

# Hydrocarbons

1. **Assertion (A):** Kjeldahl method is not applicable to compounds containing nitrogen in nitro and azo groups and nitrogen present in the ring

**Reason (R):** Nitrogen of these compounds does not change to ammonium sulphate under these conditions.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

2. **Assertion (A):** Nitrogen, Sulphur, halogens and phosphorus present in an organic compound are detected by "Lassaigne's test"

**Reason (R):** The elements present in the compound are converted from covalent form into the ionic form by fusing the compound with sodium metal.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

3. **Assertion (A):** Rate of reaction of alkanes with halogens is  $F_2 > Cl_2 > Br_2 > I_2$ .

**Reason (R):** Rate of Fluorination is too violent to be controlled & iodination is very slow and a reversible reaction

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

4. **Assertion (A):** Arrangements of atoms which can be converted into one another by rotation around a C-C single bond are called conformation or conformers or rotamers

**Reason (R):** Rotation around a C-C single bond is hindered by a small energy barrier of  $1-20 \text{ kJ mol}^{-1}$

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

5. **Assertion (A):** Nitration of benzene with nitric acid requires the use of concentrated sulphuric acid.

**Reason (R):** The mixture of concentrated sulphuric acid and concentrated nitric acid produces the electrophile,  $\text{NO}_2^+$ .

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

6. **Assertion (A):** Heterolytic fission involves the breaking of covalent bond in such a way that both the electrons of the shared pair are carried away by one the atoms

**Reason (R):** Heterolytic fission occurs readily in polar covalent bonds.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false



7. **Assertion (A):** Boiling point of alkanes increases with increase in molecular weight.

**Reason (R):** Van der Waal's forces increase with increase in molecular weight

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

8. **Assertion (A):** Sodium acetate on Kolbe's electrolysis gives methane

**Reason (R):** Methyl free radical is formed at anode

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

9. **Assertion (A):** Wurtz reaction is not a good method to prepare propane.

**Reason (R):** Wurtz reaction leads to the formation of symmetrical alkane having an even number of carbon atoms.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

10. **Assertion (A):** Chlorination of methane can take place in sunlight

**Reason (R):** Methyl chloride formed as major product if  $\text{Cl}_2$  present in excess.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

11. **Assertion (A):** Iodination of alkane is reversible

**Reason (R):** Iodination of alkane is carried out in presence of iodic acid.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

12. **Assertion (A):** Ethene is more reactive than ethyne towards electrophilic addition reaction.

**Reason (R):** Intermediate formed by ethene is more stable than ethyne in Electrophilic addition reaction

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

13. **Assertion (A):** Hydroxylation of cis-alkene of the type  $\text{RCH}=\text{CHR}$  by alkaline  $\text{KMnO}_4$  solution (cold and dilute) yields meso product  $\text{RCH(OH)}-\text{CH(OH)R}$ .

**Reason (R):** Hydroxylation by cold and dilute and alkaline solution of  $\text{KMnO}_4$  is an anti-addition.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false



14. **Assertion (A):** Rate of electrophilic aromatic nitration of  $C_6H_6$ ,  $C_6D_6$  and  $C_6T_6$  follows the order  $C_6H_6 > C_6D_6 > C_6T_6$

**Reason (R):** The cleavage of C-H, C-D and C-T is involved in rate limiting step.

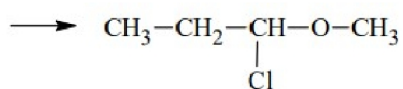
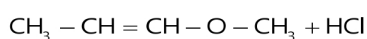
- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

15. **Assertion (A):** Hydration of alkene using  $Hg(OAc)_2 / H_2O$  followed by  $NaBH_4$  is regioselective.

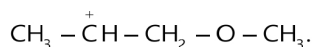
**REASON (R):** It involves carbocation formation.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

16. **Assertion (A):**



**Reason (R):**  $CH_3 - CH_2 - \overset{+}{C}H - O - CH_3$  is more stable than



- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
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- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

17. **Assertion (A):** Chlorination in alkane is less reactive more selective.

**Reason (R):** Bromination in alkane is more reactive less selective.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

18. **Assertion (A):** Bromination of cis-2-butene gives racemic mixture.

**Reason (R):** Bromination to alkene is anti-addition.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

19. **Assertion (A):** Alkenes are more reactive than alkynes towards bromination.

**Reason (R):** Cyclic bromonium ion formed by alkene is more stable than that formed by alkyne.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false



### ANSWER KEY

| Que. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|
| Ans. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 3  | 2  | 1  | 3  | 4  | 3  | 1  | 4  | 1  | 1  |