

Organic Chemistry- Some Basic Principles and Techniques

Assertion Reason Questions

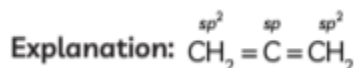
a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choice.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

1. Assertion (A): In $\text{H}_2\text{C}=\text{C}=\text{CH}_2$, all of the carbon atoms are sp^2 hybridised.

Reason (R): All of the carbon atoms in this molecule are linked together by double bonds.

Ans. (d) (A) is false but (R) is true.



All are bonded by double bonds.

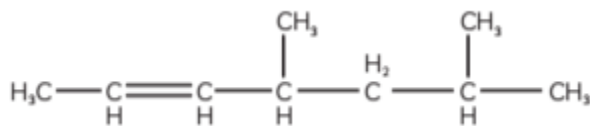
2. Assertion (A): Butane and 2-methyl butane are homologous.

Reason (R): Butane is a straight-chain alkane while 2-methyl butane is a branched-chain alkane.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

Explanation: Butane and 2-methylbutane are homologous as they differ by a $-\text{CH}_2$ group.

3. Assertion (A): 2, 3-Dimethylhept-5-ene is



preference over the alkyl

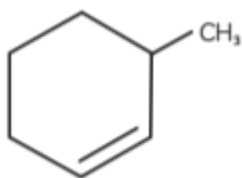
Reason (R): The double-bond gets group.

Ans. (d) (A) is false but (R) is true.

Explanation: The correct IUPAC name for the compound is 4,6-Dimethyl hept-2-ene.



4. Assertion (A): The IUPAC name for the compound cyclohexene. is 3-Methyl



Reason (R): In cycloalkenes, double- bond carbon atoms take precedence over the alkyl group in numbering.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: When naming cycloalkenes, number the ring to indicate the location of the double-bonded carbons and choose the numbering direction such that the substituents get the lowest number. It is not defined because the location of the double bond is known to lie between C-1 and C-2.

5. Assertion (A): Energy of resonance hybrid is equal to the average of energies of all canonical forms.

Reason (R): Resonance hybrid cannot be presented by a single structure.

Ans. (d) (A) is true but (R) is false.

Explanation: Resonance hybrid is more stable than the canonical structures. Canonical structures that are lower in energy make a greater contribution to resonance hybrid. Thus, the energy of the resonance hybrid is equal to the sum of energies of all canonical forms. So, here assertion is correct but the reason is not correct.

6. Assertion (A): Tertiary carbocations are generally formed more easily than primary carbocations.

Reason (R): Hyperconjugation as well as an inductive effect due to additional alkyl groups stabilise tertiary carbocations.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: An alkyl group attached to the positively charged carbon of carbocation increases its stability by inductive effect (+I) as it release electrons toward that carbon. Thus, the positive charge get dispersed. More the numbers of alkyl groups, greater is the dispersal of positive charge and therefore more easily it will formed.



7. Assertion (A): Alkyl carbanions like ammonia have a pyramidal shape.

Reason (R): The carbon atom carrying negative charge has an octet of electrons.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

Explanation: As both ammonia and alkyl carbanion have lone pairs of electrons on the central atom (3 bond pairs + 1 lone pair), thus they both have a pyramidal shape.

8. Assertion (A): Inductive effect is responsible for the dipole moment in the molecules.

Reason (R): All inductive effects are permanent polarisations in the ground state.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: In the inductive effect, the bonded electrons are displaced towards the more electronegative atom. So, we can say that if the inductive effect increases, the polarity of the bond increases and hence the dipole moment increases. Also due to the displacement of electrons towards the more EN atom, a permanent state of bond polarisation occurs where the more EN atom has a negative charge and the less EN atom has a positive charge. So, both the assertion and reason are correct and the reason is the correct explanation of assertion.

9. Assertion (A): Quantitative analysis is used to estimate the percentage mass of the compound present.

Reason (R): Lassaigne's test is one of the qualitative tests for nitrogen, sulphur and halogen in the compounds.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

Explanation: The Lassaigne's test is for the qualitative study it doesn't give an explanation for the quantitative analysis. The quantitative analysis methods are Kjeldahl's, Carius and Dumas which are not mentioned here.

10. Assertion (A): An organic compound that contains halogen can be quantitatively estimated by the carius method.

Reason (R): Halogens are precipitated as a yellow solid.

Ans. (c) (A) is true but (R) is false.

Explanation: In the carius method, the halogen is treated with fuming nitric acid and silver nitrate, the halogen gets precipitated as a silver halide.

