon



sp^3 carbon

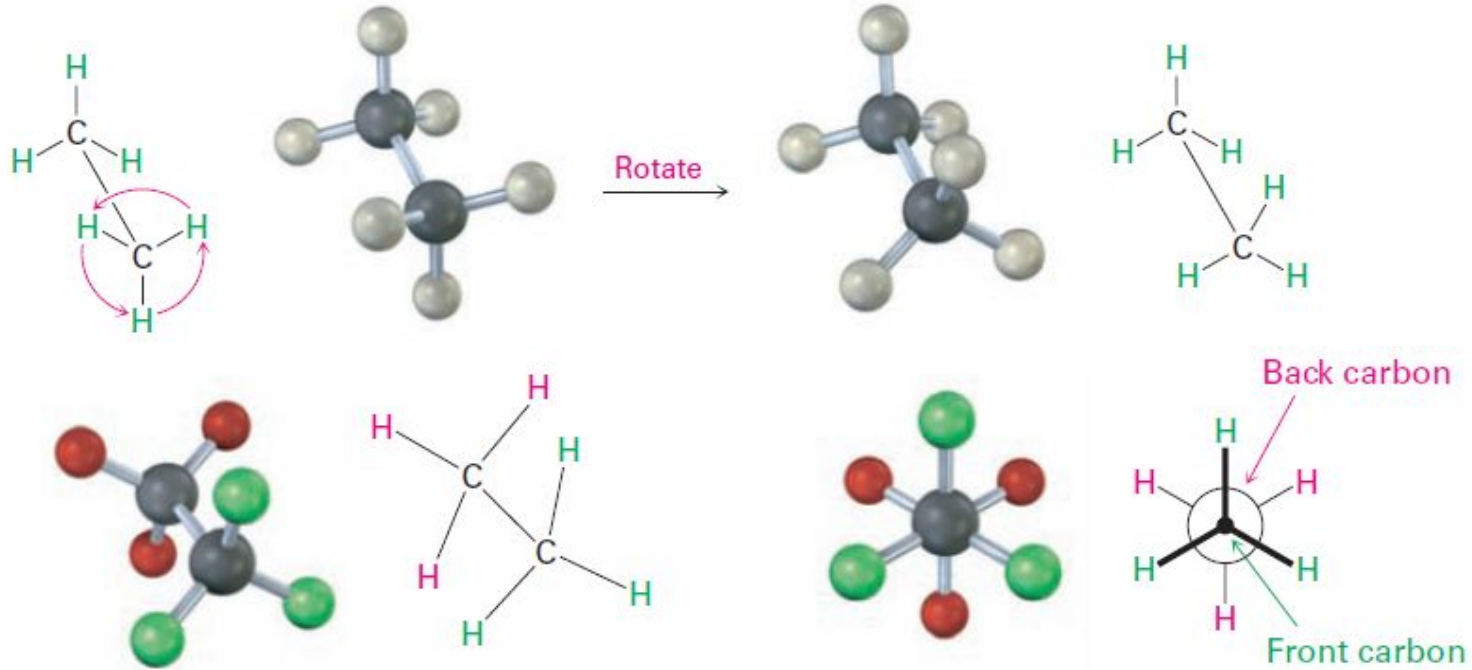


sp^3-sp^3 σ bond



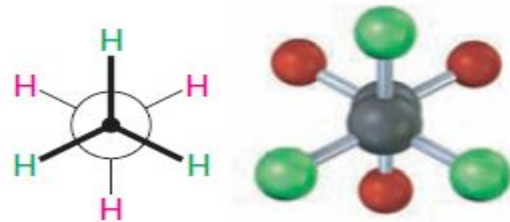
Hexane

Конформации этана



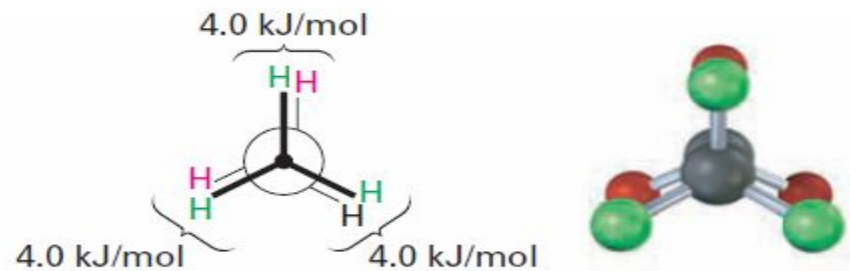
Sawhorse representation

Newman projection

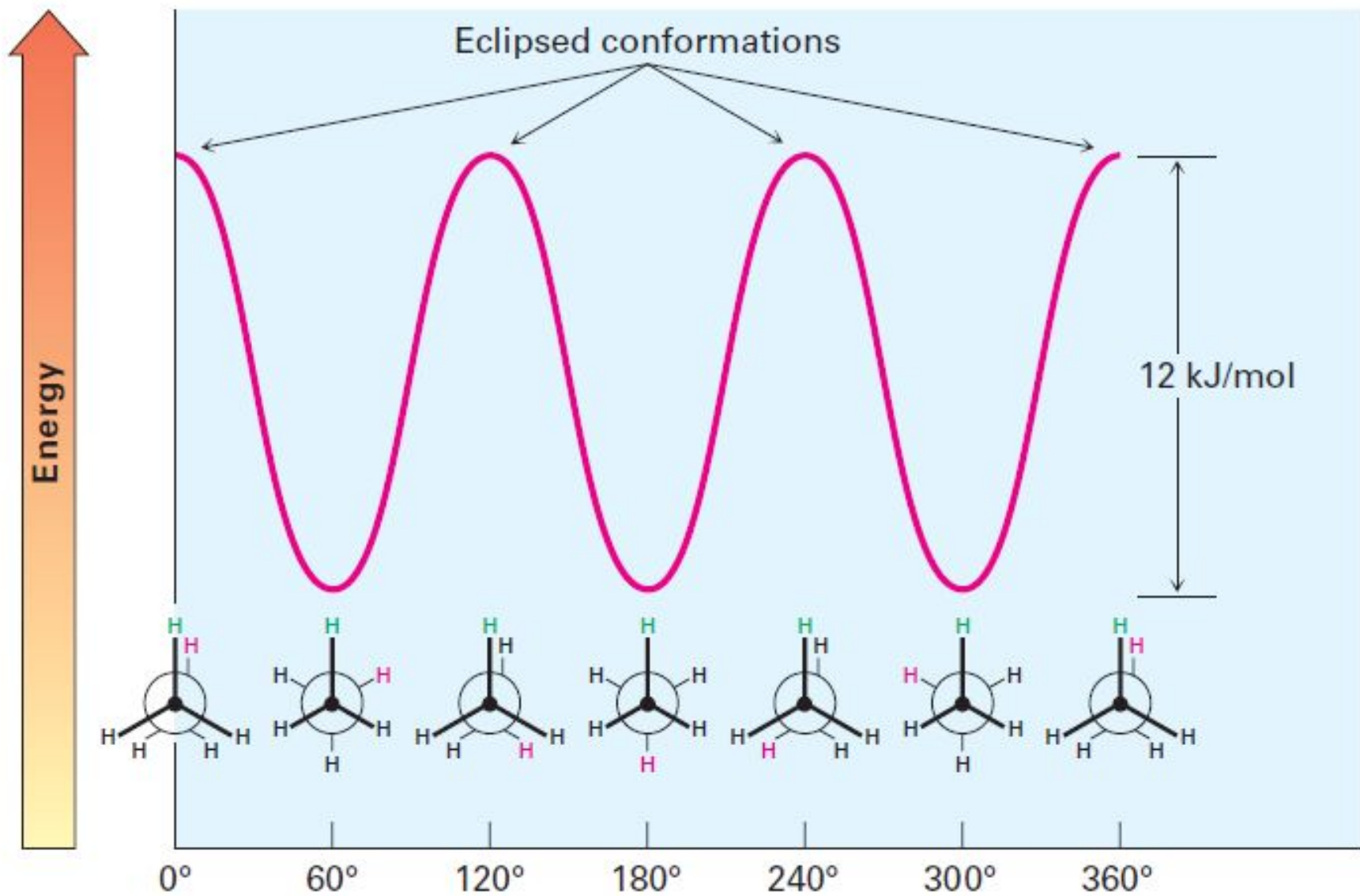


Ethane—staggered conformation

Rotate rear carbon 60°

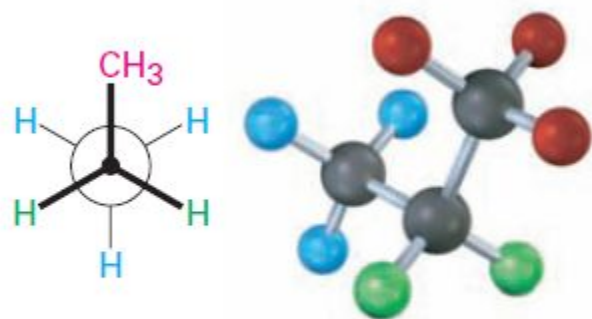


Ethane—eclipsed conformation

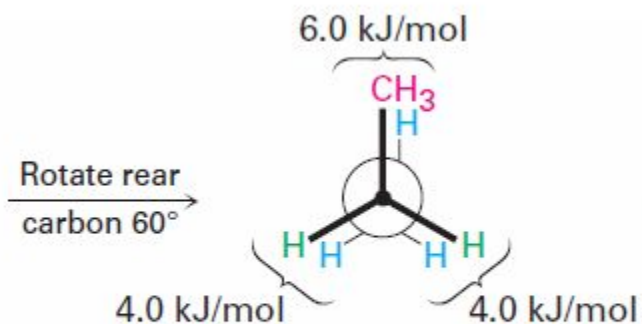


Конформации пропана и бутана

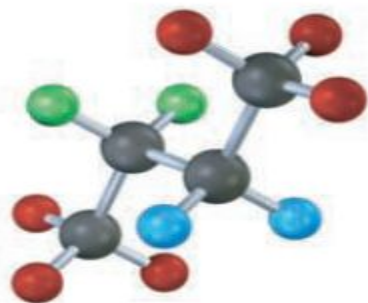
The eclipsed conformation of propane has three interactions—two ethane-type hydrogen–hydrogen interactions and one additional hydrogen–methyl interaction. Since each eclipsing $\text{H} \leftrightarrow \text{H}$ interaction is the same as that in ethane and thus has an energy “cost” of 4.0 kJ/mol, we can assign a value of $14 - (2 \times 4.0) = 6.0$ kJ/mol (1.4 kcal/mol) to the eclipsing $\text{H} \leftrightarrow \text{CH}_3$ interaction



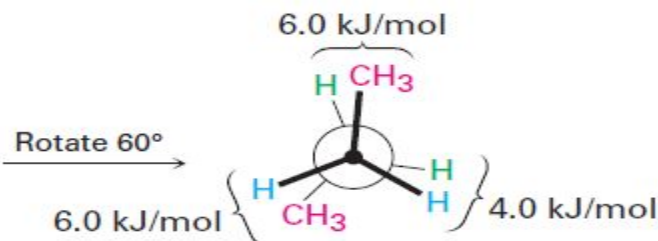
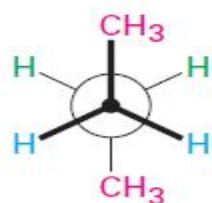
Staggered propane



Eclipsed propane



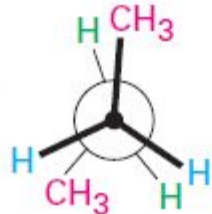
Butane—anti conformation
(0 kJ/mol)



Butane—eclipsed conformation
(16 kJ/mol)

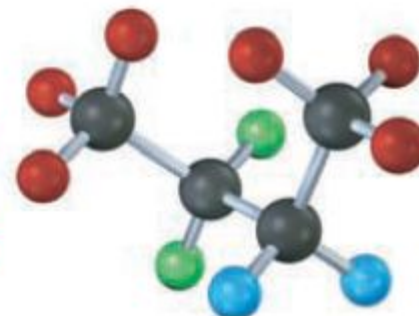
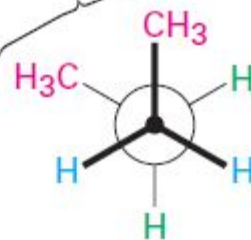


**Butane—eclipsed
conformation
(16 kJ/mol)**

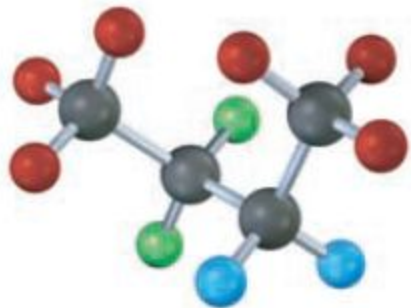


Rotate 60°

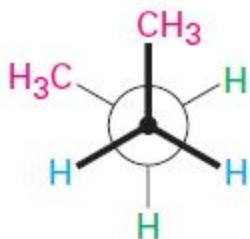
Steric strain
3.8 kJ/mol



**Butane—gauche
conformation
(3.8 kJ/mol)**



**Butane—gauche
conformation
(3.8 kJ/mol)**



Rotate 60°

11 kJ/mol



4.0 kJ/mol

4.0 kJ/mol



**Butane—eclipsed
conformation
(19 kJ/mol)**

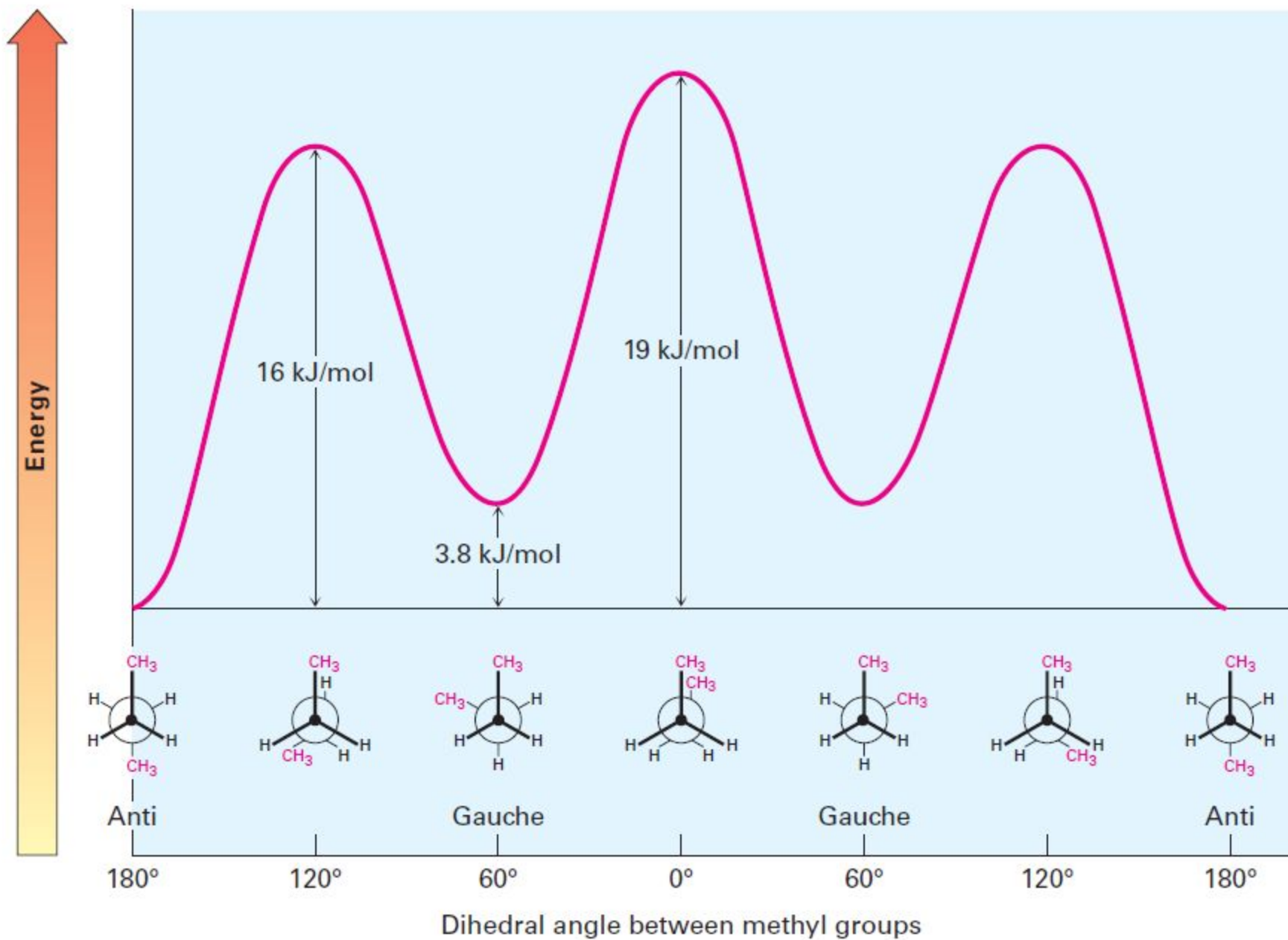
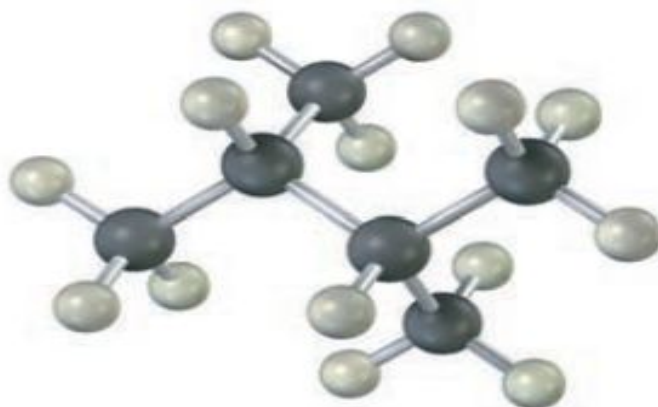


Table 3.5 Energy Costs for Interactions in Alkane Conformers

Interaction	Cause	Energy cost	
		(kJ/mol)	(kcal/mol)
H ↔ H eclipsed	Torsional strain	4.0	1.0
H ↔ CH ₃ eclipsed	Mostly torsional strain	6.0	1.4
CH ₃ ↔ CH ₃ eclipsed	Torsional and steric strain	11	2.6
CH ₃ ↔ CH ₃ gauche	Steric strain	3.8	0.9

Sight along the C2–C3 bond of 2,3-dimethylbutane, and draw a Newman projection of the most stable conformation.

Draw a Newman projection along the C2–C3 bond of the following conformation of 2,3-dimethylbutane, and calculate a total strain energy:



Sight along the C2–C1 bond, 2-methylpropane (isobutane) and

(a) draw a Newman projection of the most stable conformation.

(b) draw a Newman projection of the least stable conformation.

(c) make a graph of energy versus angle of rotation around the C2–C1 bond.

(d) Since an H ↔ H eclipsing interaction costs 4.0 kJ/mol and an H ↔ CH₃ eclipsing interaction costs 6.0 kJ/mol, assign relative values to the maxima and minima in your graph.

Consider 2-methylbutane (isopentane). Sighting along the C2–C3 bond:

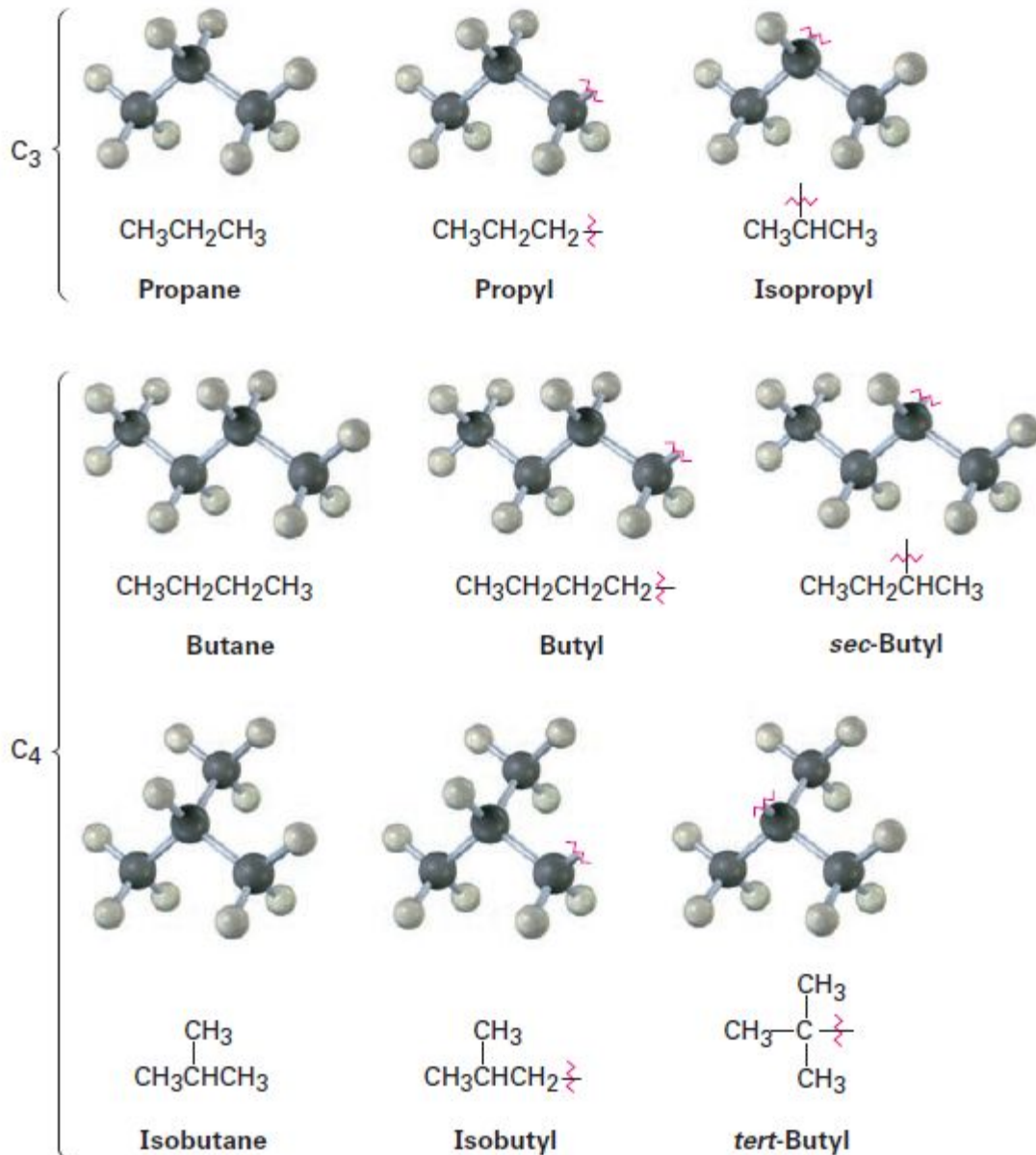
(a) Draw a Newman projection of the most stable conformation.

(b) Draw a Newman projection of the least stable conformation.

(c) If a CH₃ ↔ CH₃ eclipsing interaction costs 11 kJ/mol (2.5 kcal/mol) and a CH₃ ↔ CH₃ gauche interaction costs 3.8 kJ/mol (0.9 kcal/mol), make a quantitative plot of energy versus rotation about the C2–C3 bond.

Construct a qualitative potential-energy diagram for rotation about the C–C bond of 1,2-dibromoethane. Which conformation would you expect to be most stable? Label the anti and gauche conformations of 1,2-dibromoethane.

Алкильные группы



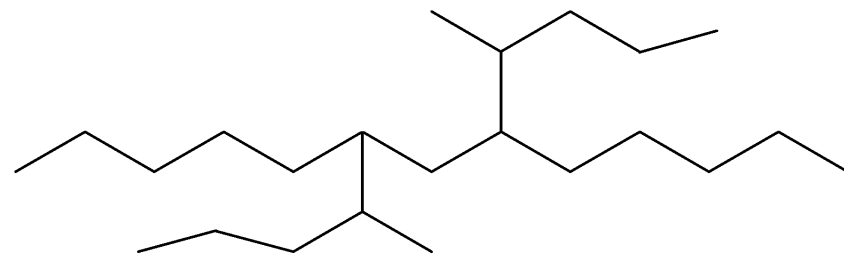
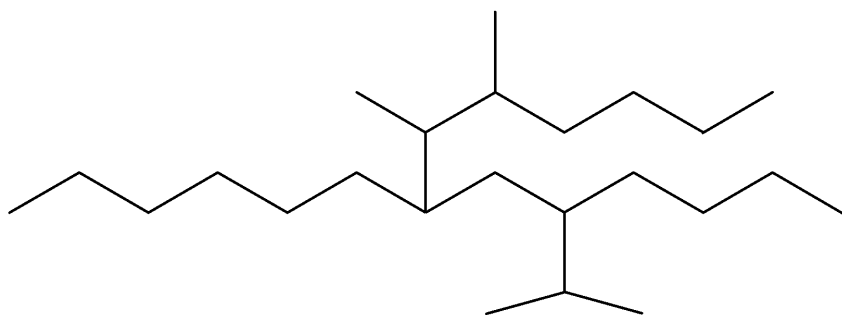
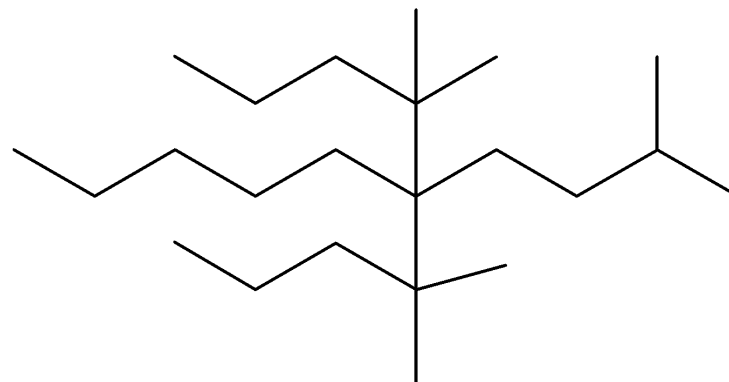
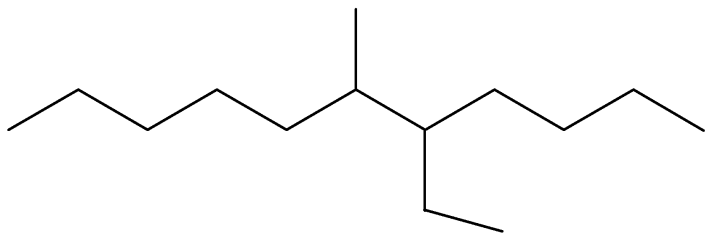
Locant — **Prefix** — **Parent** — **Suffix**

Where are the substituents and functional groups?

What are the substituents?

How many carbons?

What is the primary functional group?



Какой простейший алкан будет
содержать энантиомер?

