Alcohols, Phenols and Ethers

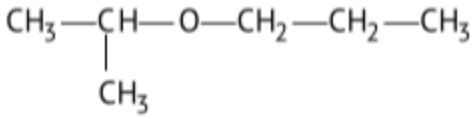
Assertion & Reason Type Questions

consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:
a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
c. Assertion (A) is true but Reason (R) is false.
d. Assertion (A) is false but Reason (R) is true.

Q 1. Assertion (A): Addition reaction of water to but-1-ene in acidic medium yields butan-2-ol.
Reason (R): Addition of water in acidic medium proceeds through the formation of primary carbocation.

Answer : (c) Assertion (A) is true but Reason (R) is false. Addition of water to but-1-ene in acidic medium yields butan-2-ol. Hence, the assertion is true but reason is false because the addition of water proceeds through formation of secondary carbocation.

Q 2. Assertion (A): IUPAC name of the compound



is 2-Ethoxy-2-methylethane.

Reason: In IUPAC nomenclature, ether is regarded as hydrocarbon derivative in which a hydrogen atom replaced by-OR or-OAr group [where R = alkyl group and Ar= aryl group].

Answer : (d) Assertion (A) is false but Reason (R) is true.

Q 3. Assertion (A): Alcohols react both as nucleophiles and electrophiles.
Reason (R): The bond between C-O is broken when alcohols react as nucleophiles.

Answer : (c) Alcohols react both as nucleophiles and When alcohols react reason is false. electrophiles. as nucleophiles, the bond between O-H is broken. Hence, assertion is true but.

Q 4. Assertion (A): p-nitrophenol is more acidic than phenol.
Reason (R): Nitro group helps in the stabilisation of the phenoxide ion by dispersal of negative charge due to resonance.

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q 5. Assertion (A): Bond angle in ethers is slightly less than the tetrahedral angle.
Reason (R): There is a repulsion between the two bulky (R) groups.

Answer : (d) Assertion (A) is false but Reason (R) is true. The bond angle in ethers is slightly greater than the tetrahedral angle. So, assertion is false but reason is true that is there is a repulsion between the two bulky (R) groups.

Q 6. Assertion (A): Boiling points of alcohols are higher in comparison to ethers of comparable molecular masses.
Reason (R): They can form intermolecular hydrogen bonding.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

Q 7. Assertion (A): Alcohols have higher boiling points than ethers of comparable molecular masses.
Reason (R): Alcohols and ethers are isomeric in nature.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

Q 8. Assertion (A): An ether is more volatile than an alcohol of comparable molecular mass.
Reason (R): Ethers are polar in nature.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A). Assertion (A) and Reason (R) are two different statements about ethers. The correct reason is that hydrogen bonding does not exist amongst ether molecules.

Q 9. Assertion (A): $(CH_3)_3$ COH when heated with conc. H_2SO_4 gives isobutylene as the main product and not di-tertiary butyl ether.
Reason (R): All alcohols readily dehydrates with conc. H_2SO_4

Answer : (c) Reason is false because higher is the stability of carbocation, more easily it can be dehydrated. Thus, dehydration of alcohols follows the order: 3° alcohol > 2° alcohol > 1° alcohol

Q10. Assertion: The bond angle in alcohols is slightly less than the tetrahedral angle.
Reason: In alcohols, the oxygen of –OH group is attached to sp3 hybridized carbon atom.

Q11. Assertion: In Lucas test, 3º alcohols react immediately.
Reason: An equimolar mixture of anhyd. $ZnCl_2$ and conc. HCl is called Lucas reagent.

Q12. Assertion: Phenol is more reactive than benzene towards electrophilic substitution reaction.
Reason: In the case of phenol, the intermediate carbocation is more resonance stabilized.

Q13. Assertion: In case of phenol, bromination takes place even in absence of Lewis acid whereas bromination of benzene takes place in presence of Lewis acid like $FeBr_3$.
Reason: – OH group attached to benzene ring is highly deactivating.

Q14. Assertion: ter – Butyl methyl ether is not prepared by the reaction of ter-butyl bromide with sodium methoxide.
Reason: Sodium methoxide is a strong nucleophile.

Q15. Assertion: Ethers behave as bases in the presence of mineral acids.
Reason: Due to the presence of lone pairs of electrons on oxygen.

Q16. Assertion: With HI, anisole gives iodobenzene and methyl alcohol.
Reason: Iodide ion combines with smaller group to avoid steric hindrance.

Q17. Assertion: With HI at 373 K, ter-butyl methyl ether gives ter-butyl iodide and methanol.
Reason: The reaction occurs by SN^2 mechanism.

Q18. Assertion: Ethyl phenyl ether on reaction with HBr form phenol and ethyl bromide.
Reason: Cleavage of C–O bond takes place on ethyloxygen bond due to the more stable phenyl-oxygen bond.

ANSWER KEY 10 to 18

Q10 : (a) **Q11 :** (b) **Q12 :** (c) **Q13 :** (a)

Q14 : (c) **Q15 :** (b) **Q16 :** (d) **Q17 :** (d)

Q18 : (c)