Aldehyde Ketone and Carboxylic Acid

1. **Assertion (A):** Benzaldehyde is less reactive than ethanal towards nucleophilic attack.

   Reason (R): All the carbon atoms of benzaldehyde are sp^2 hybridized.

   (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):** Crossed-Cannizzaro reaction between formaldehyde and benzaldehyde gives benzyl alcohol and formate ion.

   Reason (R): Formaldehyde is a better hydride donor than benzaldehyde.

   (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):** Ketones cannot be prepared by the reaction of RCOCl with Grignard reagent R'MgCl.

   Reason (R): The Grignard reagent reacts with ketone to form alcohol

   (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):** Carbonyl compounds are more soluble in water than the isomeric alkanes.

   Reason (R): The carbonyl oxygen forms extensive hydrogen bonding with water.

   (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):** Pentan-2-one can be distinguished from pentan-3-one by iodoform test.

   Reason (R): Former is a methyl ketone while the latter is not.

   (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):** Aromatic aldehydes as well as formaldehyde undergo Cannizzaro's reaction with strong alkali.

   Reason (R): Aldehydes which have α-hydrogen atoms undergo Cannizzaro's 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

7. **Assertion (A):** Protonation of a carbonyl group increases its electrophilic nature.

Reason (R): The protonation of nucleophilic oxygen is an 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

8. **Assertion (A):** Formic acid reduces Tollen's reagent

Reason (R): Compounds containing CHO group reduce Tollen's reagent.

(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):** Aldehydes and have much higher boiling points than corresponding alkanes

Reason (R): Aldehyde and ketone are much more polar than alkanes

(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):** The correct acidity order among formic acid (I), acetic acid (II) and benzoic acid (III) is I > III > II.

Reason (R): Formic acid is the only acid which gives positive tollen's test.

(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):** A ketone may also reduce Fehling's solution and Tollen's reagent if there is an –OH group at $\alpha-$ position w.r.t. each.

Reason (R): Fructose reduces Fehling's solution and Tollen's reagent.

(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):** Acetic acid does not undergo haloform reaction.

Reason (R): Acetic acid has no alpha hydrogen.

(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):** Acetophenone and benzophenone can be distinguished by iodoform test.

Reason (R): Acetophenone and benzophenone both are carbonyl compounds.

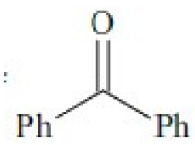
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

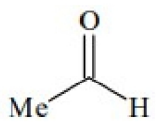
(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

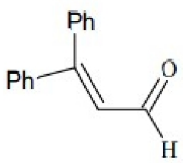
14. **Assertion (A):** A mixture of



and



on treatment with dil. NaOH gives



Reason (R): The ketone is very hindered and very conjugated and so less reactive than aldehyde.

(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):** The addition of amines in aldehyde and ketone is carried out in weakly acidic medium.

Reason (R): In strong acidic medium amines will be protonated hence the nucleophilic character of amine decrease.

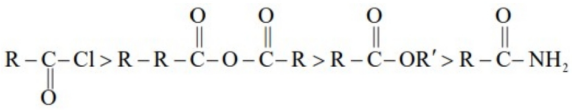
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(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):** The order of reactivity towards nucleophilic substitution of carboxylic acid derivatives is



Reason (R): The order of reactivity is related to the leaving aptitude of the leaving group.

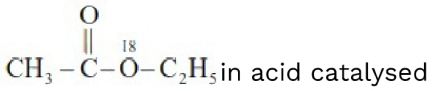
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(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

17. **Assertion (A):** Hydrolysis



in acid catalysed medium gives $CH_3COOOH + C_2H_5\overset{18}{O}H$

Reason (R): Esters on hydrolysis gives alcohol and carboxylic 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

18. **Assertion (A):** Grignard reagent reacts with aldehydes and ketones to form alcohol.

Reason (R): Alcohols have acidic hydrogen.

(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):** Carbonyl compound take part is nucleophilic addition reactions.

Reason (R): These reactions are initiated By nucleophilic attack at the electron deficient carbon atom.

(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

20. **Assertion (A):** The addition of ammonia derivatives on carbonyl compounds is carried in weakly acidic medium.

Reason (R): In weakly acidic medium attacking nucleophile is also protonated.

(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

21. **Assertion (A):** Formic acid reduces mercuric chloride solution.

Reason (R): Formic acid has reducing aldehydic group.

(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

22. **Assertion (A):** Acetaldehyde undergoes aldol condensation with dilute NaOH.

Reason (R): Aldehyde which do not contain α-hydrogen undergoes aldol condensation.

(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

23. **Assertion (A):** Crossed Cannizzaro reaction between formaldehyde and benzaldehyde give benzyl alcohol and formate ion.

Reason (R): Formaldehyde is a better hydride donar than benzaldehyde.

(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

24. **Assertion (A):** Acetic acid does not give haloform reaction.

Reason (R): Acetic acid has no α-hydrogen.

(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

25. **Assertion (A):** Carboxylic acid $R-\overset{\overset{O}{\|}}{C}-OH$ have a carbonyl group but it does not give the test of carbonyl group.

Reason (R): Due to resonance the double bond character of group is greatly reduced.

(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

26. **Assertion (A):** Acetic acid does not give haloform reaction.

Reason (R): Acetic acid has no α-hydrogen

(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

27. **Assertion (A):** Ethanamide undergoes dehydration by heating with P_2O_5.

Reason (R): Ethanamide undergoes dehydration to give nitro compound.

(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

28. **Assertion (A):** 1^0 amide react with Br_2 in presence of NaOH to form 1^0 amine having one carbon atom less than amide.

Reason (R): It is degradative reduction involving acylnitrene intermediate.

(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

29. **Assertion (A):** Ester which contain α-hydrogen undergoes Claisen condensation.

Reason (R): $LiAlH_4$ reduction of ester gives 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

30. **Assertion (A):** Aceto acetic ester will $CH_3-C-CH_2-\overset{O}{\overset{\|}{C}}-OC_2H_5$ give iodoform test.

Reason (R): It contains methyl keto group.

(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

31. **Assertion (A):** p-nitrobenzaldehyde is more reactive than benzaldehyde.

Reason (R): Benzaldehyde is less reactive than acetone.

(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

32. **Assertion (A):** Both acetone and benzaldehyde are less reactive to nucleophilic attack as compared to acetaldehyde.

Reason (R): Both acetone and benzaldehyde are resonance stabilized.

(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

33. **Assertion (A):** Aldehydes can be easily prepared by the reduction of carboxylic acids with $LiAlH_4$.

Reason (R): In going from $-COOH$ to $-CHO$ group oxidation number of C decreases.

(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

34. **Assertion (A):** Picric acid does not contain $-COOH$ group.

Reason (R): Picric acid is 2, 4, 6-trinitrophenol.

(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

35. **Assertion (A):** Distillation of calcium carboxylate and sulphuryl chloride can produce acid anhydrides.

Reason (R): Distillation of calcium carboxylate produces ketones.

(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

36. **Assertion (A):** Benzamide and methyl benzoate are derivatives of benzoic acid.

Reason (R): Benzamide is less easily hydrolysed as compared to methyl benzoate.

(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

37. **Assertion (A):** Benzoic acid does not undergo Friedel-Craft's reaction.

Reason (R):-COOH group deactivates the benzene ring by its electron withdrawing nature.

(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

38. **Assertion (A):** p-Fluorobenzoic acid is weaker acid as compared to p-chlorobenzoic acid.

Reason (R): Fluoroacetic acid is strongest acid as compared to chloroacetic 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

39. **Assertion (A):** m-Nitrobenzoic acid is less acidic as compared to p-nitrobenzoic acid.

Reason (R): It is due to $+M$ effect of $-NO_2$ group.

(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

40. **Assertion (A):** With $Br_2 - H_2O$, phenol gives 2, 4, 6tribromophenol but with $Br_2 - CS_2$ it gives 4-bromophenol is the major product.

Reason (R): In water ionization of phenol is enhanced but in CS_2, it is greatly suppressed.

(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

41. **Assertion (A):** m-Chlorobenzoic acid is a stronger acid than p-chlorobenzoic acid.

Reason (R): In p-chlorobenzoic acid both -I-effect and +R-effect of Cl operate but in m-chlorobenzoic acid only -I-effect of Cl operates.

(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

42. **Assertion (A):** Although fluorine is more electronegative than chlorine, yet p-fluorobenzoic acid is a weaker acid than p-chlorobenzoic acid.

Reason (R): Due to matching size of 2p-orbitals of F and C, F has a stronger +R -effect than Cl.

(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

44. **Assertion (A):** Nitration of benzoic acid gives m nitrobenzoic acid.

Reason (R): carboxylic group is meta-directing group.

(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**	**20**
Ans.	2	1	1	1	1	3	2	2	1	2	2	3	2	1	1	1	2	2	1	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	1	3	1	3	1	3	1	1	3	3	3	3	3	1	3	2	1	2	3	1
Que.	**41**	**42**	**43**	**44**																
Ans.	2	2	1	1																