

Questions and Answers – Conformations

1. Conformations are different arrangements of atoms that can be converted into one another by rotation about _____

- a) Covalent bond
- b) Double bond
- c) Single bond
- d) Triple bond

Answer: c

Explanation: Conformational isomerism is a form of stereoisomerism in which the isomers can be interconverted exclusively by rotations about formally single bonds. Such isomers are generally referred to as conformational isomers or conformers and, specifically, as rotamers.

2. The energy required to rotate n-butane molecule about the carbon-carbon bond is called _____

- a) Rotational energy
- b) Torsional energy
- c) Enantiomeric energy
- d) Potential energy

Answer: b

Explanation: The energy required to rotate n-butane molecule about the carbon-carbon bond is called torsional energy. Torsion energy can be used to solve problems of general relativity especially the singularity problem.

3. The rotation about the ($C_2 - C_3$) carbon-carbon bond of n-butane requires the energy of about _____

- a) 100 kJ/mol
- b) 50 kJ/mol
- c) 10 kJ/mol
- d) 3 kJ/mol

Answer: d

Explanation: The rotation about the ($C_2 - C_3$) carbon-carbon bond of n-butane requires the very less energy of about 3kJ/mol. It requires very less amount of energy.

4. The infinity of intermediate conformations are called _____

- a) Skew conformations
- b) Staggered conformations
- c) Eclipsed conformations
- d) Gauche

Answer: a

Explanation: The infinity of intermediate conformations are called skew conformations. Three conformations of cyclohexane, designated as chair, boat, and skew (or twist), are essentially free of angle strain.

5. The potential energy of n-butane is minimum for _____

- a) Skew conformations
- b) Staggered conformations
- c) Eclipsed conformations
- d) Gauche

Answer: b

Explanation: The potential energy of n-butane is minimum for staggered conformations. It is because of no steric hindrance.

6. The potential energy of n-butane is maximum for _____

- a) Skew conformations
- b) Staggered conformations
- c) Eclipsed conformations
- d) Gauche

Answer: c

Explanation: The potential energy of n-butane is maximum for eclipsed conformations. It is because of overlapping of functional groups.

7. The relative instability of any of the intermediate skew conformations is due to _____

- a) Lateral strain
- b) Shear strain
- c) Longitudinal strain
- d) Torsional strain

Answer: d

Explanation: The relative instability of any of the intermediate skew conformations is due to torsional strain. Torsion energy can be used to solve problems of general relativity especially the singularity problem.

8. In gauche conformations, the methyl groups are _____

- a) 60° apart
- b) 90° apart
- c) 180° apart
- d) 360° apart

Answer: a

Explanation: In gauche conformations, the methyl groups are 60° apart. In general a gauche rotamer is less stable than an anti-rotamer.

9. Both anti and gauche conformations are free of torsional strain.

- a) True
- b) False

Answer: a

Explanation: Both anti and gauche conformations are free of torsional strain. In general, a gauche rotamer is less stable than an anti-rotamer.

10. Gauche conformation is less stable due to _____

- a) Hydrogen bonding
- b) Covalent bonding
- c) Vander Waal's repulsion
- d) Torsional strain

Answer: c

Explanation: Gauche conformation is less stable due to Vander Waal's repulsion. Vander Waal's are weak forces of attraction which results in lesser stability of gauche conformer.

11. Which of the following is least stable?

- a) Anti conformation
- b) Gauche conformation
- c) Staggered conformation

Answer: d

Explanation: Eclipsed conformation is the least stable due to its high torsional energy. The potential energy of n-butane is maximum for eclipsed conformations.

12. Potential energy remains same during the rotation about the carbon-carbon of n-butane.

- a) True
- b) False

Answer: b

Explanation: Potential energy changes during the rotation about the carbon-carbon of n-butane. The potential energy of n-butane is maximum for eclipsed conformations and minimum for staggered conformations.