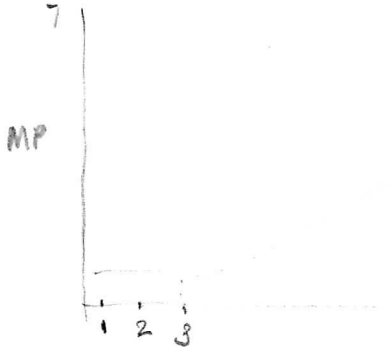
CHM 151:

PROPERTIES OF ALKANES

20160921

→



EFFICIENCY OF PACKING AFFECTS THE MP TREND.

MELTING: SOLID → LIQUID

METHANE ETHANE PROPANE

COMBUSTION

ALKANES ARE RELATIVELY UNREACTIVE, BUT THEY BURN.

CONFORMATIONAL ANALYSIS

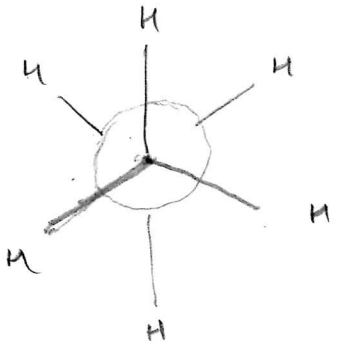
DEFINITION

CONFORMATIONS :: DIFFERENT ARRANGEMENTS OF ATOMS RESULTING FROM BOND ROTATION

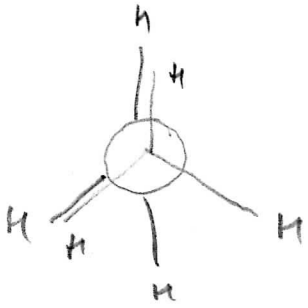
MOLECULES HAVING DIFFERENT CONFORMATIONS ARE REFERRED AS CONFORMERS OR CONFORMATIONAL ISOMERS

CYLINDRICAL SYMMETRY OF σ BONDS MEANS THAT ROTATION ABOUT C-C BOND IS POSSIBLE.

CONFORMATIONS OF ETHANE



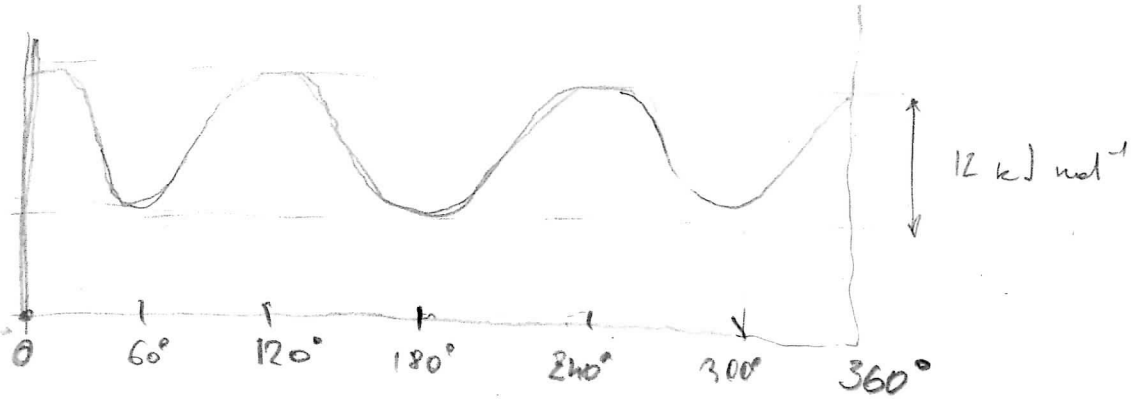
ETHANE — STAGGERED CONFORMATION



ETHANE — ECLIPSED CONFORMATION

10^9 Hz AT ROOM TEMPERATURE, (23°)

SINCE ECLIPSED CONFORMATION HAS 12 kJ/mol OF TORSIONAL STRAIN



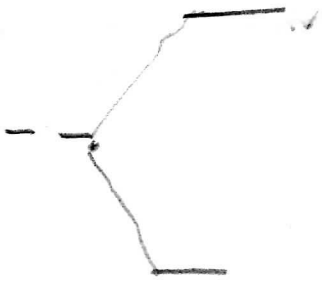
THE ORIGIN OF THE ROTATIONAL BARRIER

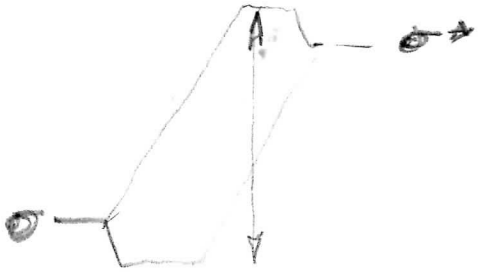
Robinistic, Goodman

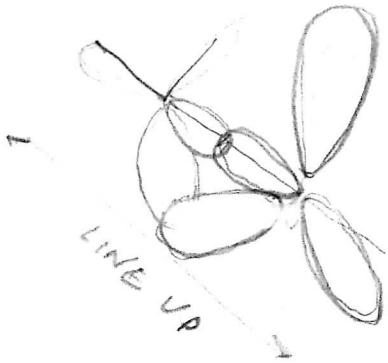
"HYPERCONJUGATION, NOT STERIC REPULSION, LEADS TO THE STAG. ST"

HYPERCONJUGATION

STABILIZATON BETWEEN FULL AND EMPTY (6^*) ORBITAL



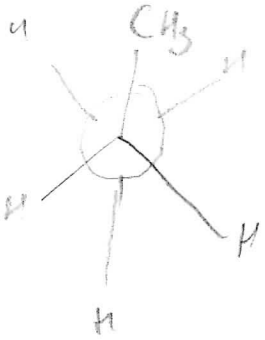




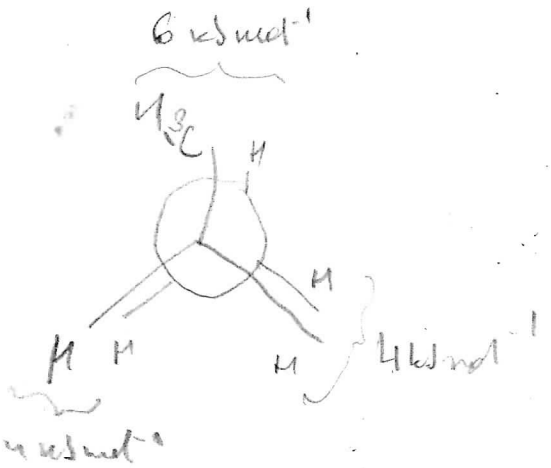
CONFORMATIONS OF PROPANE

WHY IS THE 'COST' OF A H/CH_3 ECLIPSING INTERACTION GREATER THAN THAT OF a H/H ECLIPSING INTERACTION

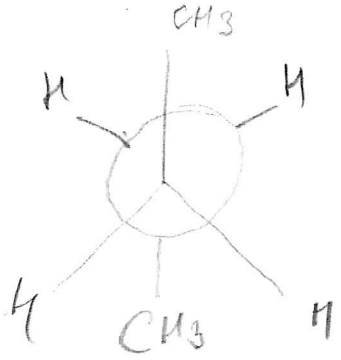
STERIC INTERACTION



ROTATE REAR CARBON 60°

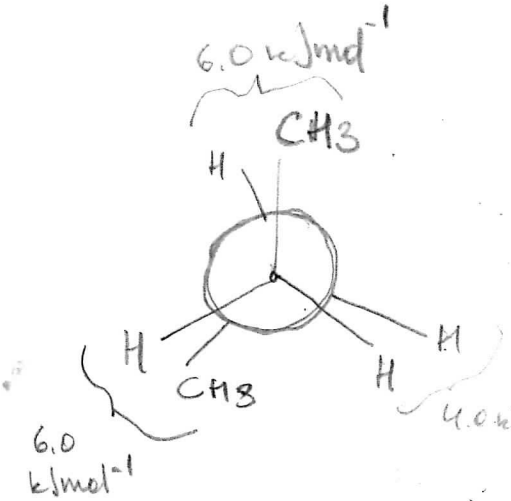


CONFORMATIONS OF BUTANE

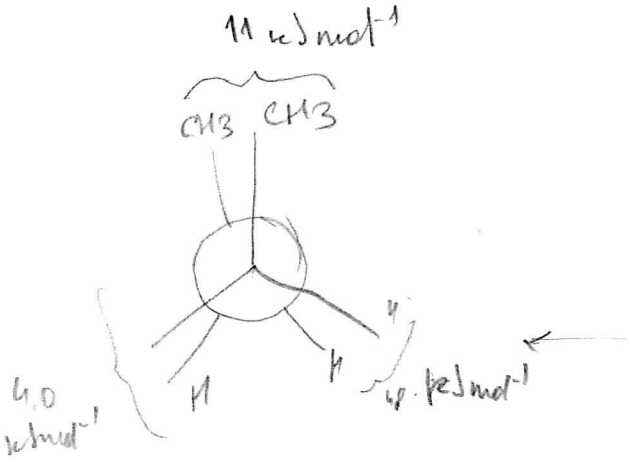


BUTANE – ANTICONFORMATION
0 kJ mol^{-1}

ROTATE 60°

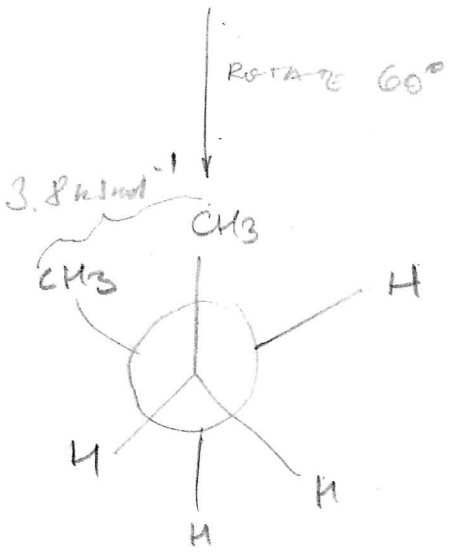


BUTANE – ECLIPSED CONFORMATION
16 kJmol^{-1}

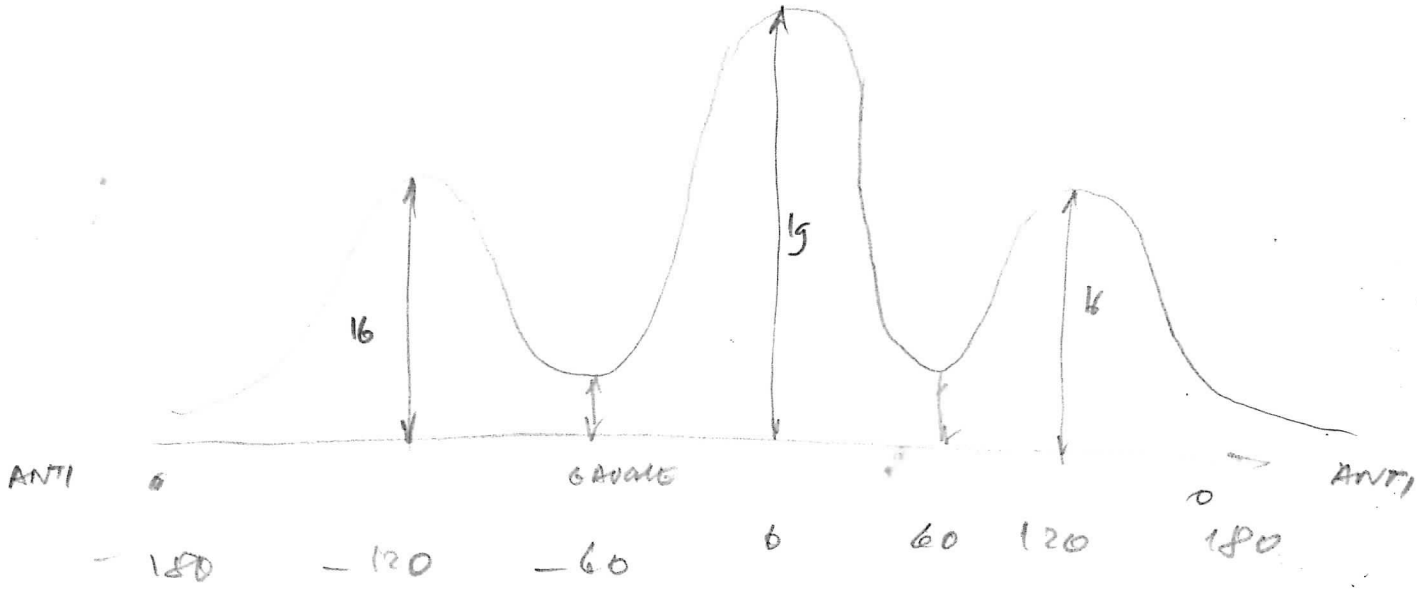


BUTANE – ECLIPSED CONFORMATION
19 kJmol^{-1}

ROTATE 60°



BUTANE – GAUCHE CONFORMATON



				kJ mol^{-1}
H – H	ECLIPSED	TORSIONAL	STRAIN	4.0
H – CH_3	ECLIPSED	MOSTLY TORSIONAL	STRAIN	6.0
CH_3-CH_3	ECLIPSED	TORSIONAL AND STERIC	STRAIN	11.0
CH_3-CH_3	GAUCHE	STERIC		3.8