DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 48

SYLLABUS : Alcohols

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 Carbon percentage is maximum in

(a) Pyrene (b) Gammexane

(c) Ethylene glycol (d) Quinol

Q.2 Carbinol is

(a) C_2H_5OH

(b) CH_3OH

(c) $(CH_3)_2CHOH$

(d) $CH_3CH_2CH(OH)CH_3$

Q.3 Methylated spirit is

(a) Methanol

(b) Methanol + ethanol

(c) Methanoic acid

(d) Methanamide

Q.4 Wood spirit is known as

(a) Methanol

(b) Ethanol

(c) Acetone

(d) Benzene

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

Space for Rough Work

Q.5 An organic compound dissolved in dry benzene evolved hydrogen on treatment with sodium. It is
(a) A ketone (b) An aldehyde
(c) A tertiary amine (d) An alcohol

Q.6 Action of nitrous acid with ethylamine produces
(a) Ethane (b) Ammonia
(c) Ethyl alcohol (d) Nitroethane

Q.7 Action of water in the presence of sulphuric acid with the following alkenes gives

(i) $CH_3-CH=C(CH_3)(CH_3)$ and (ii) $CH_3-CH=CH_2$

(a) (i) $CH_3-CH_2-C(OH)(CH_3)(CH_3)$ and (ii) $CH_3-CH(OH)-CH_3$

(b) (i) $CH_3-CH(OH)-CH(CH_3)(CH_3)$ and (ii) $CH_3-CH_2-CH_2OH$

(c) (i) $CH_3-CH(OH)-CH(CH_3)(CH_3)$ and (ii) $CH_3-CH(OH)-CH_3$

(d) (i) $CH_3-CH_2-C(OH)(CH_3)(CH_3)$ and (ii) $CH_3-CH_2-CH_2OH$

Q.8 Glycerol reacts with $P_4 + I_2$ to form
(a) aldehyde (b) allyl iodide
(c) allyl alcohol (d) acetylene

Q.9 Final product formed on reaction of glycerol with excess of hydroiodic acid is
(a) Propane (b) Propanoic acid
(c) propene (d) Propyne

Q.10 Which of the following explains the viscous nature of glycerol?
(a) Covalent bonds (b) Hydrogen bonds
(c) vander Waal's force (d) Ionic forces

Q.11 Ethylene glycol, on oxidation with per-iodic acid, gives
(a) Oxalic acid (b) Glycol
(c) Formaldehyde (d) Glycolic acid

Q.12 Which reagent is useful in converting 1-butanol to 1-bromobutane?
(a) $CHBr_3$ (b) Br_2 (c) CH_3Br (d) PBr_3

Q.13 The alcohol which easily reacts with conc. HCl is
(a) $CH_3-CHOH-CH_2-CH_3$
(b) $(CH_3)_3-C-OH$
(c) $CH_3-CH_2-CH_2-CH_2-OH$
(d) $(CH_3)_3-C-CH_2OH$

Q.14 The reagent used for the dehydration of an alcohol is
(a) phosphorus pentachloride
(b) calcium chloride
(c) aluminium oxide
(d) sodium chloride

Q.15 Glycerol is heated with oxalic acid at 110°C to form
(a) Formic acid (b) Oxalicacid
(c) Allyl alcohol (d) Glycerol trioxalate

Q.16 Maximum solubility of alcohol in water is due to
(a) covalent bond (b) ionic bond
(c) H-bond with H_2O (d) None of these

Q.17 The boiling point of methanol is greater than that of methyl thiol because
(a) There is intramolecular hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol
(b) There is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol
(c) There is no hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol
(d) There is intramolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol

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

Space for Rough Work

Q.18 Alcohols (i) $CH_3CH_2CH_2OH$, (ii) $CH_3-CHOH-CH_3$ and (iii) $CH_3-C(CH_3)(OH)-CH_3$ were treated with Lucas reagent (Conc. $HCl + ZnCl_2$). What results do you expect at room temperature ?

(a) (ii) and (iii) react immediately and (i) in about 5 minutes

(b) (iii) reacts immediately, (ii) reacts in about 5 minutes and (i) not at all

(c) (i) reacts immediately, (ii) reacts in about 5 minutes and (iii) not at all

(d) (i) reacts in about 5 minutes, (ii) reacts in about 15 minutes and (iii) not at all

Q.19 In the esterification reaction of alcohols

(a) H^- is replaced by CH_3COO group

(b) OH^- is replaced by chlorine

(c) H^- is replaced by sodium metal

(d) OH^- of acid is replaced by $C_2H_5O^-$ of alcohol

Q.20 In the following series of chemical reactions, identify Z

$$C_3H_7OH \xrightarrow[160-180°C]{Conc.H_2SO_4} X \xrightarrow{Br_2} Y \xrightarrow[Alc.KOH]{Excess\ of} Z$$

(a) $CH_3-\underset{NH_2}{\underset{|}{CH}}-\underset{NH_2}{\underset{|}{CH_2}}$ (b) $CH_3-\underset{OH}{\underset{|}{CH}}-\underset{OH}{\underset{|}{CH_2}}$

(c) $CH_3-\underset{OH}{\underset{|}{C}}=CH_2$ (d) $CH_3C\equiv CH$

Q.21 $A \xrightarrow[dil.H_2SO_4]{K_2Cr_2O_7} B \xrightarrow[H_2O]{CH_3MgI} CH_3-\underset{OH}{\underset{|}{\overset{CH_3}{\overset{|}{C}}}}-CH_3$,

the reactant A is

(a) $CH_3CHOHCH_3$

(b) CH_3COCH_3

(c) C_2H_5OH

(d) CH_3COOH

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 are the characteristics of alcohols?

(1) Lower alcohols are colourless toxic liquids

(2) The boiling points of alcohols increase with increasing molecular mass

(3) The lower alcohols are soluble in water

(4) Higher alcohols are colourless toxic liquids

Q.23 Which of the following statements are correct?

(1) A secondary alcohol on oxidation gives a ketone

(2) Ethanol reacts with conc. H_2SO_4 at 180°C to yield ethylene

(3) Hydrogen gas is liberated when sodium is added to alcohol.

(4) Methanol reacts with iodine and sodium hydroxide to give a yellow precipitate of iodoform

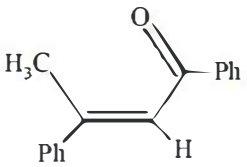
Q.24 $A \xleftarrow[\Delta]{Cu} CH_3CH_2OH \xrightarrow[\Delta]{Al_2O_3} B$. A and B respectively are

(1) A is Alkyne (2) A is alkanal

(3) B is Alkenal (4) B is Alkene

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

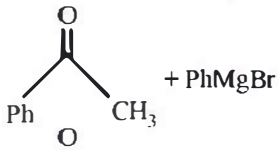
A tertiary alcohol H upon acid catalysed dehydration gives a product I. Ozonolysis of I leads to compounds J and K. Compound J upon reaction with KOH gives benzyl alcohol and compound L, whereas K on reaction with KOH gives only M, having following structure

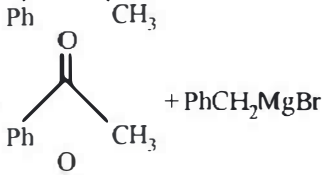


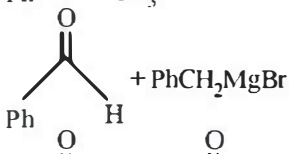
RESPONSE GRID					
	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ
	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ			

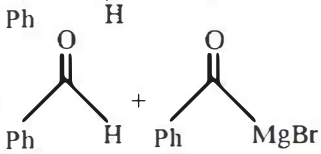
Space for Rough Work

Q.25 Compound H is formed by the reaction of

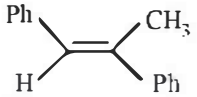
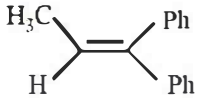
(a)  + PhMgBr

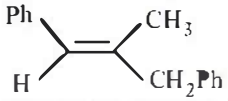
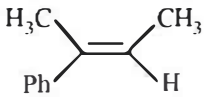
(b) 

(c) 

(d) 

Q.26 The structure of compound I is

(a)  (b) 

(c)  (d) 

Q.27 The structure of compounds J, K and L respectively, are –

(a) $PhCOCH_3$, $PhCH_2COCH_3$ and $PhCH_2COO^-K^+$

(b) PhCHO, $PhCH_2CHO$ and $PhCOO^-K^+$

(c) $PhCOCH_3$, $PhCH_2CHO$ and $CH_3COO^-K^+$

(d) PhCHO, $PhCOCH_3$ and $PhCOO^-K^+$

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 : The water solubility of the alcohols follow the order: *ter*-butyl alcohol > *sec*-butyl alcohol > *n*-butyl alcohol.
Statement-2 : Alcohols form H-bonding with water to show soluble nature.

Q.29 Statement-1 : Tert- butyl alcohol undergoes acid catalysed dehydration readily than propanol.
Statement-2 : 3° Alcohols do not give Victor-Meyer's test.

Q.30 Statement-1 : Primary and secondary alcohols can be distinguished by Victor-Meyer's test
Statement-2 : Primary alcohols form nitrolic acid which dissolve in NaOH to form blood red colouration but secondary alcohols form pseudonitroles which give blue colouration with NaOH.

RESPONSE GRID	25.ⓐⓑⓒⓓ 26.ⓐⓑⓒⓓ 27.ⓐⓑⓒⓓ 28.ⓐⓑⓒⓓ 29. ⓐⓑⓒⓓ 30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 48 - 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)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

48

1. **(d)** $\%\text{ of } C = \frac{\text{Atomic Mass of C}}{\text{Molecular Mass of substance}} \times 100$

$CCl_4 = \frac{12}{154} \times 100 = 7.79\%$

$C_6H_6Cl_6 = \frac{72}{291} \times 100 = 24.74\%$

$CH_2OH - CH_2OH = \frac{24}{62} \times 100 = 38.70\%$

$HO-C_6H_4-OH = \frac{72 \times 100}{110} = 65.45\%$

2. **(b)** Carbinol is CH_3OH(Methanol).

3. **(b)** 5-10% Methyl alcohol and remaining ethanol is called methylated spirit. It is also known as denatured alcohol because it is unfit for drinking.

4. **(a)** Methanol is also referred as wood alcohol or wood spirit or wood naphtha as the earliest method for its preparation was by destructive distillation of wood.

5. **(d)** $2R-OH + Na \xrightarrow{\text{dry benzene}} 2R-ONa + H_2$

6. **(c)** $C_2H_5-NH_2 + HNO_2 \rightarrow C_2H_5OH + N_2 + H_2O$

7. **(a)** $CH_3-CH=C(CH_3)(CH_3) + H_2O \xrightarrow[\text{Markownikoff rule}]{H_2SO_4}$

2-Methyl-2-butene

$CH_3-CH_2-C(OH)(CH_3)(CH_3)$

2-Methylbutan-2-ol

$CH_3CH=CH_2 + H_2O \xrightarrow[\text{Markownikoff rule}]{H_2SO_4} CH_3-CH(OH)-CH_3$

Propene — Propan-2-ol

8. **(b)** $CH_2(OH)-CH(OH)-CH_2OH \xrightarrow{P_4+I_2} CH_2I-CH(I)-CH_2I \xrightarrow{-I_2} CH_2=CH-CH_2I$

Unstable — Allyl iodide

9. **(c)** $CH_2(OH)-CH(OH)-CH_2OH \xrightarrow[-H_2O]{3HI} CH_2I-CH(I)-CH_2I \xrightarrow{-I_2}$

Unstable

$CH_2=CH-CH_2I \xrightarrow{HI} CH_3-CH(I)-CH_2I \xrightarrow{-I_2} CH_3-CH=CH_2$

Propene

10. **(b)** Glycerol undergoes extensive hydrogen bonding due to the presence of 3– OH groups. As a result the glycerol molecules are highly associated and thus it has high viscosity

11. **(c)** $CH_2(OH)-CH_2(OH) + HIO_4 \rightarrow 2HCHO + HIO_3 + H_2O$

12. **(d)** $3CH_3CH_2CH_2CH_2-OH + PBr_3 \rightarrow$

$3CH_3CH_2CH_2CH_2-Br + H_3PO_3$

13. **(b)** Presence of 3 alkyl groups increases electron density on 3° carbon atom. Hence –OH group is easily removed. After the removal of –OH group, 3° carbonium ion is formed which is most stable.

$CH_3-C(CH_3)(CH_3)-OH \rightarrow CH_3-C^+(CH_3)(CH_3) + OH^-$

14. **(c)** $C_2H_5OH \xrightarrow[250°C]{Al_2O_3} C_2H_4 + H_2O$

Ethene

15. **(a)** $CH_2(OH)-CH(OH)-CH_2OH + COOH-COOH \xrightarrow[-H_2O]{110°C} CH_2(O-CO-COOH)-CH(OH)-CH_2OH$

Glycerol mono-oxalate

$\xrightarrow{-CO_2} CH_2(COOH)-CH(OH)-CH_2OH \xrightarrow{\text{Hydrolysis}} CH_2(OH)-CH(OH)-CH_2OH + HCOOH$

Glycerol mono-formate — Formic acid

16. **(c)** Alcohol is soluble in water due to H-bonding

$R-O-H\cdots O(H)-H\cdots O(H)-R$

Alcohol — Water — Alcohol

17. **(b)** Methanol has high boiling point than methyl thiol because there is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol

18. **(b)**

19. **(d)** $CH_3COOH + C_2H_5OH \rightarrow \underset{\text{Ethyl acetate}}{CH_3COOC_2H_5} + H_2O$

20. **(d)** $CH_3CH_2CH_2OH \xrightarrow[160-180^\circ C]{conc.H_2SO_4} CH_3CH=CH_2$

$$\xrightarrow{Br_2} CH_3-\underset{Br}{CH}-\underset{Br}{CH_2} \xrightarrow{Alc.KOH} \underset{\text{Propyne}}{CH_3-C\equiv CH}$$

21. **(a)** $\underset{A}{CH_3CHOHCH_3} \xrightarrow[dil.H_2SO_4]{K_2Cr_2O_7} \underset{B}{CH_3COCH_3}$

$$\xrightarrow[H_2O]{CH_3MgI} (CH_3)_3COH$$

22. **(a)** Higher alcohols are waxy solids.

23. **(a)**

(1) $CH_3-\underset{OH}{CH}-CH_3 \xrightarrow{Oxidation} CH_3-\underset{O}{C}-CH_3$

(2) $CH_3-CH_2-OH \xrightarrow[180^\circ]{Conc.H_2SO_4} CH_2=CH_2+H_2O$

(3) $2CH_3CH_2OH + 2Na \rightarrow 2CH_3-CH_2-ONa + H_2$

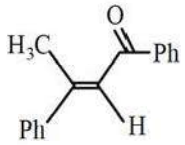
(4) Methanol does not undergo iodoform reaction.

24. **(c)** $\underset{(A)}{CH_3CHO} \xleftarrow[\Delta]{Cu} CH_3CH_2OH \xrightarrow[\Delta]{Al_2O_3} \underset{(B)}{CH_2=CH_2}$

For Q.25-27

Before answering these question let us complete the sequence of reactions given in data.

The given compound (M),



is the only product formed by the action of KOH on compound K.

Thus compound K should be $Ph-\underset{CH_3}{\underset{|}{C}}=\bullet$

$$2Ph-\underset{CH_3}{\underset{|}{C}}=O \xrightarrow[(Aldol\ conden.)]{KOH} Ph-\underset{CH_3}{\underset{|}{C}}=CH-\underset{\bullet}{\underset{\|}{C}}-Ph$$

Compound K (i.e. $Ph-\underset{CH_3}{\underset{|}{C}}=O$) is one of the products of ozonolysis of compound I. Therefore, the compound I may be

$$>C=\underset{CH_3}{\underset{|}{C}}-Ph \xrightarrow{Ozonolysis} >CO + O=\underset{CH_3}{\underset{|}{C}}$$

(I) (J) (K)

$$>C=O \xrightarrow{KOH} Ph-CH_2-OH + L$$

(J) Benzyl alcohol

Thus compound J seems to be C_6H_5CHO.

$$\underset{J}{C_6H_5CHO} \xrightarrow[Cannizzaro\ reaction]{KOH}$$

$$\underset{\text{Benzyl alcohol}}{C_6H_5CH_2OH} + \underset{(L)}{C_6H_5COO^-K^+}$$

Hence I is $Ph-CH=\underset{CH_3}{\underset{|}{C}}-Ph$

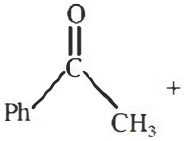
Now, we will try to answer the questions.

25. **(b)** As can be seen from above reaction sequence compound (I) is $Ph-CH=\underset{CH_3}{\underset{|}{C}}-Ph$ and it is formed by catalytic dehydration (acid catalysed) of a tertiary alcohol (compound H). Therefore, compound H is

$$Ph-CH_2-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-Ph \xrightarrow[-H_2O]{H^+} Ph-CH=\underset{CH_3}{\underset{|}{C}}-Ph$$

(H) (I)

(H) can be formed by the action of $PhCOCH_3$ with $PhCH_2$ Mg Br as follows

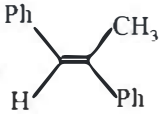


$$+ PhCH_2MgBr \longrightarrow$$

$$\xrightarrow{Hydrolysis} Ph-CH_2-\underset{CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}-Ph+Mg\begin{matrix}Br\\OH\end{matrix}$$

(H)

26. **(a)** As can be seen form the above sequence of reactions the structure of compound (I) is



27. **(d)** As can be seen from the above sequence of reactions the structures of compounds J, K and L respectively are

$$\underset{(J)}{Ph-CHO},\ \underset{\underset{CH_3}{|}}{Ph-C=O}\ (K)\ \text{and}\ \underset{(L)}{PhCOO^-K^+}$$

28. **(b)** The tendency to show H-bonding decreases with increasing hydrophobic character of carbon chain. The hydrophobic character of carbon chain increases with the length of carbon chain.

29. **(b)** Alcohols which form the more stable carbocations undergo dehydration more readily. Since *tert-butyl* alcohol forms more stable *tert*-butyl cation, therefore, it undergoes dehydration more readily than propanol.

30. **(a)** VictorMeyers test is used to distinguish primary, secondary and tertiary alcohols.