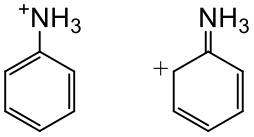
Date : **TEST ID: XIICH1301**
Marks : **CHEMISTRY**

AMINES

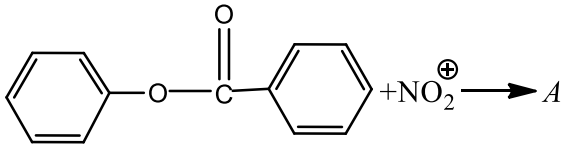
Single Correct Answer Type

1. During diazotization of benzenamine with sodium nitrite and hydrochloric acid, the excess of hydrochloric acid is used primarily to
   a) Check the hydrolysis of $\phi - OH$
   b) Ensure a stoichiometric amount of nitrous acid
   c) Check the concentration of free aniline
   d) Neutralize any base formed during reaction
2. Hofmann's bromamide reaction is to convert
   a) Acid to alcohol b) Alcohol to acid c) Amide to amine d) Amine to amide
3. Examine the following two structures for the anilinium ion and choose the correct statement from the ones given below

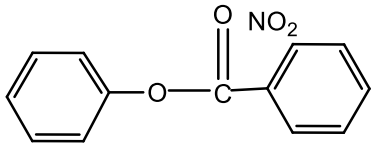


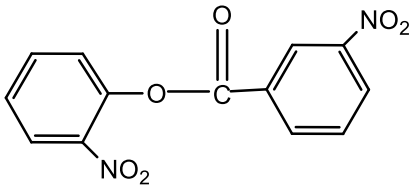
(I) (II)

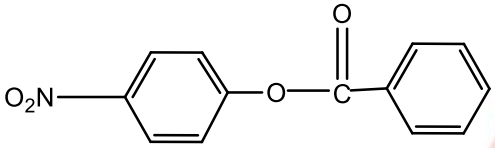
   a) II is not acceptable as canonical structure because carbonium ions are less stable than ammonium ions
   b) II is not an acceptable canonical structure because it is non-aromatic
   c) II is not an acceptable canonical structure because in it N has 10 valence electrons
   d) II is an acceptable as canonical structure
4. Choose the amide which on reduction with $LiAlH_4$ yields a secondary amine
   a) Ethanamide
   b) N-methylethanamide
   c) N, N-dimethylethanamide
   d) Phenylmethanamide
5. When methyl cyanide is hydrolysed in presence of alkali, the product is:
   a) Acetamide b) Methane c) $CO_2 + H_2O$ d) Acetic acid
6. In the following reactions, reactants A, B and C are:
   $Cl_2H_5NH_2 + A \longrightarrow C_2H_5N = CH - C_6H_5 + H_2O$
   $Urea + B \longrightarrow H_2N - NHCONH_2 + NH_3$
   $CH_2H_5NH_2 + C \longrightarrow C_2H_5Cl + H_2O + N_2$
   a) $CH_3CHO, NH_2 - NH_2$ and PCl_5
   b) $C_6H_5CHO, NH_2 - NH_2$ and $SOCl_2$
   c) $C_6H_5CHO, NH_2 - NH_2$ and $NOCl$
   d) $CH_3CHO, NH_2 - NH_2$ and PCl_3
7. Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains.
   a) Mixture of *o*-and *p*-bromotoluenes
   b) Mixture of *o*-and *p*-dibromobenzenes
   c) Mixture of *o*-and *p*-bromoanilines
   d) Mixture of *o*-and *m*-bromotoluenes
8. $>C=O$ compounds reacts with NH_3 or amines followed by H_2/Ni. The reaction is called
   a) Mendius reaction
   b) Hofmann bromamide
   c) Reductive amination
   d) Gabriel's phthalimide
9. A compound which on reaction with aqueous nitrous acid gives an oily nitrosoamine is:
   a) Methylamine b) Ethylamine c) Diethylamine d) Triethylamine
10.

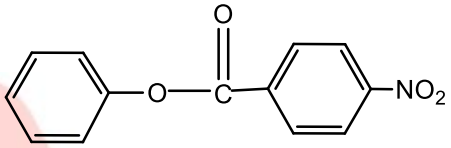


The product A is

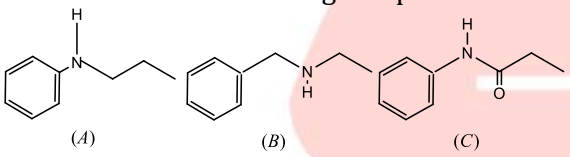
a) 

b) 

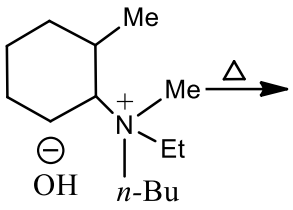
c) 

d) 

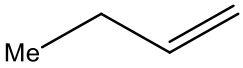
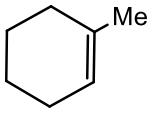
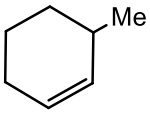
11. The active species produced in Hofmann's bromamide reaction is:
    a) Br^-
    b) Br_2
    c) OBr^-
    d) OBr_2
12. $C_5H_{13}N$ reacts with HNO_2 to give an optically active alcohol. The compound is
    a) Pentan-1-amine
    b) Pentan-2-amine
    c) N, N-dimethylpropan-2-amine
    d) N-methylbutan-2-amine
13. Reduction of alkyl nitriles, produces
    a) Secondary amine
    b) Primary amine
    c) Tertiary amine
    d) amide
14. Which one of the following compound is most basic?



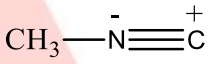
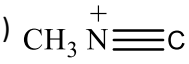
    a) *(A)*
    b) *(B)*
    c) *(C)*
    d) All are equally basic
15. Alkyl halide (RX) on treatment with KCN followed by reduction leads to formation of:
    a) RNH_2
    b) RCH_2NH_2
    c) $RH + NH_3$
    d) $RCH_3 + N_2$
16. A gaseous carbon compound is soluable in dilute HCI. The solution on treating with $NaNO_2$ gives off nitrogen leaving behind a solution which smells of wood spirit. The carbon compound is
    a) HCHO
    b) CO
    c) $C_2H_5NH_2$
    d) CH_3NH_2
17. Benzaldehyde condenses with N, N-diamethylaniline in presence of anhydrous $ZnCl_2$ to give
    a) Azo dye
    b) Malachite green
    c) Michler's ketone
    d) Buffer yellow
18. Which of the following statements are correct?
    a) Aniline is a stronger base ethyl amine
    b) Aniline is a stronger base than p-methoxyaniline
    c) Aniline must be acetylated before nitration with an acid mixture
    d) Aniline is soluble in an ammonium hydroxide solution
19. $CHCI_3$ and KOH on heating with a compound from a bad smelling product, compound is
    a) C_2H_5CN
    b) C_2H_5NC
    c) C_2H_5OH
    d) $C_2H_5NH_2$
20. On heating urea, a gas evolves along with formation of biuret. Identify the gas.
    a) CO
    b) NH_3
    c) CO_2
    d) H_2

21. 

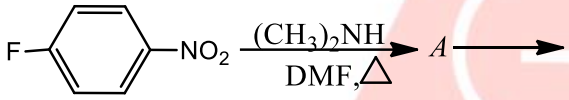
The alkene formed as a major product in the above elimination reaction is

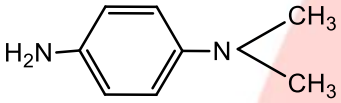
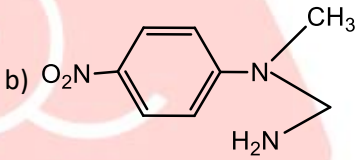
a)  b) $CH_2 = CH_2$ c)  d) 

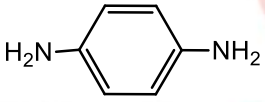
22. $CH_3NH_2 + CHCl_3 + KOH \rightarrow$nitrogen containing compound $+KCl + H_2O$. Nitrogen containing compound is

a) $CH_3 - C \equiv N$ b) $CH_3 - NH - CH_3$ c)  d) 

23. A secondary amine is:
a) A compound with two $—NH_2$ groups
b) A compound with 2 carbon atoms and a $—NH_2$ group
c) A compound with a $—NH_2$group on the carbon atom in number 2 position
d) A compound in which 2 of the hydrogens of NH_3 have been replaced by alkyl or aryl groups

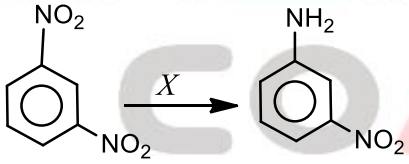
24. 

a)  b) 

c)  d) 

25. The name urea given by:
a) Wöhler b) Berzelius c) Roulle d) Lemery

26. In the reaction



X is
a) SiC b) H_2SO_4 c) $KMnO_4$ d) Fe/HCl

27. Which of the following enzymes can hydrolyse urea into CO_2 and NH_3?
a) Amylase b) Urease c) Lipase d) Zymase

28. $C_6H_5NH_2 \xrightarrow[180°C]{H_2SO_4} H_2NC_6H_4(SO_3H)$
$(para)$
The true statement about the product is
a) It does not exist as Zwitter ion
b) $-NH_2$displays a powerful basic character
c) It does not act as inner salt
d) $-SO_3$ dimminishes the basic character of $-NH_2$

29. Aniline on treatment with $NaNO_2$ in HCI at 0°C followed by treatment with alkaline β −naphthol gives
    a) A violet solution
    b) A red solution
    c) A green solution
    d) A blue precipitate
30. Which of the test is used for detection of secondary amines ?
    a) Liebermann's nitroso test
    b) Lucas test
    c) Tollen's test
    d) Carbylamine reaction

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AMINES

ANSWER KEY

1)	c	2)	c	3)	c	4)	d
5)	d	6)	c	7)	a	8)	c
9)	c	10)	c	11)	c	12)	d
13)	b	14)	d	15)	b	16)	d
17)	b	18)	b	19)	b	20)	b
21)	b	22)	b	23)	d	24)	a
25)	c	26)	d	27)	b	28)	d
29)	d	30)	a				

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AMINES

HINTS AND SOLUTIONS

2 **(c)**

Hofmann's bromamide reaction is used to convert amide to amine.

$$\underset{\text{amide}}{R\text{CONH}_2} + \text{Br} + 4\text{KOH} \rightarrow \underset{\text{amine}}{R\text{NH}_2} + \text{K}_2\text{CO}_3 + 2\text{KBr} + 2\text{H}_2\text{O}$$

4 **(d)**

Secondary amides such as N-methylethanamide on reduction with $LiAlH_4$ give secondary amines.

$$\underset{\text{N-methylethanamide}}{\text{CH}_3\text{CONHCH}_3} + [\text{H}] \xrightarrow{\text{LiAlH}_4} \underset{2°\text{amine}}{\text{CH}_3\text{CH}_2\text{NHCH}_3} + \text{H}_2\text{O}$$

5 **(d)**

$$\text{CH}_3\text{CN} \xrightarrow{\text{HOH}} \text{CH}_3\text{COOH}$$

6 **(c)**

$$\text{C}_2\text{H}_5\text{NH}_2 + \text{O} = \underset{\text{Benzaldehyde (A)}}{\overset{\overset{\text{H}}{|}}{\text{C}} - \text{C}_6\text{H}_5} \rightarrow \text{C}_2\text{H}_5\text{N} = \text{HCC}_6\text{H}_5 + \text{H}_2\text{O}$$

$$\underset{\text{(C)}}{\text{C}_2\text{H}_5\text{NH}_2} + \text{NOCl} \rightarrow \text{C}_2\text{H}_5\text{Cl} + \text{H}_2\text{O} + \text{N}_2$$

11 **(c)**

The reaction is believed to follow the mechanism.

$$R\text{—CONH}_2 + \text{OBr}^- \longrightarrow R\text{CONHBr} + \text{OH}^-$$
$$R\text{CONHBr} + \text{OH}^- \longrightarrow R\text{CONBr} + \text{H}_2\text{O}$$

12 **(d)**

HNO_2 reacts to give an alcohol means the compound is primary amine.

$C_5H_{13}N$ means $C_5H_{11}NH_2$(primary amine)

Optically active alcohol means C_5H_{11} segment contain a chiral carbon.

$$\underset{\text{Pentan-2-amine}}{\overset{5}{\text{CH}_3} - \overset{4}{\text{CH}_2} - \overset{3}{\text{CH}_2} - \overset{2}{\overset{\overset{\text{H}}{|}}{\text{C}} - \text{NH}_2}} \quad \overset{1}{\text{CH}_3}$$

13 **(b)**

$$\underset{\text{Alkyl nitriles}}{R - \text{CN}} + 4[\text{H}] \xrightarrow{\text{LiAlH}_4} \underset{\text{primary amine}}{R - \text{CH}_2\text{NH}_2}$$

14 **(d)**

Electron donors are bases. In the given choices structure which does not involve resonance will

have electron easily available for donation, hence most basic.
∴ Only in choice (b) electrons are not in conjugation with double bond of adjacent atom.
∴ Compound in choice (b) is most basic.

15 **(b)**

$$R\text{Br} + \text{KCN} \longrightarrow R\text{CN} \xrightarrow{\text{Reduction}} R\text{CH}_2\text{NH}_2$$

16 **(d)**

It is methyl amine which, being basic dissolves in dilute HCI. It with $NaNO_2$ evolves nitrogen gas leaving behind methyl alcohol which has smell of wood-spirit.

$$CH_3NH_2 \xrightarrow{HCI} CH_3NH_2.HCI$$

$$CH_3NH_2 + HNO_2 \xrightarrow{NaNO_2/HCI} \underset{\text{methyl alcohol}}{CH_3OH} + N_2 \uparrow + H_2O$$

17 **(b)**

Benzaldehyde condenses with N, N-diamethyl aniline in presence of anhydrous $ZnCl_2$ to give malachite green

19 **(b)**

This is carbylamine reaction which is used to distinguish 1° amines from other amines. The reaction is given by 1° amines only.

$$C_2H_5NH_2 + CHCI_3 + 3KOH \rightarrow C_2H_5N \overset{=}{\rightarrow} C + 3KCI + 3H_2O$$

$$R\text{NH}_2 + \text{CHCI}_3 + 3\text{KOH} \rightarrow R - \text{N} \overset{=}{\rightarrow} \text{C} + 3\text{KCI} + 3\text{H}_2\text{O}$$

1°amine chloroform isocyanide (bad smelling)

20 **(b)**

$$NH_2CONH_2 + HNHCONH_2 \longrightarrow NH_2CONHCONH_2 + NH_3$$

21 **(b)**

There are four β- hydrogens, in this quaternary ammonium salt.
On heating quaternary ammonium salt gives Hofmann elimination (abstraction of most acidic hydrogen which is β^1).
Hence, major product is $CH_2 = CH_2$. (Least substituted alkene).

22 **(b)**

$$CH_3NH_2 + CHCI_3 + 3KOH \rightarrow CH_3NC + 3KCI + 3H_2O$$

CH_3NC or $CH_3 - N^+ \equiv C^-$methyl isocyanide or methyl carbylamine.
This reaction is an example of carbylamine reaction and it is used for the distinction of *p*-amines from *s*- and *t*-amines or identification of *p*-amino group.

25 **(c)**

Roulle first isolated urea (in 1773) from urine and named it as urea.

26 **(d)**

Reduction of NO_2 group to NH_2group is taking place by Fe/HCI.

28 **(d)**

Sulphanilic acid exists as a dipolar ion which has acidic and basic groups in the same molecule. Such ions are called Zwitter ions or inner salts

30 **(a)**

For detection of secondary amines Liebermann's nitroso test is used.