

Conformations of n-butane : n-Butane is an alkane

containing four carbon atoms. Different conformations of n-butane can be obtained by rotation about the central C-C bond i.e. C₂-C₃. When one side of n-butane is rotated through 360° relative to other, three eclipsed and three staggered conformations are obtained as show in the fig. ①.

The partially staggered conformation (I) which is also known as gauche or skew form is rotated in clock wise direction through 60° keeping the front carbon fixed.

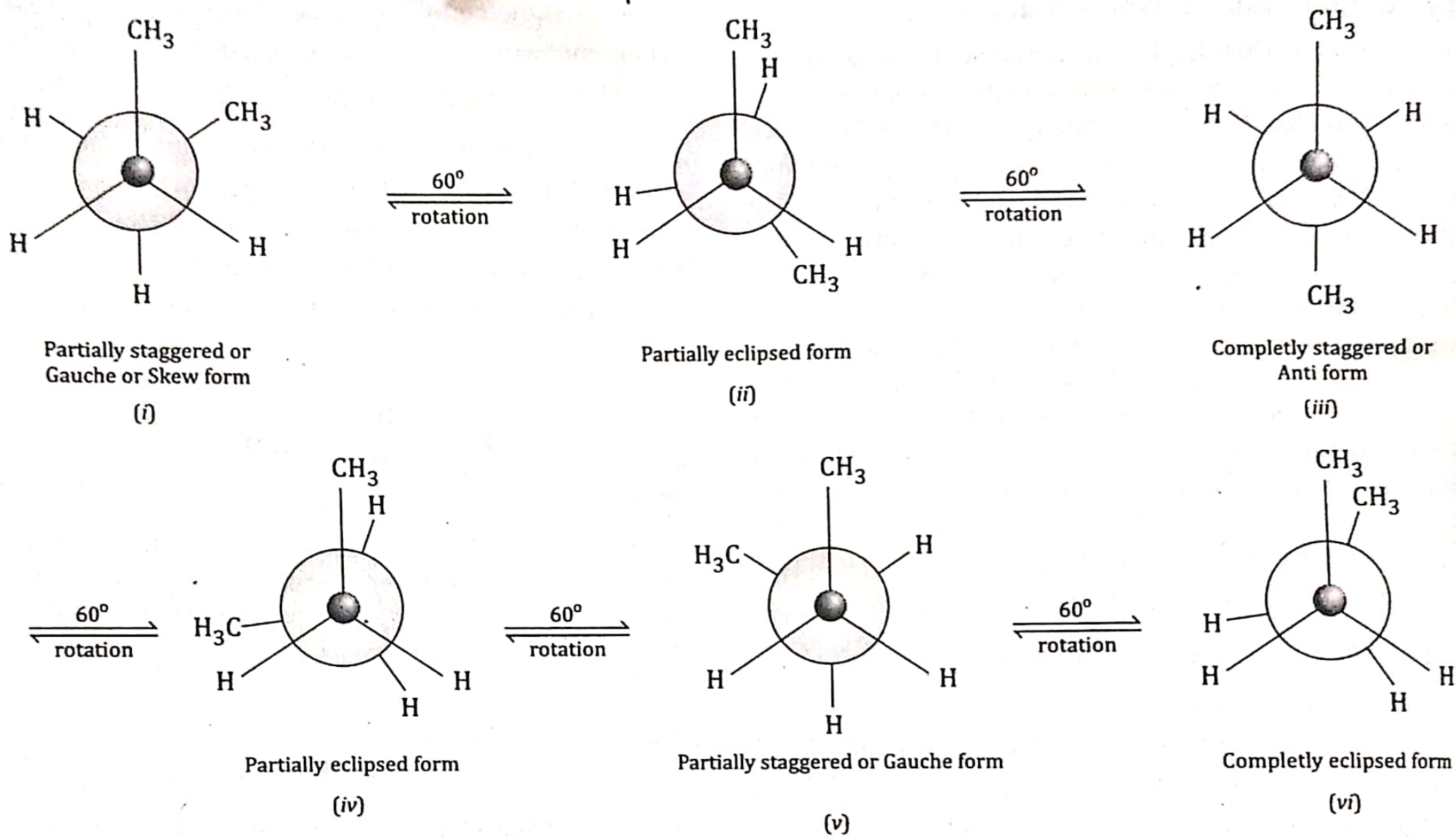
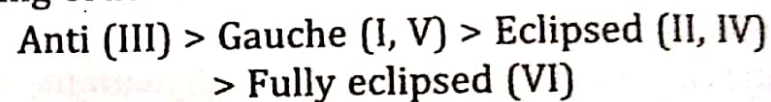


Fig. 1. Conformations of *n*-Butane.

Relative Stabilities of the Conformations of *n*-Butane :

Out of the six conformers of *n*-butane, the completely staggered or anti-conformer (III) is most stable and partially staggered or gauche conformer (I or V) is slightly less stable, the energy difference being only 0.9 K.cal/mole. On the other hand the completely eclipsed conformer (VI) is least stable and partially eclipsed conformer (II or IV) is slightly more stable, again the energy difference being 0.9 k.cal/mole. This

is due to steric strain between two methyl groups. Thus, the relative stabilities of the six conformers of *n*-butane in decreasing order is as follows :



At ordinary temperature, *n*-butane exists in anti form with some gauche form. The energy diagram of *n*-butane is shown in Fig. 2.

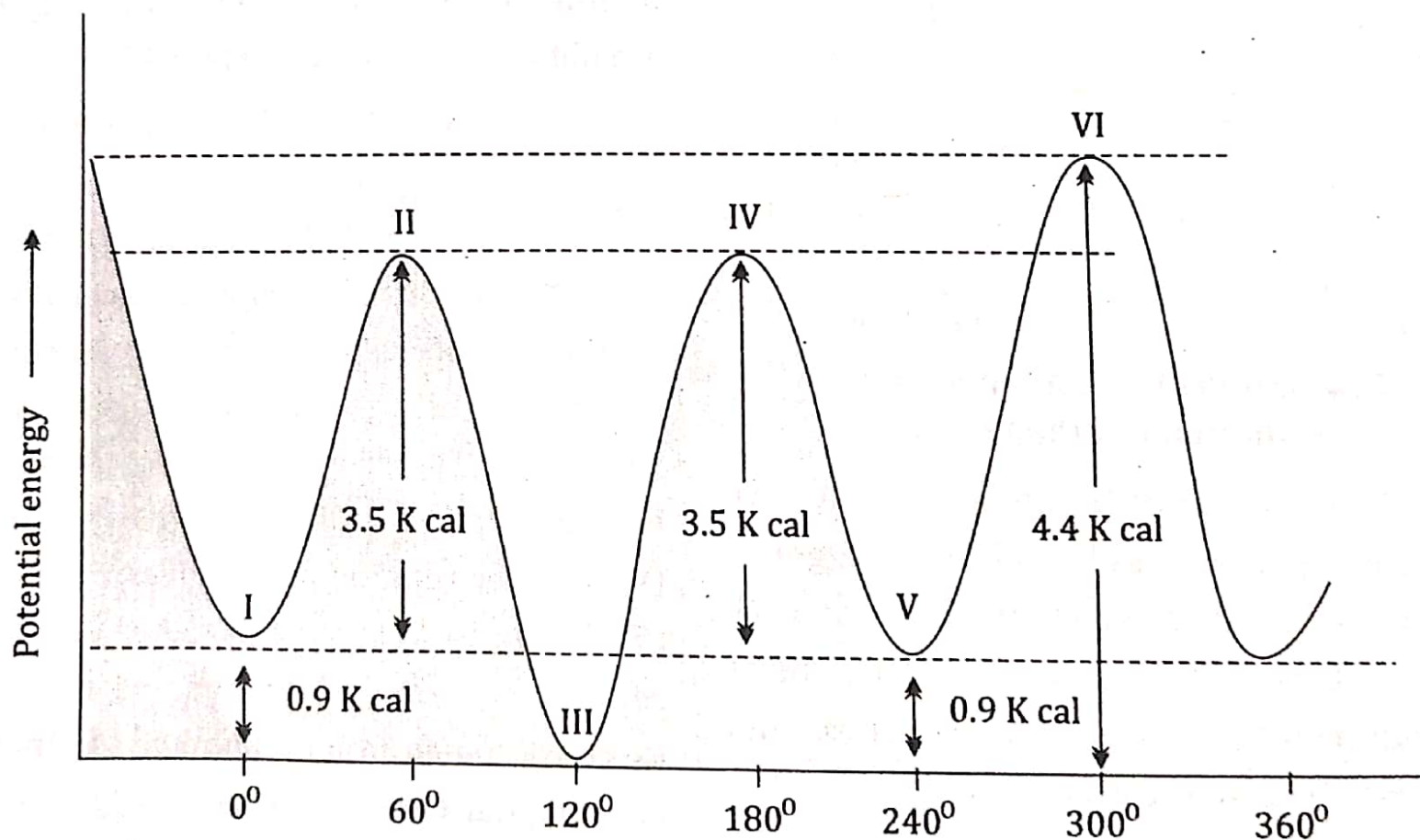


Fig. 2. Potential energy diagram for *n*-Butane.