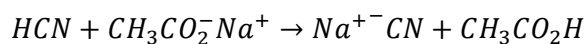


## 1.22

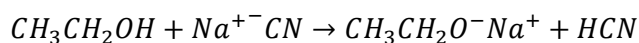
a)



$$pK_a: 9.31 \rightarrow 4.76$$

Not likely to take place

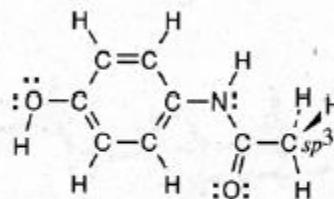
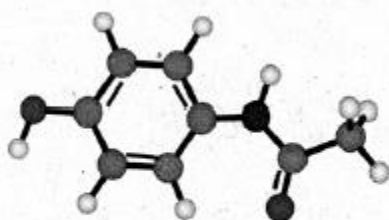
b)



$$pK_a: 16.00 \rightarrow 9.31$$

Not likely to take place

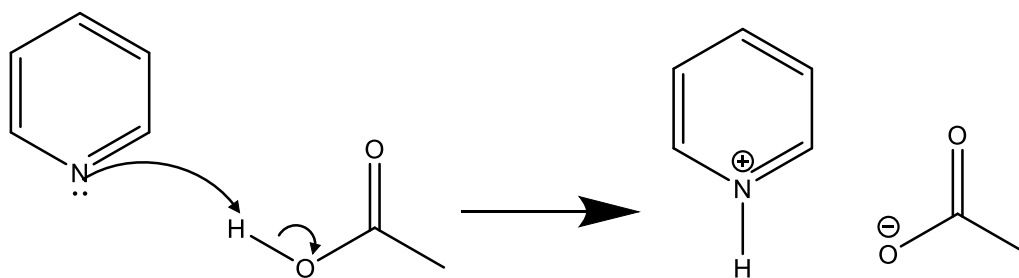
## 1.30



Acetaminophen

All carbons are  $sp^2$  hybridized, except for the carbon indicated as  $sp^3$ . The two oxygen atoms and the nitrogen atom have lone pair electrons, as shown.

## 1.63



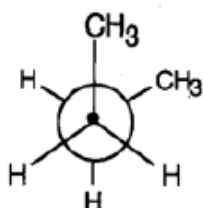
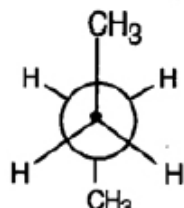
## 1.64

**1.64** In a compound containing a carbon-carbon triple bond, atoms bonded to the  $sp$ -hybridized carbons must lie in a straight line. It is not possible to form a five-membered ring if four carbons must have a linear relationship.

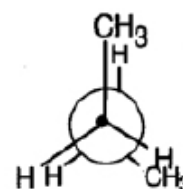
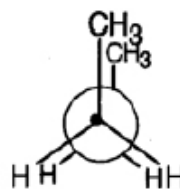
2.13

2.13

Staggered butane



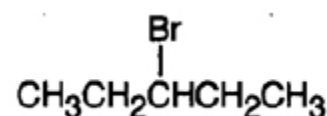
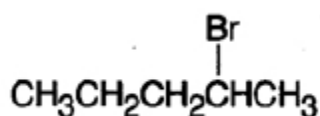
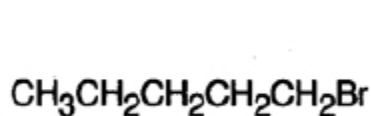
Eclipsed butane



2.14

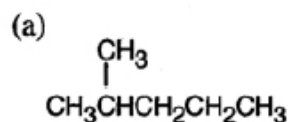
2.14 The first staggered conformation of butane (pictured above) is the most stable, because the relatively large methyl groups are as far apart as possible.

2.42

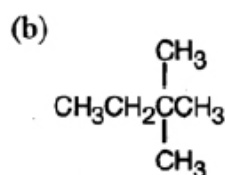


2.45

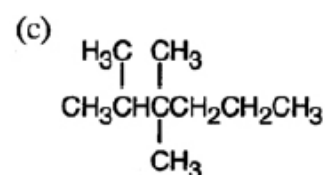
2.45



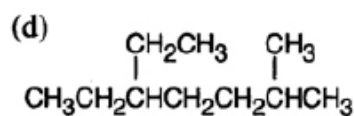
2-Methylpentane



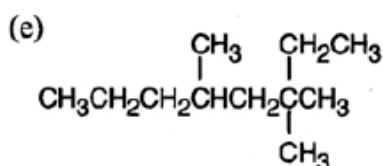
2,2-Dimethylbutane



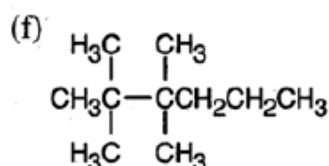
2,3,3-Trimethylhexane



5-Ethyl-2-methylheptane



3,3,5-Trimethyloctane

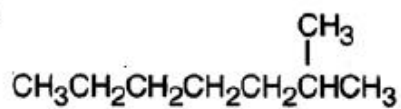


2,2,3,3-Tetramethylhexane

2.46

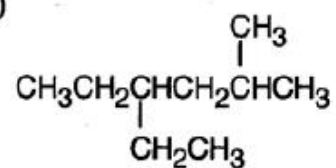
2.46

(a)



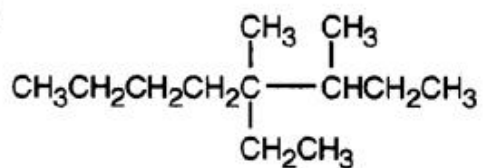
2-Methylheptane

(b)



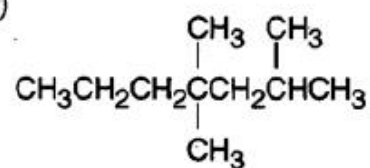
4-Ethyl-2-methylhexane

(c)



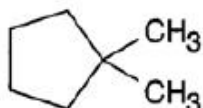
4-Ethyl-3,4-dimethyloctane

(d)



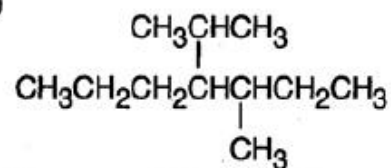
2,4,4-Trimethylheptane

(e)



1,1-Dimethylcyclopentane

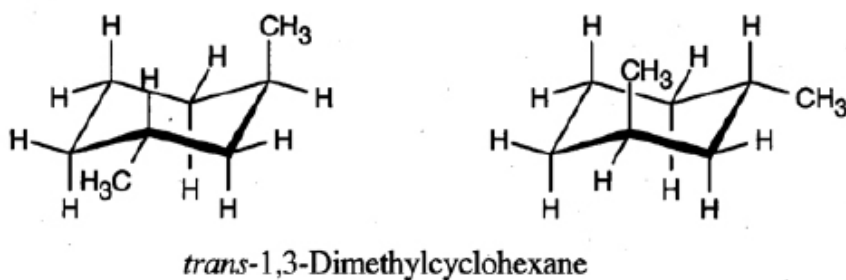
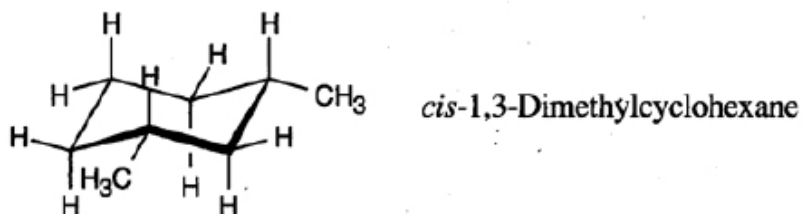
(f)



4-Isopropyl-3-methylheptane

2.56

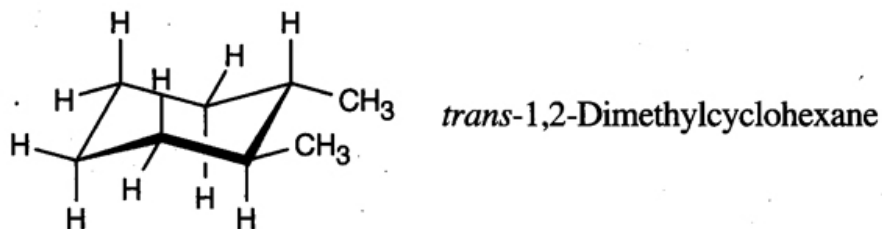
2.56



The lowest energy conformations of both 1,3-dimethylcyclohexanes are drawn. *cis*-1,3-Dimethylcyclohexane is the more stable isomer because both methyl groups are equatorial in the most stable conformation. For *trans*-1,3-dimethylcyclohexane, one methyl group must always be in the higher energy axial orientation. (A high energy diaxial conformation of *cis*-1,3-dimethylcyclohexane can also be drawn.)

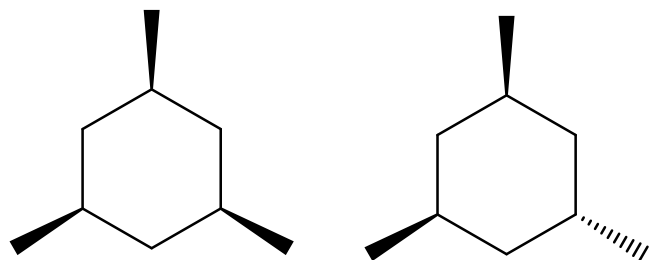
2.57

2.57



The methyl groups are equatorial in the more stable chair conformation of *trans*-1,2-dimethylcyclohexane.

2.69



2.73

