DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 54

SYLLABUS : Nitrogen Containing Compounds- 1

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 C_3H_9N represents

(a) Primary amine (b) Secondary amine

(c) Tertiary amine (d) All of these

Q.2 Allyl isocyanide has

(a) 9 sigma bonds and 4 pi bonds

(b) 8 sigma bonds and 5 pi bonds

(c) 8 sigma bonds, 3 pi bonds and 4 non-bonding electrons

(d) 9 sigma bonds, 3 pi bonds and 2 non-bonding electrons

Q.3 Triaminobenzene is a

(a) 2° amine (b) 3° amine

(c) 1° amine (d) quarternary salt

Q.4 Leakage of which gas was responsible for the Bhopal tragedy in 1984

(a) $CH_3 - N = C = O$ (b) $CH_3 - C - N = S$

(c) $CHCl_3$ (d) C_6H_5COCl

Q.5 Number of isomeric primary amines obtained from $C_4H_{11}N$ are

(a) 3 (b) 4

(c) 5 (d) 6

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

Space for Rough Work

Q.6 Amides may be converted into amines by reaction named after
(a) Perkin (b) Claisen
(c) Hofmann (d) Kolbe

Q.7 Ethylamine can be obtained by the
(a) Action of NH_3 on ethyl iodide
(b) Action of NH_3 on ethyl alcohol
(c) Both (a) and (b)
(d) None of the above

Q.8 When methyl iodide is heated with ammonia, the product obtained is
(a) Methylamine
(b) Dimethylamine
(c) trimethylamine
(d) A mixture of the above three amines

Q.9 In the reaction

$$R-\overset{\overset{O}{\|}}{C}-OH \xleftarrow{H_3O^+} X \xrightarrow{[H]} RCH_2NH_2;\ 'X' \text{ is}$$

(a) Isonitrile (b) Nitrile
(c) Nitrite (d) Oxime

Q.10 Which of the following compound is the strongest base?
(a) Ammonia (b) Aniline
(c) Methylamine (d) N-methylaniline

Q.11 Following reaction is an example of

$$R-\overset{\overset{O}{\|}}{C}-OH+HN_3 \xrightarrow{H_2SO_4} R-NH_2$$

(a) Hofmann reaction (b) Curtius reaction
(c) Schmidt reaction (d) Lossen reaction

Q.12 When aniline reacts with $NaNO_2$ and dil. HCl at 0°– 5°C, the product formed is
(a) Nitroaniline
(b) Benzenediazonium chloride
(c) Benzene
(d) Trinitroaniline

Q.13 In the following reaction, X is

$$X \xrightarrow{\text{Bromination}} Y \xrightarrow{NaNO_2+HCl} Z \xrightarrow[C_2H_5OH]{\text{Boiling}}$$

Tribromobenzene
(a) Benzoicacid (b) Salicylicacid
(c) Phenol (d) Aniline

Q.14 Which of the following statements about primary amines is **'False'** ?
(a) Alkyl amines are stronger bases than aryl amines
(b) Alkyl amines react with nitrous acid to produce alcohols
(c) Aryl amines react with nitrous acid to produce phenols
(d) Alkyl amines are stronger bases than ammonia

Q.15 Which of the following reacts with chloroform and a base to form phenyl isocyanide ?
(a) Aniline (b) Phenol
(c) Benzene (d) Nitrobenzene

Q.16 Ethyl amine on heating with CS_2 in presence of $HgCl_2$ forms
(a) C_2H_5NCS (b) $(C_2H_5)_2S$
(c) $(C_2H_5)_2CS$ (d) $C_2H_5(CS)_2$

Q.17 Which of the following reacts with $NaNO_2$ + HCl to give phenol ?
(a) $C_6H_5CH_2NHCH_3$ (b) $(CH_3)_2$ NH
(c) CH_3NH_2 (d) $C_6H_5NH_2$

Q.18 Starting from propanoic acid, the following reactions were carried out

$$\text{Propanoic acid} \xrightarrow{SOCl_2} X \xrightarrow{NH_3} Y \xrightarrow{Br_2+KOH} Z$$

What is the compound Z?
(a) CH_3-CH_2-Br (b) $CH_3-CH_2-NH_2$
(c) $CH_3-CH_2-C(=O)-Br$ (d) $CH_3-CH_2-CH_2-NH_2$

Q.19 Aromatic nitriles (ArCN) are not prepared by reaction
(a) ArX + KCN (b) $ArN_2^+ + CuCN$
(c) $ArCONH_2 + P_2O_5$ (d) $ArCONH_2 + SOCl_2$

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	

Space for Rough Work

Q.20 Azo-dyes are prepared from :

(a) Aniline

(b) Salicylic acid

(c) Benzaldehyde

(d) Chlorobenzene

Q.21 For the preparation of *p*-nitroiodobenzene from *p*-nitroaniline, the best method is

(a) $NaNO_2$/HCl followed by KI

(b) $NaNO_2$/HCl followed by CuCN

(c) $LiAlH_4$ followed by I_2

(d) $NaBH_4$ followed by I_2

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 reactions yield an amine ?

(1) $RX + NH_3 \longrightarrow$

(2) $RCH = NOH + [H] \xrightarrow[C_2H_5OH]{Na}$

(3) $RCONH_2 + 4H \xrightarrow{LiAlH_4}$

(4) $RCN + H_2O \xrightarrow{H^+}$

Q.23 Which of the following do not give primary amine on reduction?

(1) $CH_3 - CH_2 - O - N = O$

(2) $CH_3CH_2NO_3$

(3) $CH_3CH_2CH_2NO_3$

(4) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{N} \rightarrow O$

Q.24 Which of the following reduces $C_6H_5NO_2$ to aniline ?

(1) Sn/HCl (2) $SnCl_2$/HCl

(3) Zn/HCl (4) $LiAlH_4$

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

Observe the following reaction :

$$RCH_2CH_2NH_2 \xrightarrow{MeI\ (excess)} (X) \xrightarrow{AgOH} (Y) \xrightarrow{heat} (Z)$$

Q.25 The structure of X is –

(a) $RCH_2CH_2NMe_3^+I^-$ (b) $RCH_2CH_2NMe_3^+OH^-$

(c) $R.CH = CH_2$ (d) None of these

Q.26 The structure of Y is –

(a) $RCH_2CH_2NMe_3^+I^-$ (b) $RCH_2CH_2NMe_3^+OH^-$

(c) $R.CH = CH_2$ (d) None of these

Q.27 The structure of Z is –

(a) $RCH_2CH_2NMe_3^+I^-$

(b) $RCH_2CH_2NMe_3^+OH^-$

(c) $R.CH = CH_2$

(d) None of these

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

Space for Rough Work

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 : Methyl isocyanide reacts with ozone to form methyl isocyanate.

Statement-2 : Methyl isocyanate was responsible for Bhopal tragedy.

Q.29 Statement-1 : Alkyl cyanide can be prepared by carbylamine reaction.

Statement-2 : Ethyl amine when heated with chloroform in presence of alcoholic KOH gives isocyanide.

Q.30 Statement-1 : In order to convert R-Cl to pure R–NH_2, Gabriel pthalimide synthesis can be used.

Statement-2 : With proper choice of alkyl halides, phthalimide synthesis can be used to prepare 1°, 2° or 3° amines.

RESPONSE GRID	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 54 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	36	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

EBD_7157

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

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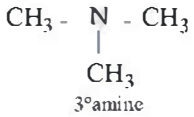
1. **(d)** C_3H_9N can form all the three types of amines.

$CH_3CH_2CH_2-NH_2$, $CH_3-CH_2-NH-CH_3$

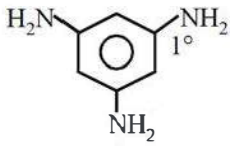
1°amine 2°amine



3°amine

2. **(d)** Allyl isocyanide, $CH_2=CH-CH_2-\ddot{N}\rightarrow C$

3. **(c)**



1° amine

4. **(a)**

5. **(b)** Four 1° amines are possible

$CH_3CH_2CH_2CH_2NH_2$, $(CH_3)_2CHCH_2NH_2$,

$CH_3CH(NH_2)CH_2CH_3$, $(CH_3)_3CNH_2$

6. **(c)** Hofmann's bromamide reaction

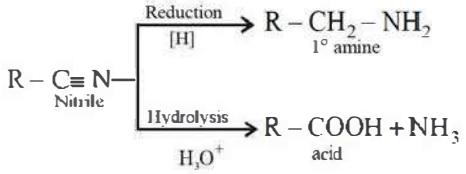
$$\underset{\text{Acetamide}}{CH_3-CO-NH_2}+Br_2+4KOH \xrightarrow{H_2O} \underset{\text{Methyl amine}}{CH_3NH_2}+K_2CO_3+2KBr+2H_2O$$

7. **(c)** $C_2H_5I+NH_3 \rightarrow HI+C_2H_5-NH_2$

$C_2H_5OH+NH_3 \rightarrow H_2O+C_2H_5-NH_2$

8. **(d)** $CH_3I \xrightarrow[\Delta]{NH_3} \underset{\text{Methyl amine}}{CH_3NH_2} \xrightarrow{CH_3I} \underset{\text{Dimethyl amine}}{(CH_3)_2NH} \xrightarrow{CH_3I} \underset{\text{Trimethyl amine}}{(CH_3)_3N}$

9. **(b)**



10. **(c)** Methylamine is the strongest base.

11. **(c)** (a) $R-\underset{\underset{O}{\|}}{C}-NH_2 \xrightarrow{Br_2/NaOH} R-NH_2$

(Hofmann reaction)

(b) $R-\underset{\underset{O}{\|}}{C}-N_3 \xrightarrow{heat} R-NH_2$

Azide

(Curtius reaction)

(c) $R-\underset{\underset{O}{\|}}{C}-OH + HN_3 \xrightarrow{H_2SO_4} R-NH_2$

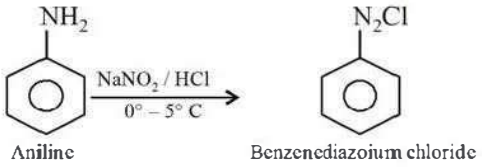
(Schmidt reaction)

(d) $R-\underset{\underset{O}{\|}}{C}-NHOH \xrightarrow{OH^-} R-NH_2$

(Lossen reaction)

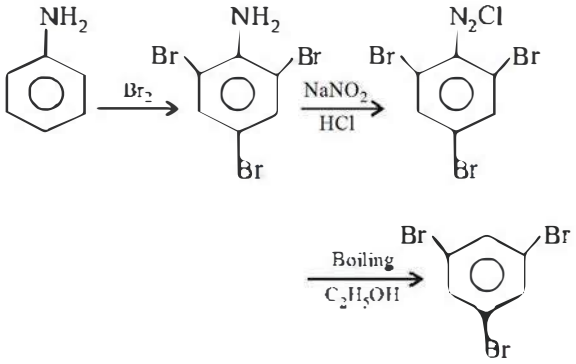
Hydroxamic acid

12. **(b)**



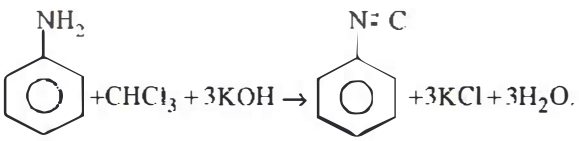
Aniline Benzenediazonium chloride

13. **(d)**



14. **(c)** Aryl amines do not produce phenol on treatment with nitrous acid.

15. **(a)**



16. **(a)** $C_2H_5NH_2+CS_2+HgCl_2 \rightarrow C_2H_5NCS+2HCl+HgS.$

17. **(d)** $C_6H_5NH_2 \xrightarrow[HCl]{NaNO_2} C_6H_5N_2Cl \xrightarrow{H_2O} C_6H_5OH+N_2+HCl$

18. **(b)** $CH_3CH_2COOH \xrightarrow{SOCl_2} CH_3CH_2COCl+SO_2+HCl$

$CH_3CH_2COCl+NH_3 \rightarrow \underset{X}{CH_3CH_2CONH_2}+HCl$

$CH_3CH_2CONH_2+Br_2/NaOH \rightarrow \underset{\text{Ethylamine, Z}}{CH_3CH_2NH_2}+CO_2$

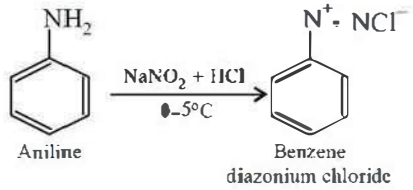
19. (a) Due to +M effect of –Cl, C–X bond in ArX acquires double bond character and hence becomes short and strong. Thus X can't be replaced easily.

$$ArN_2^+ + CuCN \rightarrow ArCN + N_2 + Cu^+$$

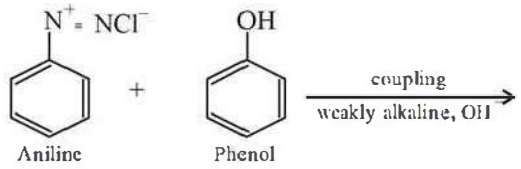
$$Ar\text{-}C(=O)NH_2 \xrightarrow[-H_2O]{P_2O_5} ArCN$$

$$ArCONH_2 + SOCl_2 \rightarrow ArCN + SO_2 + 2HCl$$

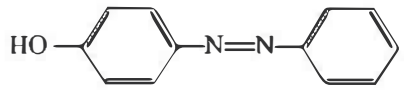
20. (a) When aniline is treated with HNO_2 at 0-5°C then diazonium salt is formed and by the coupling of diazonium salt and phenol, azo dyes are prepared.



Aniline — Benzene diazonium chloride

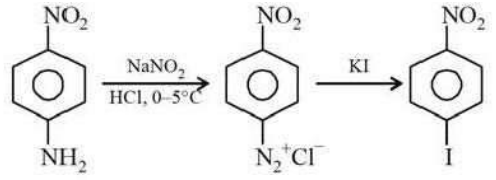


Aniline — Phenol



Azo dye

21. (a) *p*-Nitroiodobenzene from *p*-nitroaniline.



p-nitroaniline — *p*-nitroiodobenzene

22. (a) $R-CN + H_2O \xrightarrow{H_2O/H^+} RCOOH + NH_3$

It yields amine when reduced as shown below.

$$R-CN + H_2 \rightarrow R-CH_2-NH_2$$

Thus option (d) is incorrect.

23. (a) $CH_3-CH_2-\overset{O}{\overset{\|}{N}}\rightarrow O + 3H_2 \rightarrow CH_3CH_2NH_2 + 2H_2O$

24. (a) $LiAlH_4$ does not reduce $-NO_2$ group.
Thus (1), (2), (3) are the correct choices.

25. (a), 26. (b), 27. (c)

The amine undergoes exhaustive when treated with AgOH methylation forming $RCH_2CH_2NMe_3^+I^-$, (X) which is converted to (Y), $RCH_2CH_2NMe_3^+OH^-$. (Y) when heated, Hofmann elimination occurs.

$$\underset{(Y)}{RCH_2CH_2NMe_3^+OH^-} \rightarrow \underset{(Z)}{RCH=CH_2} + Me_3N + H_2O$$

28. (b) The reason being that the terminal carbon atom in isocyanide has electron-deficient carbon having a sextet of electrons and hence undergoes addition reactions with ozone.

29. (c) When primary amines are heated with chloroform in the presence of alcoholic KOH, isocyanides are formed. This reaction is known as carboylamine reaction, *eg.* ethyl amine gives ethyl isocyanide on treatment with $CHCl_3$ and alcoholic KOH.

$$\underset{\text{Ethylamine}}{C_2H_5-NH_2} + \underset{\text{Chloroform}}{CHCl_3} + 3KOH(alc) \xrightarrow{\Delta}$$

$$C_2H_5-N\equiv C + 3KCl + 3H_2O$$

30. (d) Only primary aliphatic amines can be prepared by Gabriel phthalimide reaction.