DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 52

SYLLABUS : Aldehydes and Ketones - II : Properties of Aldehydes and Ketones

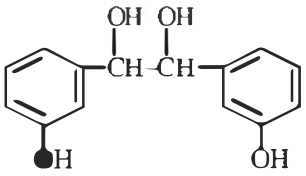
Max. Marks : 120 **Time : 60 min.**

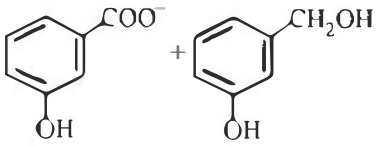
GENERAL INSTRUCTIONS

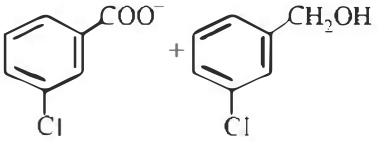
- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

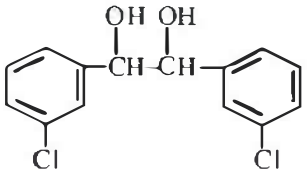
DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 When *m*-chlorobenzaldehyde is treated with 50% KOH solution, the product(s) obtained is (are)

(a) 

(b) 

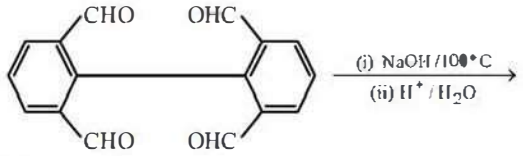
(c) 

(d) 

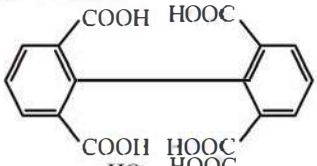
RESPONSE GRID	1. ⓐⓑⓒⓓ

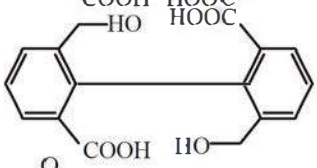
Space for Rough Work

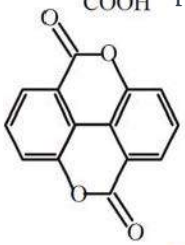
Q.2

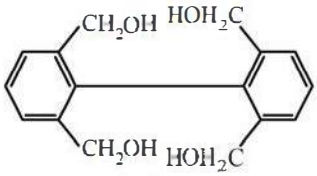


Major Product is

(a) 

(b) 

(c) 

(d) 

Q.3 Aromatic aldehydes undergo disproportionation in presence of sodium or potassium hydroxide to give corresponding alcohol and acid. The reaction is known as
(a) Wurtz's reaction (b) Cannizzaro reaction
(c) Friedel-Craft's reaction (d) Claisen reaction

Q.4 Aldehydes can be oxidised by which of the following ?
(a) Tollen's reagent (b) Fehling solution
(c) Benedict solution (d) All of these

Q.5 Which of the following reagents is used to distinguish acetone and acetophenone?
(a) $NaHSO_3$ (b) Grignard reagent
(c) Na_2SO_4 (d) NH_4Cl

Q.6 A mixture of benzaldehyde and formaldehyde on heating with aqueous NaOH solution gives
(a) Benzyl alcohol and sodium formate
(b) Sodium benzoate and methyl alcohol
(c) Sodium benzoate and sodium formate
(d) Benzyl alcohol and methyl alcohol

Q.7 The reaction in which sodium cyanide is used is
(a) Perkin reaction (b) Reimer-Tiemann reaction
(c) Benzoin condensation (d) Rosenmund reaction

Q.8 Enol content is highest in
(a) Acetone (b) Acetophenone
(c) Acetic acid (d) Acetyl acetone

Q.9 Aldehydes and ketones can be reduced to hydrocarbons by using which of the following reagents?
(a) $LiAlH_4$ (b) $H_2/Pd–BaSO_4$
(c) Na–Hg/HCl (d) $NH_2–NH_2/C_2H_5ONa$

Q.10 Acetaldehyde and acetone can be distinguished by
(a) Molisch test (b) Bromoform test
(c) Solubility in water (d) Tollen's test

Q.11 CH_3CHO reacts with aqueous NaOH solution to form
(a) 3-hydroxybutanal (b) 2-hydroxybutanal
(c) 4-hydroxybutanal (d) 3-hydroxybutanol

Q.12 Propanal on treatment with dilute sodium hydroxide forms
(a) $CH_3CH_2CH_2CH_2CH_2CHO$
(b) $CH_3CH_2CH(OH)CH_2CH_2CHO$
(c) $CH_3CH_2CH(OH)CH(CH_3)CHO$
(d) CH_3CH_2COONa

Q.13 Benzaldehyde and acetaldehyde can be differentiated by
(a) HCN (b) NH_2OH
(c) Hydrazine (d) NaOH solution

Q.14 Which of the following does not react with Fehling solution ?
(a) Acetaldehyde (b) Benzaldehyde
(c) Glucose (d) Formic acid

Q.15 The order of susceptibility of nucleophilic attack on aldehydes follows the order
(a) $1° > 3° > 2°$ (b) $1° > 2° > 3°$
(c) $3° > 2° > 1°$ (d) $2° > 3° > 1°$

Q.16 The pair of compounds in which both the compounds give positive test with Tollen's reagent is
(a) Glucose and Sucrose
(b) Fructose and Sucrose
(c) Acetophenone and Hexanal
(d) Glucose and Fructose

RESPONSE GRID					
	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ	6. ⓐⓑⓒⓓ
	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ	11. ⓐⓑⓒⓓ
	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ

Space for Rough Work

Q.17 Which of the following will form two isomers with semicarbazide ?
(a) Benzaldehyde (b) Acetone
(c) Benzoquinone (d) Benzophenone

Q.18 Contents of three bottles were found to react
(i) Neither with Fehling's solution nor with Tollen's reagent
(ii) Only with Tollen's reagent but not with Fehling's solution
(iii) With both Tollen's reagent and Fehling's solution.
If they contained either acetaldehyde or acetone or benzaldehyde, which bottle contained which
(a) In (i) benzaldehyde, in (ii) ethanal and in (iii) propanone
(b) In (i) benzaldehyde, in (ii) propanone and in (iii) ethanal
(c) In (i) propanone, in (ii) benzaldehyde and in (iii) ethanal
(d) In (i) propanone, in (ii) ethanal and in (iii) benzaldehyde

Q.19 An organic compound 'A' has the molecular formula C_3H_6O, it undergoes iodoform test. When saturated with dil. HCl it gives 'B' of molecular formula $C_9H_{14}O$. A and B respectively are
(a) Propanal and mesitylene
(b) Propanone and mesityl oxide
(c) Propanone and 2,6-dimethyl-2, 5-heptadien-4-one
(d) Propanone and mesitylene oxide

Q.20 Aldehydes and ketones can be reduced to corresponding hydrocarbons by
(a) Refluxing with water
(b) Refluxing with strong acids
(c) Refluxing with soda amalgam and water
(d) Refluxing with zinc amalgam and concentrated HCl

Q.21 Grignard's reagent reacts with ethanal (acetaldehyde) and propanone to give
(a) Higher aldehydes with ethanal and higher ketones with propanone
(b) Primary alcohols with ethanal and secondary alcohols with propanone
(c) Ethers with ethanal and alcohols with propanone
(d) Secondary alcohols with ethanal and tertiary alcohols with propanone

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes:
(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct
(c) 2 and 4 are correct **(d)** 1 and 3 are correct

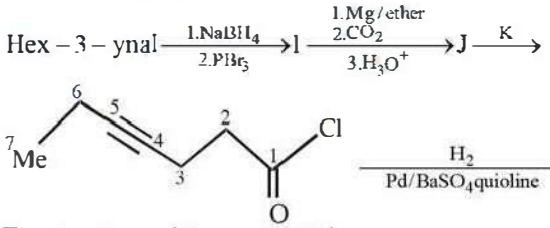
Q.22 Which of the following will give aldol condensation?
(1) Acetaldehyde (2) Propanaldehyde
(3) Trideuteroacetaldehyde (4) Benzaldehyde

Q.23 Which gives difference between aldehyde and ketone?
(1) Fehling's solution (2) Tollen's reagent
(3) Schiff's reagent (4) Grignard reagent

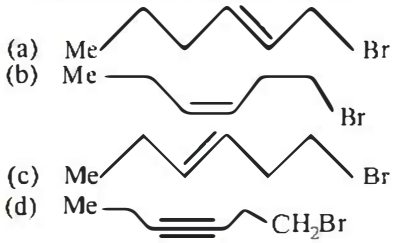
Q.24 Which are true about acetophenone?
(1) Reacts to form 2, 4-dinitrophenylhydrazone
(2) On oxidation with alkaline $KMnO_4$ followed by hydrolysis gives benzoic acid
(3) Reacts with I_2/NaOH to form iodoform
(4) Reacts with Tollen's reagent to form silver mirror

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

In the following reaction sequence, products I, J and L are formed. K represents a reagent.



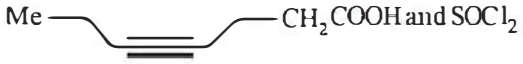
Q.25 The structure of the product I is –



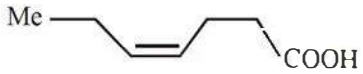
RESPONSE GRID					
	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ
	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	

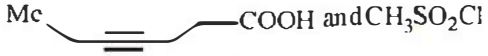
Space for Rough Work

Q.26 The structures of compounds J and K, respectively, are

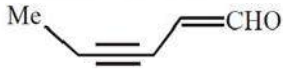
(a) 

(b) 

(c) 

(d) 

Q.27 The structure of product L is

(a) 

(b) 

(c) 

(d) 

DIRECTIONS (Q. 28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(c) Statement -1 is False, Statement-2 is True.
(d) Statement -1 is True, Statement-2 is False.

Q.28 Statement 1: CH_3CHO reacts with NH_3 to form urotropine.
Statement 2 : Urotropine is used as medicine in case of urinary troubles.

Q.29 Statement 1 : α-Hydrogen atom in aldehydes and ketones are acidic.
Statement 2 : The anion left after the removal of α-hydrogen is stabilized by inductive effect.

Q.30 Statement 1 : 2, 2-Dimethylpropanal undergoes Cannizzaro reaction with concentrated NaOH.
Statement 2 : Cannizzaro reaction is a disproportionation reaction.

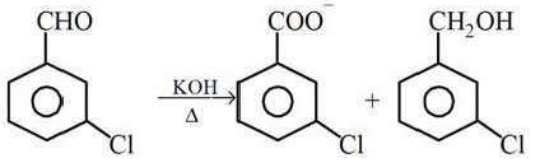
RESPONSE GRID	26.ⓐⓑⓒⓓ	27.ⓐⓑⓒⓓ	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 52 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	32	Qualifying Score	52
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

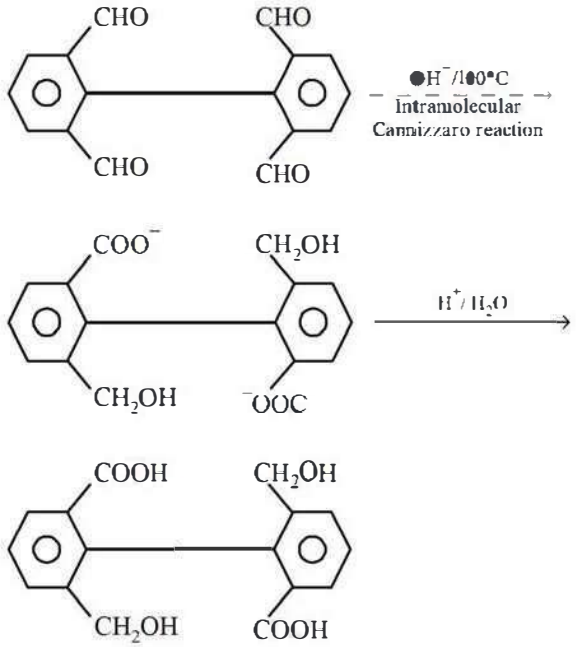
Space for Rough Work

DAILY PRACTICE PROBLEMS | **CHEMISTRY SOLUTIONS** | **52**

1. **(c)** It is Cannizzaro reaction



2. **(b)**



3. **(b)**

4. **(d)**

5. **(a)** Acetone forms sodium bisulphite adduct but acetophenone does not. Aromatic ketones do not give addition product with $NaHSO_3$

6. **(a)** Crossed aldol reaction gives benzyl alcohol and sodium formate.

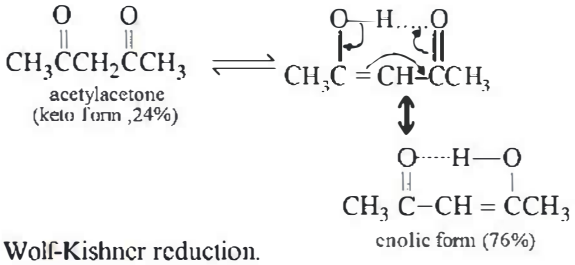
$$\underset{\text{Benzaldehyde}}{C_6H_5CHO} + \underset{\text{Formaldehyde}}{HCHO} \xrightarrow{NaOH(aq)} C_6H_5CH_2OH + \underset{\text{Sod. formate}}{HCOONa}$$

Benzyl alcohol

7. **(c)**

$$C_6H_5-\overset{O}{\overset{\|}{C}}-H + H-\overset{O}{\overset{\|}{C}}-C_6H_5 \xrightarrow{\text{alc. NaCN}} C_6H_5-\underset{\text{Benzoin}}{\overset{OH}{\overset{|}{C}}H}-\overset{O}{\overset{\|}{C}}-C_6H_5$$

8. **(d)** The amount of enolic form is highest (76%) in acetylacetone because enol form is stabilised due to resonance as well as H-bonding.



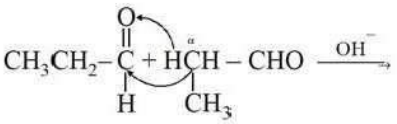
9. **(d)** Wolf-Kishner reduction.

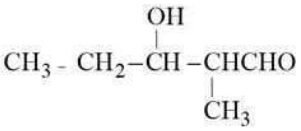
10. **(d)** $CH_3CHO \xrightarrow{[Ag(NH_3)_2]^+} \underset{\text{Silver mirror}}{CH_3COOH + Ag\downarrow}$

11. **(a)** This reaction is aldol condensation

$$2CH_3CHO \xrightarrow{\text{dil NaOH}} \underset{\text{3–Hydroxybutanal}}{CH_3-\underset{OH}{\underset{|}{CH}}-CH_2-CHO}$$

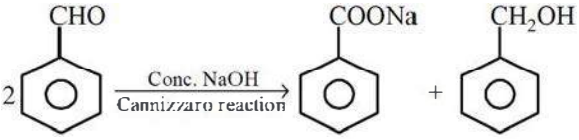
12. **(c)**





Remember that the α-H of one molecule adds on the carbonyl group of true other.

13. **(d)** Benzaldehyde gives Cannizzaro's reaction whereas acetaldehyde gives aldol condensation.



$$2CH_3CHO \xrightarrow{\text{dil NaOH}} \underset{\text{Aldol}}{CH_3CHCH_2CHO}$$

OH

14. **(b)** Fehling solution is a weak oxidising agent, therefore unable to oxidise benzaldehyde.

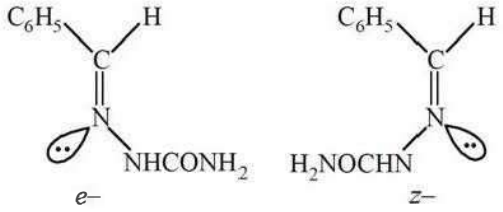
15. **(b)** $R-\overset{+\delta}{\overset{\|}{C}}(=O)-H$; Susceptibility of nucleophilic attack on aldehyde is decreased by electron releasing effect of R group. Decreasing order of aldehyde towards nucleophilic attack is $1^\circ > 2^\circ > 3^\circ$ R group.

16. **(d)** Tollen's reagent oxidizes the compound having aldehyde group like glucose and also oxidizes α-hydroxyketones, $-COCH_2OH$, group as in fructose.

17. **(a)** $C_6H_5CH=O + H_2NNHCONH_2 \rightarrow C_6H_5CH=NNHCONH_2$

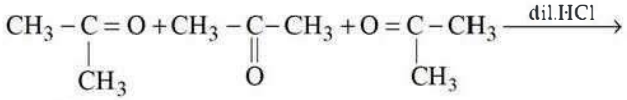
Semicarbazone

The product shows E and Z configurations.

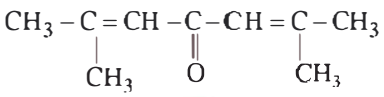


18. **(c)**

19. **(c)** The compound A with formula C_3H_6O gives iodoform test, it is propanone. It forms a compound B having carbon atoms three times to the number of carbon atoms in propanone, it is 2, 6-dimethyl-2, 5-heptadien-4-one.



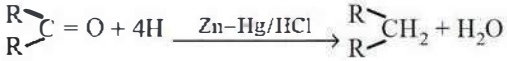
(A)



(B)

2, 6-Dimethyl-2, 5-heptadien-4-one

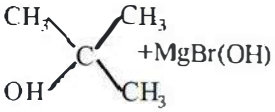
20. **(d)** $RCHO + 4H \xrightarrow[\text{(Clemmensen reduction)}]{Zn-Hg/HCl} R-CH_3 + H_2O$



21. **(d)** $CH_3-MgBr + CH_3-\overset{O}{\overset{\|}{C}}-H \xrightarrow{H_2O}$

$CH_3-\underset{CH_3}{\underset{|}{CH}}-OH + MgBr(OH)$

$CH_3MgBr + CH_3-\underset{CH_3}{\underset{|}{C}}=O \xrightarrow{H_2O}$



22. **(a)** Deuterium behaves like H and hence trideuteroacetaldehyde also undergoes aldol condensation but benzaldehyde does not since it has no α-hydrogen.

Thus (1), (2) and (3) are correct choices.

23. **(a)** Fehling solution = Alkaline $CuSO_4$ + Na–K tartarate

Tollen's reagent = $NH_4OH + AgNO_3$

Schiff's reagent = *p*-rosaniline hydrochloride or magneta

Reagents in (1), (2) and (3) are used to distinguish between aldehydes and ketones. Aldehydes reacts with all these reagents while ketones do not react.

24. **(a)** Acetophenone is a ketone and does not react with Tollen's reagent to give silver mirror.

25. **(d)** $CH_3-CH_2-C\equiv C-CH_2-CHO$

Hex-3-ynal

$\xrightarrow[2.PBr_3]{1.NaBH_4} CH_3-CH_2-C\equiv C-CH_2-CH_2Br$

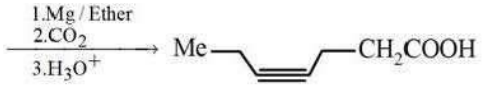
or

I

Sodium borohydride reduces –CHO selectively into $-CH_2OH$

26. **(a)**

"I"

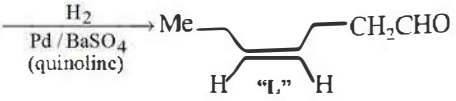


"J"

Thus "K" is $SOCl_2$

27. **(c)**

"J"



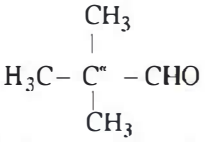
It is Rosenmund reaction. Simultaneously the reagent H_2-Pd also reduces carbon-carbon triple bond to double bond (*syn* -addition) giving *cis* product.

28. **(c)** Urotropine is formed by the reactions of HCHO with NH_3

$6HCHO + 4NH_3 \rightarrow (CH_2)_6N_4 + 6H_2O$

29. **(d)** The anion left after the removal of α-hydrogen is stabilized by resonance effect.

30. **(b)** Aldehydes which do not contain α-hydrogen undergo Cannizzaro reaction.



2,2- dimethylpropanal (no α-hydrogen)