ORGANIC CHEMISTRY

NEET

CRASH COURSE

NITROGEN COMPOUNDS

SMART ACHIEVERS

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NITROGEN COMPOUNDS

Q.1 A reaction used in descending a homologous series would be -
(1) $RCONH_2 + Br_2 + KOH$ (2) $RCH_2Cl + KCN$
(3) $RNH_2 + CHCl_3 + KOH$ (4) None of the above

Q.2 Amines are basic in nature because-
(1) They produce OH^- ions when treated with water
(2) They have replaceable H atoms on N atoms
(3) They have lone pair of electron on N atom
(4) None of these

Q.3 Which of the following diazonium salt is relatively stable of 0-5ºC -
(1) $CH_3–N\equiv N\}\ ^{\oplus}Cl^-$ (2) $CH_3–C(CH_3)–N\equiv N\}\ ^{\oplus}Cl^-$
(3) $C_6H_5–N\equiv N\}\ ^{\oplus}Cl^-$ (4) $(CH_3)_3C–N\equiv N\}\ ^{\oplus}Cl^-$

Q.4 The odour of alkyl cyanides is similar to –
(1) Bitter almonds (2) Acid (3) Fruity smell (4) None

Q.5 Minimum boiling point would be of :
(1) Ethylmethyl amine (2) Ethylamine (3) n-Propyl amine (4) Trimethylamine

Q.6 The presence of primary amines can be confirmed by-
(1) Reaction with HNO_2 (2) Reaction with $CHCl_3$ and alc. KOH
(3) Reaction with Grignard reagent (4) Reaction with acetyl chloride

Q.7 How many isomeric amines can have the formula $C_4H_{11}N$ -
(1) Five (2) Six (3) Seven (4) Eight

Q.8 Acetonitrile has the structure :
(1) C_2H_5NC (2) C_2H_5CN (3) CH_3NC (4) CH_3CN

Q.9 The compound obtained by the reaction between primary amine and aldehyde is-
(1) An amide (2) Imine (3) Nitrite (4) Nitro

Q.10 Heating sodium benzoate with sodalime gives
(1) Benzoic Acid (2) Calcium benzoate
(3) Phenol (4) Benzene

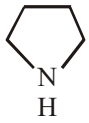
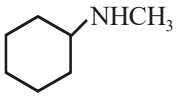
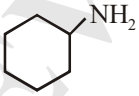
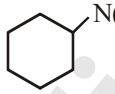
Q.11 An amine (X) on being heated with an excess of methyl bromide produces diethyldimethylammonium bromide. The amine (X) is–
(1) $C_2H_5NH_2$ (2) $(C_2H_5)_2NH$ (3) $C_2H_5NHCH_3$ (4) $C_2H_5N(CH_3)_2$

Q.12 The end product (B) formed in the reaction

$$CH_2{=}CH_2 \xrightarrow[2.\ KCN\,(excess)]{1.\ Br_2,\ CCl_4} A \xrightarrow[2.\ H_3O^+]{1.\ LiAlH_4} B$$

(1) $CH_2{=}CHCH_2NH_2$ (2) $H_2N(CH_2)_4NH_2$
(3) $CH_3NH(CH_2)_2NHCH_3$ (4) $NC(CH_2)_2CN$

Q.13 In which of the following compounds are intermolecular hydrogen bonds not formed among its molecules ?
(1) $(C_2H_5)_2NH$ (2) C_2H_5OH (3) C_2H_5COOH (4) $(C_2H_5)_3N$

Q.14 Among the following compounds which one will produce a Schiff base on reaction with cyclohexanone?
(1)  (2)  (3)  (4) 

Q.15 The product (A) and (B) of the reaction
$CH_3CH_2NH_2 + CH_3MgBr \rightarrow A + B$ are–
(1) $CH_3CH_2CH_3$ and NH_2MgBr (2) $CH_3CH_2NHCH_3$ and $MgBr_2$
(3) $CH_3CH_2N(CH_3)_2$ and $MgBr_2$ (4) $CH_3CH_2NHMgBr$ and CH_4

Q.16 A compound (X) having the molecular formula C_3H_9N reacts with benzenesulphonyl chloride to form a solid that is insoluble in alkalis. The compound (X) is–
(1) $CH_3CH_2CH_2NH_2$ (2) $(CH_3)_2CHNH_2$ (3) $CH_3CH_2NHCH_3$ (4) $(CH_3)_3N$

Q.17 Which of the following may be prepared by Gabriel phthalimide synthesis ?
(1) Aliphatic amines (2) Aromatic amines (3) Aliphatic amides (4) Aromatic amides

Q.18 When an organic compound was treated with sodium nitrite and HCl in the ice-cold condition, nitrogen gas was evolved. The compound is :
(1) a nitro compound (2) a primary amine (3) a secondary amine (4) a tertiary amine

Q.19 Primary amines on being heated with CS_2 in the presence of $HgCl_2$ form alkyl/aryl isothiocyanates. The reaction is known as–
(1) Hofmann hypobromite reaction (2) Hofmann elimination reaction
(3) Hofmann-Martius reaction (4) Hofmann mustard oil reaction

Q.20 α-amino acids on heating with $Ba(OH)_2$ gives:
(1) Ba salt of acid (2) Amine (3) α-hydroxy acids (4) None of these

Q.21 $R{-}Cl + NH_3$ (excess) $\rightarrow$ (X) (major product), the major product (X) is a :
(1) 1° amine (2) 2° amine (3) 3° amine (4) 4° ammonium salt

Q.22 In carbylamine reaction :

(1) the nucleophile is a RNH_2 and electrophile is : CCl_2

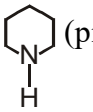
(2) the nucleophile is primary amine and electrophile is CCl_3^-

(3) the nucleophile is CCl_3^- and the electrophile is primary amine

(4) the attacking reagent is electrophile

Q.23 One mole of an amine (A) consumes two moles of methyl bromide to give a quaternary ammonium salt. The amine (A) is :

(1) $(CH_3)_3CCH_2NH_2$ (2) $(CH_3)_2NCH_2CH_3$

(3)  (piperidine) (4)  (Pyridine)

Q.24 (A) $\xrightarrow{H_2/Pt}$ 1° Amine (B) $\xrightarrow{H_2/Pt}$ 2° Amine:

(A) and (B) respectively are :

(1) RNC, RNC (2) RCN, RCN (3) RCN, RNC (4) RNC, RCN

Q.25 Gabriel phthalimide reaction is used in the preparation of:-

(1) Secondary amine (2) Primary aliphatic amine

(3) Primary aromatic amine (4) Tertiary amine

Q.26 Compound does not respond to carbylamine reaction :

(1) lsopropylamine (2) Diethylamine (3) t-Butylamine (4) Sec-Butylamine

Q.27 $A + CS_2 + HgCI_2$ gives C_2H_5-N=C–S. Thus compound A is :

(1) $C_2H_5NH_2$ (2) $C_2H_5NHC_2H_5$ (3) CH_3–CH=NOH (4) $CH_3CH_2NO_2$

Q.28 When -OCH_3 group is introduced at para position in- aniline, it will cause its basic character to :

(1) Increase (2) Decrease (3) Remain unchanged (4) None of the above

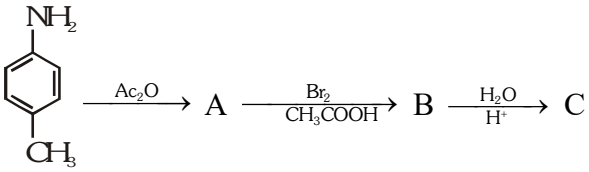
Q.29 The correct set of the products obtained in the following reactions

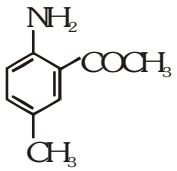
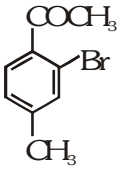
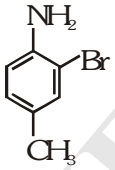
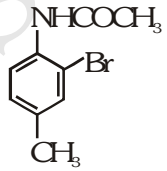
RCN $\xrightarrow{\text{reduction}}$ (A) , RCN $\xrightarrow[(ii)H_2O]{(i)CH_3MgBr}$ (B), RNC $\xrightarrow{\text{hydrolysis}}$ (C), RNH_2 $\xrightarrow{HNO_2}$ (D)

The answer is

	A	B	C	D
(1)	2°Amine	Methyl ketone	1° Amine	Alcohol
(2)	1°Amine	Methyl ketone	1° Amine	Alcohol
(3)	2°Amine	Methyl ketone	2° Amine	Acid
(4)	2°Amine	Methyl ketone	2° Amine	Aldehyde

Q.30 The final product C, obtained in this reaction would be



(1) 
(2) 
(3) 
(4) 

Q.31 $CH_3CH_2CONH_2 \xrightarrow[Br_2]{NaOH} A$,

Aqueous solution of A

(1) Turns blue litmus to red
(2) Turns red litmus to blue
(3) Does not affect the litmus
(4) Decolourise the litmus

Q.32 Methylamine on treatment with chloroform and ethanolic caustic alkali gives foul smelling compound, the compound is

(1) CH_3NCO (2) CH_3CNO (3) CH_3CN (4) CH_3NC

Q.33 Ethanamine can be obtained if the following compound is heated with [KOH + Br_2]

(1) Ethanamide (2) Methanamide (3) Propionamide (4) All the above

Q.34 Least availability of lone pair of electrons is associated with the following compound

(1) NH_2CONH_2 (2) $CH_3CH_2NH_2$ (3) $CH_3NHCH_2CH_3$ (4) $(CH_3)_3N$

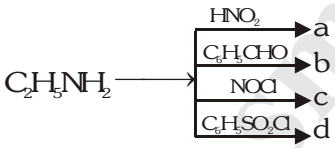
Q.35 $CH_3CONH_2 \xrightarrow[I]{PCl_5} A \xrightarrow[II]{Na/EtOH} B$

Reaction II is called

(1) Clemensen (2) Stephen (3) Mendius (4) Bauveault–blank reduction

Q.36 Hoffmann's rearrangement during the conversion of an amide to amine is

(1) Intramolecular (2) Intermolecular (3) Both (4) None

Q.37 

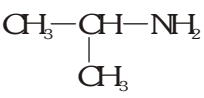
Which product is a Schiff's base :-

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

Q.38 Gabriel phthalimide reaction is used in the synthesis of

(1) Primary aromatic amines
(2) Secondary amines
(3) Primary aliphatic amines
(4) Tertiary amines

Q.39 A compound of molecular formula C_3H_9N when reacts with benzene sulphonyl chloride gives a product soluble in dilute NaOH solution. The compound should be :–

(1)  (2) $CH_3—NH—C_2H_5$ (3) $(CH_3)_3N$ (4) All of these

Q.40 The reaction : $[C_2H_5Br + NH_3]$ is in fact an example of

(1) Ammonolysis only
(2) Nucleophilic substitution only
(3) Ammonolysis as well as nucleophilic substitution
(4) None

Q.41 Benzyl amine is ..... basic than aniline while ethyl amine is ..... basic than diethyl amine

(1) More, less (2) Less, more (3) Both (4) None

Q.42 This compound does not respond to carbylamine reaction :-

(1) Isopropylamine (2) Diethylamine (3) t–Butylamine (4) Sec–Butylamine

Q.43 Match list I with II and choose the correct answer from the codes given below :-

List I	**List II**
(A) Aniline	a. Used in making azo dyes
(B) Nitrobenzene	b. Sulpha drug
(C) Sulphanilamide	c. Solvent in the Friedel Crafts reaction
(D) Trinitrotoluene	d. Used as explosive

Code is :-

	A	**B**	**C**	**D**		**A**	**B**	**C**	**D**
(1)	a	c	b	d	(2)	a	b	c	d
(3)	c	d	a	b	(4)	d	c	b	a

Q.44 Chloroform and ethanolic KOH is used as a reagent in the following reaction :-

(a) Hoffmann carbylamine reaction (b) Hoffmann degradation reaction
(c) Reimer–Tiemann reaction (d) Hoffmann mustard oil reaction

Code is :-

(1) Only for a (2) Only for a and b
(3) Only for b and d (4) Only for a and c

ASSERTION AND REASON

Directions : Each of these questions contains an Assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

Q.45 **Assertion :** Ammonolysis of alkyl halides is not a suitable method for the preparation of pure primary amines.

Reason : Ammonolysis of alkyl halides yields mainly secondary amines.

Q.46 **Assertion :** The main product of reaction of alcoholic silver nitrite and ethyl bromide is nitroethane.
Reason : Silver nitrite is predominantly covalent compound.

Q.47 **Assertion :** Carbylamine reaction involves chemical reaction between 1° amine and chloroform in basic medium.
Reason : In carbylamine reaction, $-NH_2$ group changes into –NC group.

Q.48 **Assertion :**Amines are basic in nature
Reason : There is the presence of the lone pair of electron on nitrogen.

Q.49 **Assertion :** Lower aldehydes and ketones are soluble in water but the solubility decreases as the molecular mass increases
Reason : Distinction between aldehydes and ketones can be made by Tollen's test.

Q.50 **Assertion :** Alkyl isocyanides in acidified water give alkyl formamides.
Reason : In isocyanides, carbon first acts as a nucleophile and then as an electrophile.

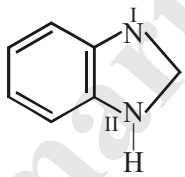
Q.51 **Assertion :** p-$O_2N—C_6H_5COCH_3$ is prepared by Friedel-Craft's acylation of nitrobenzene.
Reason : Nitrobenzene easily undergoes electrophilic substitution reaction.

Q.52 **Assertion :** Anilinium chloride is more acidic than ammonium chloride.
Reason : Anilinium ion is resonance-stabilised.

Q.53 **Assertion :** Amines are more basic than esters and ethers.
Reason : Nitrogen is less electronegative than oxygen. It is in better position to accommodate the positive charge on the proton.

Q.54 **Assertion :** Nitrobenzene is used as a solvent in Friedel-Craft's reaction.
Reason : Fusion of nitrobenzene with solid KOH gives a low yield of a mixture of o- and p-nitrophenols.

Q.55 **Assertion :** In benzinidazole,

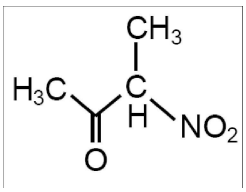


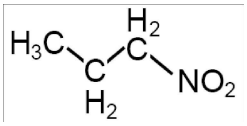
both the nitrogens ($\overset{I}{N}$ and $\overset{II}{N}$) are basic.

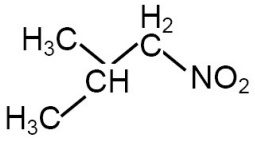
Reason : Lone pair of electrons present on $\overset{I}{N}$ are involved in delocalisation.

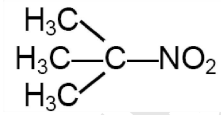
Q.56 **Assertion :** Basicity of $CH_3CH_2NH_2$(I), NH_3(II) and $C_6H_5NH_2$(III) is in order
I > II > III
Reason : Electron-donating groups (such as alkyl group) increase the basicity of amines, and electron-withdrawing groups (such as aryl group) decrease the basicity of amines.

Q.31 Which one of the following nitro-compounds does not react with nitrous acid **[NEET-II-2016]**

(1) 

(2) 

(3) 

(4) 

Q.32 Which of the following reactions is appropriate for converting acetamide to methanamine ? **[NEET-2017]**

(1) Carbylamine reaction
(2) Hoffmann hypobromamide reaction
(3) Stephens reaction
(4) Gabriels phthalimide synthesis

ANSWER KEY

Q.1	1	Q.2	3	Q.3	1	Q.4	1	Q.5	4	Q.6	2	Q.7	4
Q.8	4	Q.9	2	Q.10	4	Q.11	4	Q.12	2	Q.13	4	Q.14	3
Q.15	4	Q.16	3	Q.17	3	Q.18	4	Q.19	4	Q.20	2	Q.21	1
Q.22	1	Q.23	3	Q.24	3	Q.25	2	Q.26	2	Q.27	1	Q.28	1
Q.29	2	Q.30	1	Q.31	2	Q.32	4	Q.33	3	Q.34	1	Q.35	3
Q.36	1	Q.37	2	Q.38	3	Q.39	1	Q.40	3	Q.41	1	Q.42	2
Q.43	1	Q.44	4	Q.45	3	Q.46	1	Q.47	1	Q.48	1	Q.49	2
Q.50	1	Q.51	4	Q.52	3	Q.53	1	Q.54	2	Q.55	4	Q.56	1