DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 51

SYLLABUS : Aldehydes and Ketones -I : Introduction and Preparation 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 In aldehydes and ketones, carbon of carbonyl group is
(a) sp^3 hybridised (b) sp^2 hybridised
(c) sp hybridised (d) Unhybridised

Q.2 IUPAC name of CH_3COCH_3 is
(a) Acetone (b) 2-Propanone
(c) Dimethyl ketone (d) Propanal

Q.3 IUPAC name of CCl_3CHO is
(a) chloral
(b) trichloroacetaldehyde
(c) 1, 1, 1-trichloroethanal
(d) 2, 2, 2-trichloroethanal

Q.4 Which of the aldehyde is most reactive?
(a) C_6H_5–CHO
(b) CH_3CHO
(c) HCHO
(d) All are equally reactive

Q.5 $CH_3COCl \xrightarrow[Pd/BaSO_4]{H_2} CH_3CHO + HCl$;

The above reaction is called
(a) Reimer-Tiemann reaction
(b) Cannizzaro reaction
(c) Rosenmund reaction
(d) Reformatsky reaction

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

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Q.6 Dry heating of calcium acetate gives
(a) Acetaldehyde (b) Ethane
(c) Acetic acid (d) Acetone

Q.7 Acetophenone is prepared by the reaction of which of the following in the presence of $AlCl_3$ catalyst ?
(a) Phenol and acetic acid
(b) Benzene and acetone
(c) Benzene and acetyl chloride
(d) Phenol and acetone

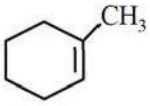
Q.8 Which of the following compound gives a ketone with Grignard reagent ?
(a) Formaldehyde (b) Ethyl alcohol
(c) Methyl cyanide (d) Methyl iodide

Q.9 Ethyl methyl ketone is prepared by the oxidation of
(a) 2-propanol (b) 1-butanol
(c) 2-butanol (d) *ter*-butyl alcohol

Q.10 Benzaldehyde can be prepared by oxidation of toluene by which of the following ?
(a) Acidic $KMnO_4$ (b) $K_2Cr_2O_7$
(c) CrO_2Cl_2 (d) All of these

Q.11 Ketones are prepared by
(a) Clemmensen's reduction (b) Cannizzaro reaction
(c) Rosenmund's reduction (d) Oppenauer'soxidation

Q.12 $CH_3-CH_2-C\equiv CH \xrightarrow[HgSO_4]{H_2SO_4} A$, the compound A is
(a) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$
(b) $CH_3-CH_2-CH_2-CHO$
(c) $CH_3-CH_2-CH_2-COOH$
(d) None of these

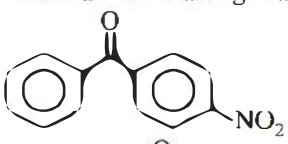
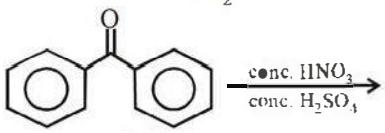
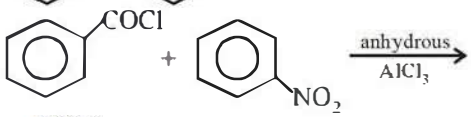
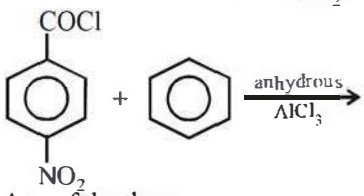
Q.13 
on reductive ozonolysis yields
(a) 6- oxoheptanal
(b) 6-oxoheptanoic acid
(c) 6-hydroxyheptanal
(d) 3-hydroxypentanal

Q.14 An alkene of molecule formula C_9H_{18} on ozonolysis gives 2, 2-dimethylpropanal & 2-butanone, then the alkene is
(a) 2, 2, 4-trimethyl -3-hexene
(b) 2, 2, 6-trimethyl -3-hexene
(c) 2, 3, 4-trimethyl -2-hexene
(d) 2, 2-dimethyl -2-heptene

Q.15 Glyoxal is
(a) CH_2O-CH_2O (b) $\begin{array}{c}CH_2OH\\|\\CH_2OH\end{array}$
(c) $\begin{array}{c}CHO\\|\\CHO\end{array}$ (d) $\begin{array}{c}CH_2OH\\|\\CHO\end{array}$

Q.16 Which of the following is a mixed ketone?
(a) Pentanone (b) Acetophenone
(c) Benzophenone (d) Butanone

Q.17 Benzoin is
(a) Compound containing an aldehyde and a ketonic group
(b) α, β-unsaturated acid
(c) α-hydroxyaldehyde
(d) α-hydroxyketone

Q.18 Which are the starting materials for the preparation of?

(a) 
(b) 
(c) 
(d) Any of the three

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ		

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Q.19 Hydrolysis of ozonide of 1-butene gives
(a) Ethylene only
(b) Acetaldehyde and formaldehyde
(c) Propionaldehyde and formaldehyde
(d) Acetaldehyde only

Q.20 Glycerol reacts with potassium bisulphate to produce
(a) Allyl iodide (b) Allyl sulphate
(c) Acryl aldehyde (d) Glycerol trisulphate

Q.21 The reagent used in Gatterman Koch aldehyde synthesis is
(a) $Pb/BaSO_4$ (b) alkaline$KMnO_4$
(c) acidic $KMnO_4$ (d) CO + HCl

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 one of the following compounds is not prepared in the laboratory from benzene by a substitution reaction?
(1) Glyoxal (2) Cyclohexane
(3) Hexabromocyclohexane (4) Acetophenone

Q.23 Acetophenone can be prepared by
(1) Oxidation of 1-phenylethanol
(2) Reaction of benzylethanol with methyl magnesium bromide
(3) Friedel Craft's reaction of benzene with acetyl chloride
(4) Distillation of calcium benzoate

Q.24 Which of the following reactions give benzophenone ?

(1) $2C_6H_6 + CCl_4 \xrightarrow[(ii)H_2O]{(i)AlCl_3}$

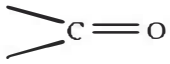
(2) $C_6H_6 + C_6H_5COCl \xrightarrow{AlCl_3}$

(3) $o-CH_3C_6H_4COC_6H_5 \xrightarrow{Heat}$

(4) $o-HOOC-C_6H_4-COC_6H_5 \xrightarrow[260°C]{Cu}$

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

Carbonyl compounds are of two types, aldehydes and ketones. Both have a carbon-oxygen double bond, often called as carbonyl group.



Both aldehydes and ketones possess the same general formula $C_nH_{2n}O$.

Structure : Carbonyl carbon atom is joined to three atoms by sigma bonds. Since these bonds utilise sp^2 -orbitals, they lie in the same plane and are 120° apart. The carbon-oxygen double bond is different than carbon-carbon double bond. Since, oxygen is more electronegative, the electrons of the bond are attracted towards oxygen. Consequently, oxygen attains a partial negative charge and carbon a partial positive charge making the bond polar.

The high values of dipole moment, $>\overset{\delta+}{C}=\overset{\delta-}{O}$ (2.3 – 2.8D) cannot be explained only on the basis of inductive effect.

Q.25 In the compound $\begin{matrix}R'\\R\end{matrix}>C=O$ the carbonyl carbon is joined to other atoms by
(a) Two sigma and one pi bonds
(b) Three sigma and one pi bonds
(c) One sigma and two pi bonds
(d) Two sigma and two pi bonds

Q.26 Which of the following types of isomerism is shown by pentanone ?
(a) Chain isomerism (b) Position isomerism
(c) Functional isomerism (d) All of these

Q.27 Carbonyl compounds are usually
(a) Ethers, aldehydes, ketones and carboxylic acids
(b) Aldehydes, ketones and carboxylic acids
(c) Aldehydes and ketones
(d) Carboxylic acids

RESPONSE GRID					
	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ
	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ	27. ⓐⓑⓒⓓ	

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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 : Acetylene on treatment with alkaline $KMnO_4$ produces acetaldehyde.
Statement-2 : Alkaline $KMnO_4$ isoxidisingagent.

Q.29 Statement -1 : Acetophenone and benzophenone can be distinguished by iodoform test.
Statement-2 : Acetophenone and benzophenone both are carbonyl compounds.

Q.30 Statement -1 : Aldol condensation can be catalysed both by acids and bases.
Statement -2 : β-Hydroxy aldehydes or ketones readily undergo acid catalysed dehydration.

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

DAILY PRACTICE PROBLEM SHEET 51 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	40	Qualifying Score	64
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

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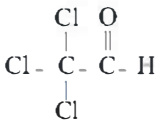
DAILY PRACTICE PROBLEMS — CHEMISTRY SOLUTIONS 51

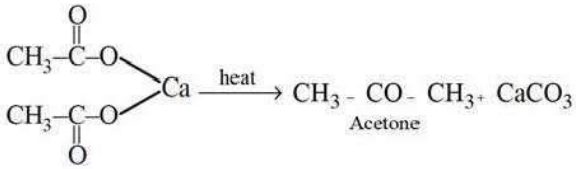
1. (b) $>C=O$ (sp^2 hybridised)

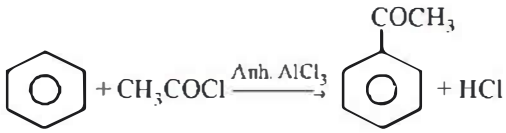
2. (b) $CH_3\overset{O}{\overset{\|}{C}}CH_3$ 2-propanone

3. (d) 
2, 2, 2-trichloroethanal

4. (c) Among carbonyl compounds, reactivity decreases with increase in alkyl groups as alkyl group (+I effect) decrease positive character on C-atom. Thus, the correct order of reactivity is
$HCHO > CH_3CHO > C_6H_5CHO$

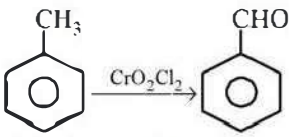
5. (c) $CH_3COCl \xrightarrow[Pd/BaSO_4]{H_2} CH_3CHO + HCl$

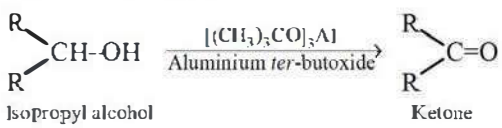
6. (d) 
Acetone

7. (c) 

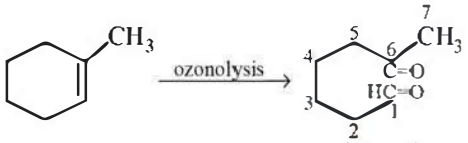
8. (c) $CH_3-C\equiv N + CH_3Mg^+Br \rightarrow CH_3-\underset{\underset{CH_3}{|}}{C}=N-MgBr$
$\xrightarrow{\text{Hydrolysis}} CH_3-CO-CH_3 + NH_3 + Mg\begin{matrix}Br\\OH\end{matrix}$

9. (c)
$CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3 \xrightarrow[\text{(Oxidation)}]{KMnO_4} CH_3-\overset{O}{\overset{\|}{C}}-CH_2CH_3$
2-Butanol → ethyl methyl ketone

10. (c) 
This is Etard's reaction

11. (d) 
Isopropyl alcohol → Ketone

12. (a) $CH_3CH_2C\equiv CH + H_2O \xrightarrow{HgSO_4/H_2SO_4} CH_3CH_2COCH_3$

13. (a) 
6-oxoheptanal

14. (a) $CH_3-\underset{\underset{CH_3}{|}}{\overset{CH_3}{\overset{|}{C}}}-CHO + O\overset{CH_3}{\overset{|}{C}}-CH_2CH_3$

$CH_3-\underset{\underset{CH_3}{|}}{\overset{CH_3}{\overset{|}{C}}}-CH=\overset{CH_3}{\overset{|}{C}}-CH_2CH_3$

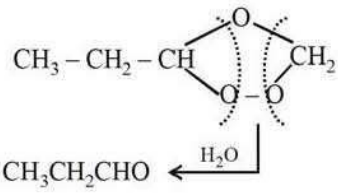
15. (c)

16. (b) Acetophenone ($C_6H_5COCH_3$) is a mixed ketone.

17. (d) Benzoin $\left(C_6H_5-\overset{OH}{\overset{|}{C}}H-\overset{O}{\overset{\|}{C}}-C_6H_5\right)$ is α - hydroxyketone.

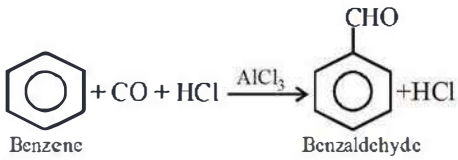
18. (c) (a) Nitration is difficult to be carried out, further the $-NO_2$ group will go to *m*-position to the $>C=O$ group
(b) Nitrobenzene, being deactivated toward electrophilic substitution will not undergo Friedal Craft reaction.
(c) Benzene easily undergoes Friedal Craft reaction forming the required product.

19. (c) $CH_3-CH_2-CH=CH_2 \xrightarrow{O_3}$



$H_2O_2 + HCHO + CH_3CH_2CHO$

20. (c)

21. (d) 
Benzene → Benzaldehyde

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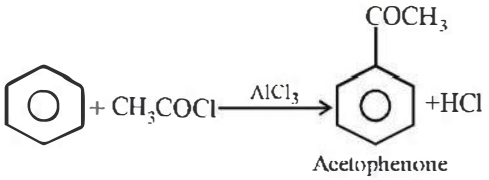
22. **(a)**



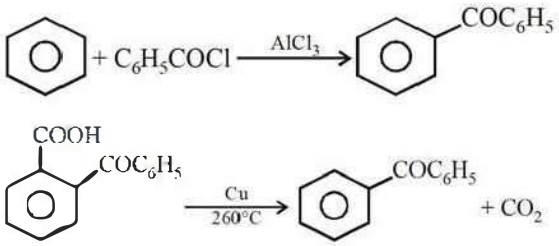
It is Friedel-Crafts reaction.

Compounds in options 1, 2 and 3 cannot be prepared in the laboratory from benzene by a substitution reaction.

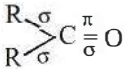
23. **(d)** $\underset{\text{1–Phenylethanol}}{C_6H_5CHOHCH_3} \xrightarrow{[O]} \underset{\text{Acetophenone}}{C_6H_5COCH_3}$

$$C_6H_6 + CH_3COCl \xrightarrow[\text{reaction}]{\text{Friedel Craft's}} C_6H_5COCH_3 + HCl$$

24. **(c)**



25. **(b)**



26. **(d)**

27. **(c)** Carbonyl compounds are usually aldehydes and ketones.

28. **(c)** Acetylene, on treatment with alkaline $KMnO_4$ is oxidized to produce oxalic acid.

$$\underset{\text{Acetylene}}{\begin{matrix} CH \\ ||| \\ CH \end{matrix}} \xrightarrow[\text{alk. } KMnO_4]{4[O]} \underset{\text{Oxalic acid}}{\begin{matrix} COOH \\ | \\ COOH \end{matrix}}$$

Therefore, statement 1 is false.

29. **(b)** Acetophenone and benzophenone can be distinguished by iodoform test. Both are carbonyl compounds. Assertion and reason both are true but statement 2 is not the correct explanation of statement 1.

30. **(b)** Both carbanions (formed in presence of base) and enol form (formed in presence of an acid) act as nucleophiles and hence add on the carbonyl group of aldehydes and ketones to give aldols.

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