

DPP - Daily Practice Problems

Chapter-wise Sheets

Date : Start Time : End Time :

CHEMISTRY (CC27)

SYLLABUS : Amines

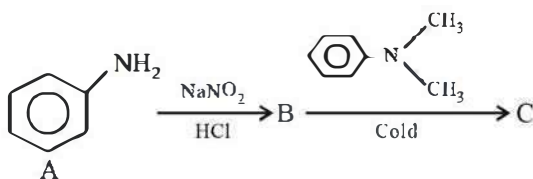
Max. Marks : 180

Marking Scheme : + 4 for correct & (-1) for incorrect

Time : 60 min.

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

- The reduction of nitro compounds is most preferred in the presence of
 (a) Pd/H_2 in ethanol (b) $\text{Sn} + \text{HCl}$
 (c) finely divided Ni (d) iron scrap and HCl .
- Ortho-Nitrophenol is less soluble in water than *p*- and *m*-Nitrophenols because :
 (a) *o*-Nitrophenol is more volatile than those of *m*- and *p*-isomers.
 (b) *o*-Nitrophenol shows intramolecular H-bonding
 (c) *o*-Nitrophenol shows intermolecular H-bonding
 (d) Melting point of *o*-Nitrophenol is lower than those of *m*- and *p*-isomers.
- In a reaction of aniline a coloured product C was obtained.



The structure of C would be :

- c1ccccc1=N=NCCN(C)c2ccccc2
- Cc1ccccc1=N=Nc2ccccc2C
- c1ccccc1N=NNc2ccc(N(C)C)cc2
- c1ccccc1=N=Nc2ccc(N(C)C)cc2

- The number of primary amines of formula $\text{C}_4\text{H}_{11}\text{N}$ is :
 (a) 1 (b) 3
 (c) 4 (d) 2

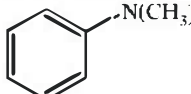
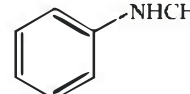
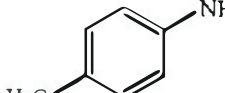
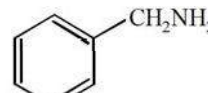
RESPONSE GRID

1. (a) (b) (c) (d) 2. (a) (b) (c) (d) 3. (a) (b) (c) (d) 4. (a) (b) (c) (d)

Space for Rough Work

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5. Which of the following reactions will not give a primary amine?
- $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{Br}_2 / \text{KOH}}$
 - $\text{CH}_3\text{CN} \xrightarrow{\text{LiAlH}_4}$
 - $\text{CH}_3\text{NC} \xrightarrow{\text{LiAlH}_4}$
 - $\text{CH}_3\text{CONH}_2 \xrightarrow{\text{LiAlH}_4}$
6. Which one of the following methods is neither meant for the synthesis nor for separation of amines?
- Curtius reaction
 - Wurtz reaction
 - Hofmann method
 - Hinsberg method
7. Amongst the following the most basic compound is
- p-nitroaniline
 - acetanilide
 - aniline
 - benzylamine
8. Which of the following is not correct?
- Ethyl amine and aniline both have $-\text{NH}_2$ group
 - Ethyl amine and aniline dissolve in HCl
 - Ethyl amine and aniline both react with CHCl_3 and KOH to form unpleasant smelling compound
 - Ethyl amine and aniline both react with HNO_2 in cold to give hydroxy compounds
9. Arrange the following amines in the order of increasing basicity.
- $\text{CH}_3\text{NH}_2 < \text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_4(\text{OCH}_3)\text{NH}_2 < \text{C}_6\text{H}_4(\text{NO}_2)\text{NH}_2$
 - $\text{C}_6\text{H}_4(\text{OCH}_3)\text{NH}_2 < \text{C}_6\text{H}_4(\text{NO}_2)\text{NH}_2 < \text{C}_6\text{H}_5\text{NH}_2 < \text{CH}_3\text{NH}_2$
 - $\text{C}_6\text{H}_4(\text{NO}_2)\text{NH}_2 < \text{C}_6\text{H}_4(\text{OCH}_3)\text{NH}_2 < \text{C}_6\text{H}_5\text{NH}_2 < \text{CH}_3\text{NH}_2$
 - $\text{C}_6\text{H}_5\text{NH}_2 < \text{C}_6\text{H}_4(\text{OCH}_3)\text{NH}_2 < \text{C}_6\text{H}_4(\text{NO}_2)\text{NH}_2 < \text{CH}_3\text{NH}_2$
10. When bromination of aniline is carried out by protecting $-\text{NH}_2$. The product is
- o-bromoaniline
 - 2,4,6-tribromoaniline
 - p-bromoaniline
 - mixture of o-and p-bromoaniline
11. Ethyl isocyanide on hydrolysis in acidic medium generates
- propanoic acid and ammonium salt
 - ethanoic acid and ammonium salt
 - methylamine salt and ethanoic acid
 - ethylamine salt and methanoic acid
12. Which one of the following is the strongest base in aqueous solution?
- Methylamine
 - Trimethylamine
 - Aniline
 - Dimethylamine
13. Tautomerism will be exhibited by
- $(\text{CH}_3)_3\text{CNO}$
 - $(\text{CH}_3)_2\text{NH}$
 - R_3CNO_2
 - RCH_2NO_2
14. Amongst the compounds given, the one that would form a brilliant colored dye on treatment with NaNO_2 in dil. HCl followed by addition to an alkaline solution of β -naphthol is
- 
 - 
 - 
 - 
15. Amongst the given set of reactants, the most appropriate for preparing 2° amine is _____.
- $2^\circ\text{R}-\text{Br} + \text{NH}_3$
 - $2^\circ\text{R}-\text{Br} + \text{NaCN}$ followed by H_2/Pt
 - $1^\circ\text{R}-\text{NH}_2 + \text{RCHO}$ followed by H_2/Pt
 - $1^\circ\text{R}-\text{Br}$ (2 mol) + Potassium phthalimide followed by $\text{H}_3\text{O}^+/\text{heat}$
16. In the chemical reaction, $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \rightarrow (\text{A}) + (\text{B}) + 3\text{H}_2\text{O}$, the compounds (A) and (B) are respectively
- $\text{C}_2\text{H}_5\text{NC}$ and 3KCl
 - $\text{C}_2\text{H}_5\text{CN}$ and 3KCl
 - $\text{CH}_3\text{CH}_2\text{CONH}_2$ and 3KCl
 - $\text{C}_2\text{H}_5\text{NC}$ and K_2CO_3
17. Which of the following is not an explosive?
- Nitroglycerine
 - o-Aminotoluene
 - Dynamite
 - Trinitrotoluene
18. Which of the following reagents will be useful to distinguish between
- $$\text{H}_3\text{C}-\text{C}_6\text{H}_4-\text{NH}_2 \text{ and } \text{C}_6\text{H}_5-\text{CH}_2\text{NH}_2$$
- Dilute HCl
 - $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ and $\text{OH}^-/\text{H}_2\text{O}$
 - HONO then β -naphthol
 - AgNO_3 in H_2O
19. High basicity of Me_2NH relative to Me_3N is attributed to:
- effect of solvent
 - inductive effect of Me
 - shape of Me_2NH
 - shape of Me_3N

RESPONSE
GRID

5. (a)(b)(c)(d)
10. (a)(b)(c)(d)
15. (a)(b)(c)(d)

6. (a)(b)(c)(d)
11. (a)(b)(c)(d)
16. (a)(b)(c)(d)

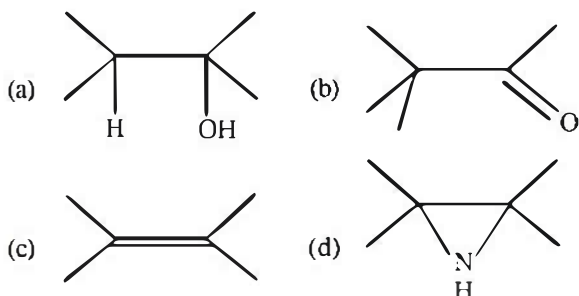
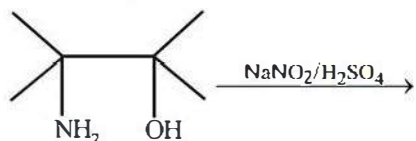
7. (a)(b)(c)(d)
12. (a)(b)(c)(d)
17. (a)(b)(c)(d)

8. (a)(b)(c)(d)
13. (a)(b)(c)(d)
18. (a)(b)(c)(d)

9. (a)(b)(c)(d)
14. (a)(b)(c)(d)
19. (a)(b)(c)(d)

Space for Rough Work

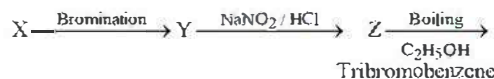
20. The major product of the reaction



21. Which reaction sequence would be best to prepare 3-chloroaniline from benzene?

- (a) Chlorination, nitration, reduction
(b) Nitration, chlorination, reduction
(c) Nitration, reduction, chlorination
(d) Nitration, reduction, acetylation, chlorination, hydrolysis

22. In the following reaction, X is

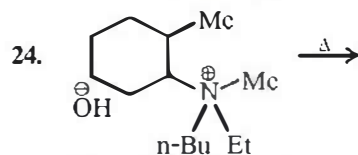


- (a) Benzoic acid (b) Salicylic acid
(c) Phenol (d) Aniline

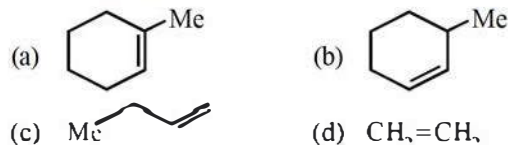
23. $R-NH_2 + CH_3COCl \xrightarrow{\text{(excess)}} A$

The product (A) will be –

- (a) $RNHCOCH_3$ (b) $RN(COCH_3)_2$
(c) $RN(COCH_3)_3Cl^-$ (d) $R-CONH_2$



The alkene formed as a major product in the above elimination reaction is



25. N-ethyl benzene sulphonyl amide is strongly acidic and soluble in alkali due to presence of

- (a) strong electron donating sulphonyl group.
(b) strong electron withdrawing sulphonyl group.
(c) weak electron donating sulphonyl group.
(d) weak electron withdrawing sulphonyl group.

26. Match the columns

Column-I	Column-II
A. Benzene sulphonyl chloride	I. Zwitter ion
B. Sulphanilic acid	II. Hinsberg reagent
C. Alkyl diazonium salts	III. Dyes
D. Aryl diazonium salts	IV. Conversion to alcohols
(a) A – IV; B – II; C – III; D – I	
(b) A – II; B – I; C – IV; D – III	
(c) A – III; B – IV; C – I; D – II	
(d) A – IV; B – I; C – III; D – II	

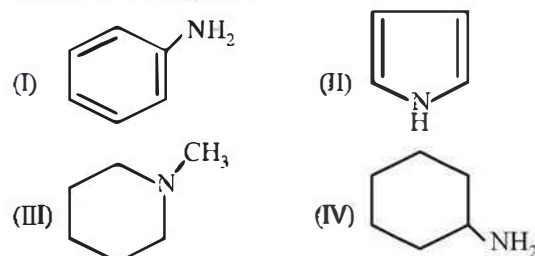
27. Primary amines can be distinguished from secondary and tertiary amines by reacting with

- (a) Chloroform and alcoholic KOH
(b) Methyl iodide
(c) Chloroform alone
(d) Zinc dust

28. The indicator that is obtained by coupling the diazonium salt of sulphanilic acid with N, N-dimethylaniline is

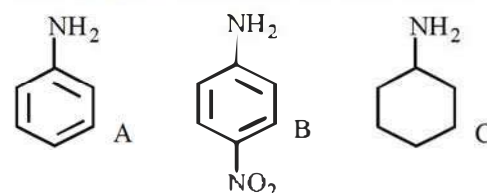
- (a) phenanthroline (b) methylorange
(c) methylred (d) phenolphthalein

29. Among the following compounds, the increasing order of their basic strength is :



- (a) (I) < (II) < (IV) < (III)
(b) (I) < (II) < (III) < (IV)
(c) (II) < (I) < (IV) < (III)
(d) (II) < (I) < (III) < (IV)

30. The correct order of basicity of the following compounds



- (a) B > A > C (b) A > B > C
(c) C > A > B (d) C > B > A

31. Which of the following compounds cannot be identified by carbylamine test?

- (a) $CH_3CH_2NH_2$ (b) $CHCl_3$
(c) $C_6H_5NH_2$ (d) $C_6H_5NH-C_6H_5$

32. A compound with molecular mass 180 is acylated with CH_3COCl to get a compound with molecular mass 390. The number of amino groups present per molecule of the former compound is :

- (a) 2 (b) 5 (c) 4 (d) 6

RESPONSE
GRID

20. (a) (b) (c) (d)	21. (a) (b) (c) (d)	22. (a) (b) (c) (d)	23. (a) (b) (c) (d)	24. (a) (b) (c) (d)
25. (a) (b) (c) (d)	26. (a) (b) (c) (d)	27. (a) (b) (c) (d)	28. (a) (b) (c) (d)	29. (a) (b) (c) (d)
30. (a) (b) (c) (d)	31. (a) (b) (c) (d)	32. (a) (b) (c) (d)		

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33. Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound if water during the reaction is continuously removed. The compound formed is generally known as

(a) an amine (b) an imine
(c) an aniline (d) a Schiff's base

34. Match the compounds in List I with their nature from List II, as seen in aqueous medium

List I

List II

A. Acetamide I. Acidic
B. Benzonitrile II. Basic
C. Triethylamine III. Neutral
D. Phenol

(a) A-III; B-III; C-II; D-I
(b) A-II; B-III; C-III; D-I
(c) A-III; B-II; C-II; D-III
(d) A-I; B-I; C-III; D-II

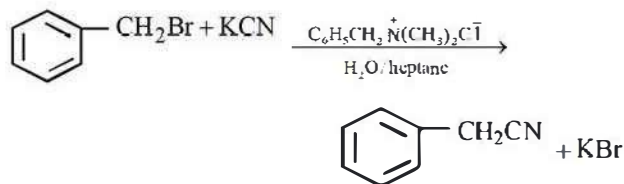
35. An organic amino compound reacts with aqueous nitrous acid at low temperature to produce an oily nitrosoamine. The compound is

(a) CH_3NH_2 (b) $\text{CH}_3\text{CH}_2\text{NH}_2$
(c) $\text{CH}_3\text{CH}_2\text{NHCH}_2\text{CH}_3$ (d) $(\text{CH}_3\text{CH}_2)_3\text{N}$

36. Nitrosoamines ($\text{R}_2\text{N}-\text{N}=\text{O}$) are insoluble in water. On heating with conc. H_2SO_4 , they give secondary amines. The reaction is called

(a) Liebermann nitroso reaction
(b) Etard reaction
(c) Fries reaction
(d) Perkin reaction

37. In which of the following two phase reaction, the catalyst works by?



- (a) Removing K^+ from the organic phase to make cyanide ion more nucleophilic.
(b) Removing Br^- from the organic phase to the aqueous phase.
(c) Transferring CN^- from the aqueous phase to organic phase containing $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$.
(d) Transferring $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$ from the organic phase to the aqueous phase containing CN^-
38. Match the compounds in List I with the appropriate test that will be answered by each one of them in List II

List I

List II

A. Propyne Fehling's I. Reduces solutions
B. Ethyl benzoate II. Forms a precipitate with AgNO_3 in ethanol
C. Acetaldehyde III. Insoluble in water but dissolves in aqueous NaOH solution upon heating
D. Aniline IV. Dissolves in dilute HCl in the cold and is reprecipitated by the addition of alkali

(a) A-I; B-IV; C-II; D-I
(b) A-I; B-IV; C-III; D-II
(c) A-IV; B-II; C-III; D-I
(d) A-II; B-III; C-I; D-IV

39. All three amines 1° , 2° , 3° react with

1. H_2O 2. R-X 3. HCl 4. $(\text{CH}_3\text{CO})_2\text{O}$
(a) 1, 2 (b) 4 only (c) 1, 2, 4 (d) 1, 2, 3

40. Hinsberg reagent is

(a) $\text{C}_6\text{H}_5\text{SO}_3\text{H}$ (b) $\text{C}_6\text{H}_5\text{NO}$
(c) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ (d) $\text{C}_6\text{H}_5\text{N}_2\text{Cl}$

41. Which of the following amines can be prepared by Gabriel method?

(i) $\text{CH}_3\text{CH}_2\text{NH}_2$ (ii) $(\text{CH}_3)_2\text{CHNH}_2$
(iii) $(\text{CH}_3)_3\text{CNH}_2$ (iv) $\text{C}_6\text{H}_5\text{NH}_2$
(a) (i) and (iii) (b) (ii) and (iv)
(c) (i), (ii) and (iii) (d) (i) and (ii)

42. When phenol and benzene diazonium chloride are coupled, the main product is:

(a) aniline (b) *p*-hydroxyazobenzene
(c) azobenzene (d) chlorobenzene

43. Replacement of $-\text{N}_2^+\text{Cl}^-$ from benzene diazonium chloride by iodine can be done by using

(a) HI (b) NaOI (c) PI_3 (d) KI

44. $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow{\text{NaCN}} \text{X} \xrightarrow{\text{Ni/H}_2} \text{Y} \xrightarrow{\text{acetic anhydride}} \text{Z}$

Z in the above reacting sequence is

(a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{NHCOCH}_3$
(b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$
(c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CONHCH}_3$
(d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CONHCOCH}_3$

45. Towards electrophilic substitution, the most reactive will be

(a) Nitrobenzene
(b) Aniline
(c) Aniline hydrochloride
(d) N-Acetylaniline

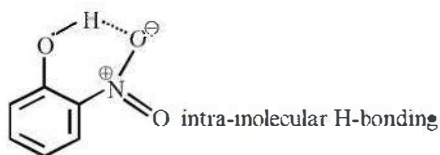
RESPONSE
GRID

33. (a) (b) (c) (d)	34. (a) (b) (c) (d)	35. (a) (b) (c) (d)	36. (a) (b) (c) (d)	37. (a) (b) (c) (d)
38. (a) (b) (c) (d)	39. (a) (b) (c) (d)	40. (a) (b) (c) (d)	41. (a) (b) (c) (d)	42. (a) (b) (c) (d)
43. (a) (b) (c) (d)	44. (a) (b) (c) (d)	45. (a) (b) (c) (d)		

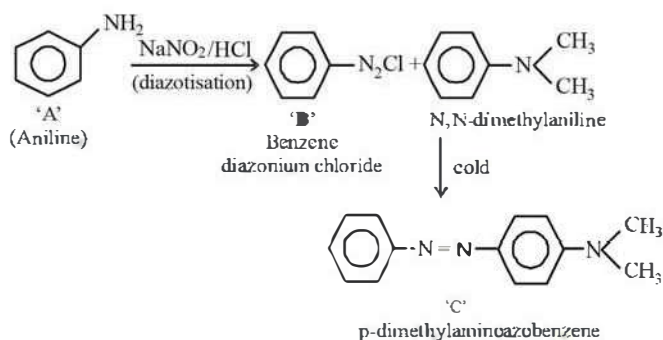
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1. (d) Reduction with iron scrap and hydrochloric acid is preferred because FeCl_2 formed gets hydrolysed to release hydrochloric acid during the reaction. Thus, only a small amount of hydrochloric acid is required to initiate the reaction.

2. (b) \bullet -Nitrophenol shows intramolecular H-bonding and forms chelate. Compounds involved in chelation become non-polar. Consequently such compounds are soluble in non-polar solvents like ether, benzene etc. and are only sparingly soluble in water whereas meta and para isomers are more soluble in water & less soluble in non-polar solvents.



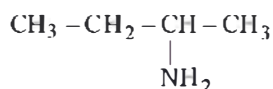
3. (d) The reaction can be completed as follows:



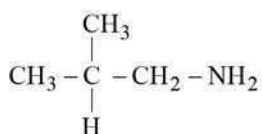
4. (c) 1° amines have $-\text{NH}_2$ group in their structure. 4 primary amines are possible by $\text{C}_4\text{H}_{11}\text{N}$.



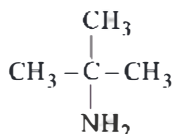
(i)



(ii)



(iii)



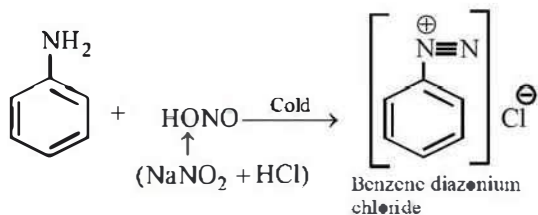
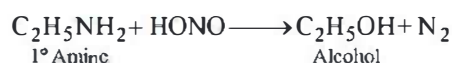
(iv)

5. (c) CH_3NC (methyl isocyanide) on reduction with LiAlH_4 gives secondary amine.
6. (b) Wurtz reaction is for the preparation of hydrocarbons from alkyl halide

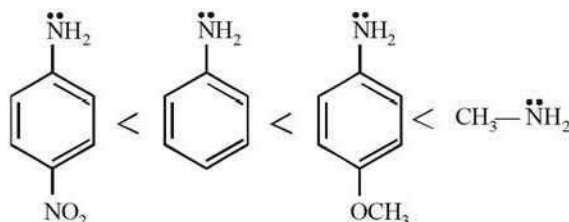


7. (d) Benzylamine is most basic. In others the basic character is suppressed due to resonance.

8. (d) Nitrous acid reacts differently with aliphatic and aromatic amines in cold.



9. (c) Aliphatic amines are more basic than aromatic amines thus methylamine is most basic. Electron donating groups increase the basicity whereas electron withdrawing groups decrease the basicity of the aromatic amines. Thus p-methoxyaniline is more basic than aniline which is further more basic than p-nitroaniline.



10. (d)

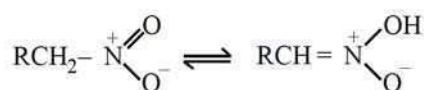
11. (d) $\text{CH}_3\text{CH}_2\text{N}\equiv\text{C} + \text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{CH}_3\text{CH}_2\text{NH}_2 + \text{HCOOH}$

12. (d) Aromatic amines are less basic than aliphatic amines. Among aliphatic amines the order of basicity is $2^\circ > 1^\circ > 3^\circ$. The electron density is decreased in

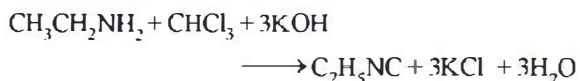
3° amine due to crowding of alkyl group over N atom which makes the approach and bonding by a proton relatively difficult. Therefore the basicity decreases. Further Phenyl group show -I effect, thus decreases the electron density on nitrogen atom and hence the basicity.

- ∴ dimethylamine (2° aliphatic amine) is strongest base among given choices.
 ∴ The correct order of basic strength is
 Dimethylamine > Methyl amine > Trimethyl amine > Aniline.

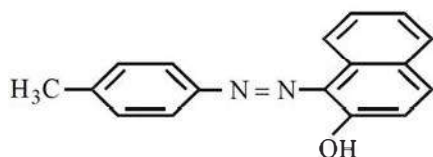
13. (d) Nitro compounds having α -hydrogen show tautomerism



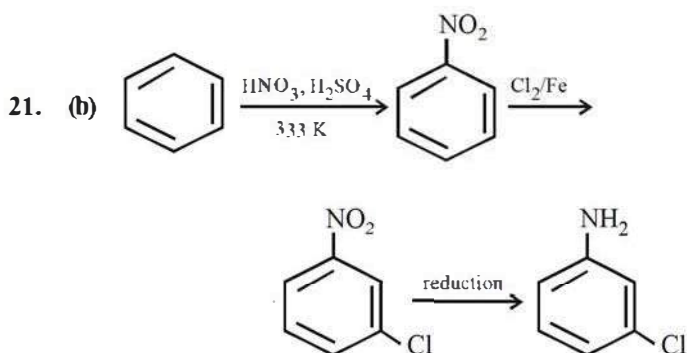
14. (c) Only primary aromatic amines undergo diazotisation followed by coupling.
 15. (c)
 16. (a) This is carbylamine reaction.



17. (b) Explosives invariably contain two or more $-\text{NO}_2$ groups, hence *o*-aminotoluene (not having any $-\text{NO}_2$ group) is not an explosive. All other three compounds have three $-\text{NO}_2$ groups per molecule.
 18. (c) The first compound will give azo dye



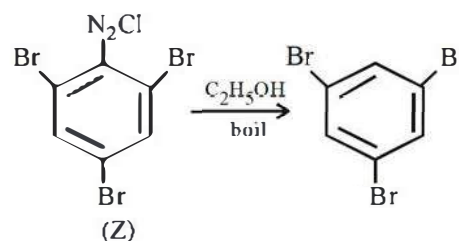
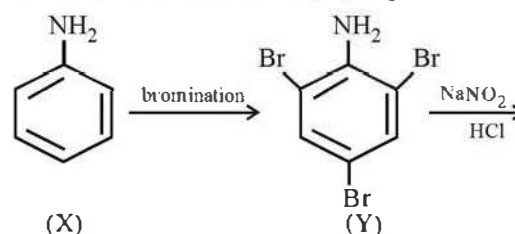
19. (a) Secondary amines are more basic than tertiary amines due to stabilisation of 2° amine by hydrogen bonding with solvent molecule.
 20. (b)



- (i) In case chlorination is done earlier than nitration, chlorobenzene formed at first step would introduce $-\text{NO}_2$ group in ortho-position, not in *m*-position

- (ii) Again if $-\text{NO}_2$ group is reduced earlier than the chlorination step, $-\text{NH}_2$ group formed on reduction will again introduce $-\text{Cl}$ in *o*-position

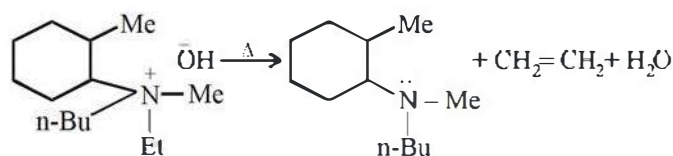
22. (d) Proceed backward ; tribromobenzene is produced by boiling compound Z with $\text{C}_2\text{H}_5\text{OH}$; Z in turn is obtained by diazotisation of Y, so Y and Z should have $-\text{NH}_2$ and $-\text{N}_2\text{Cl}$ groups respectively, in addition to three Br atoms. Hence X should be $\text{C}_6\text{H}_5\text{NH}_2$.



23. (a) Acylation occurs in one step only because lone pair of nitrogen is delocalized with acyl group.



24. (d) **Hofmann's rule** : When theoretically more than one type of alkenes are possible, the alkene containing least alkylated double bond is formed. Hence



25. (b) The hydrogen attached to nitrogen in sulphonamide is strongly acidic due to the presence of strong electron withdrawing sulphonyl group. Hence, it is soluble in alkali.

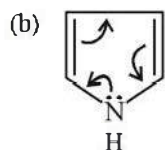
26. (b)

27. (a) 1° amines (aliphatic and aromatic) react with CHCl_3/KOH to yield isocyanide (foul smelling). This is known as carbylamine test which is not given by 2° and 3° amines.

28. (b)

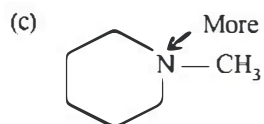
29. (c) (a)
-
- + R effect

the lone pair of electron is less easily available for protonation.



+ R effect

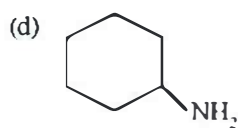
the lone pair of electron is not available for proton.



More +I, less H-bonding

+ I, H-bonding

+I more preferred than H-bonding, is due to steric hindrance to H-bonding in 1° amine.



+ I, H-bonding

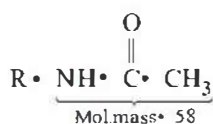
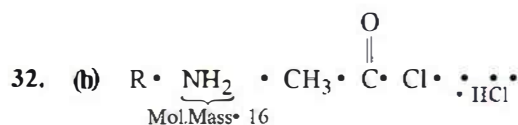
More H-bonding, less +I effect

Unstable Thus, the correct order is

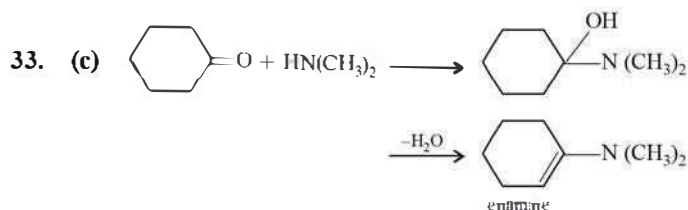
(II) < (I) < (IV) < (III).

30. (c) Aliphatic amines are more basic than aromatic amines. Resonance decreases the basic character due to delocalisation of shared pair of electrons on nitrogen within benzene nucleus.

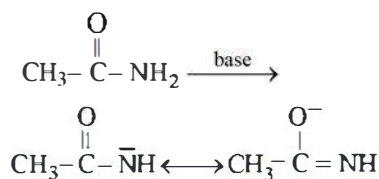
31. (d)



Now since the molecular mass increases by 42 unit as a result of the reaction of one mole of CH_3COCl with one -NH_2 group and the given increase in mass is 210. Hence the number of -NH_2 groups is = $210/42 = 5$.



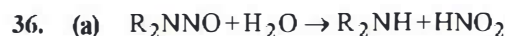
34. (a) Acetamide is basic due to the presence of lone pair of electrons of N; it is also acidic because its conjugate base shows resonance.



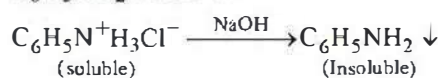
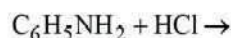
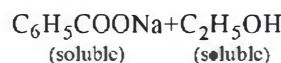
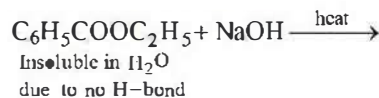
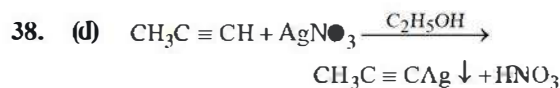
(more stable due to -ve charge on O)

∴ Acetamide is neutral. Benzonitrile ($\text{C}_6\text{H}_5\text{C}\equiv\text{N}$) acts as an electrophile (Lewis acid) due to electron deficiency of C of CN as well as nucleophile (Lewis base) in nature due to presence of lone pair electrons on N; hence it is neutral. Triethyl amine and phenol are basic and acidic in nature respectively.

35. (c) Since the organic amino compound on reaction with nitrous acid at low temperature produces an oily nitrosoamine so the organic amino compound is a secondary aliphatic amine.



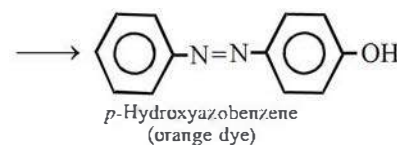
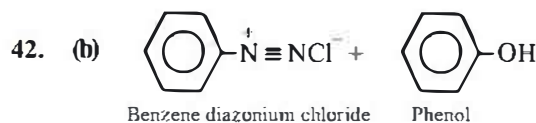
37. (c)



39. (d)

40. (c)

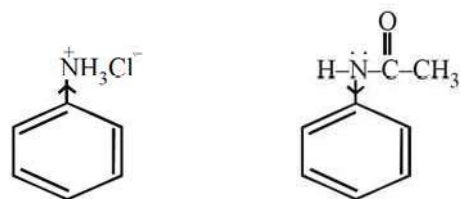
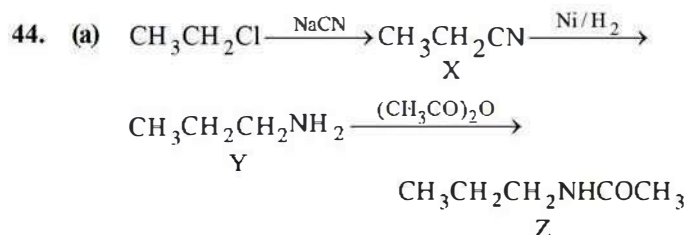
41. (d) For the preparation of Me_3CNH_2 , the required alkyl halide is Me_3CX which will react with potassium phthalimide, a strong base, to form alkene rather than substituted product. For preparing $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{Cl}$ will be the starting halide in which Cl is non-reactive.



DPP/CC27

s-79

43. (d)



Nitrobenzene and aniline hydrochloride have electron-withdrawing ($-\text{NO}_2$ and $-\text{NH}_3^+$) groups, hence these will undergo electrophilic substitution with difficulty. Aniline and N- acetylaniline (acetanilide) have electron-releasing groups, however $-\text{NHCOCH}_3$ is less electron-releasing than $-\text{NH}_2$ due to delocalisation of lone pair of electron on N toward carbonyl group. Hence aniline (having $-\text{NH}_2$) will undergo electrophilic substitution most easily.