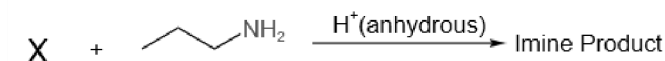


SECTION A

1 For the following reaction, identify the carbonyl compound X that shows the highest reactivity.



1.		2.	
3.		4.	

2 The time required for 40% completion of first-order reaction is 10 minutes. Time required for completion of 90% of this reaction will be

- 22.5 minutes
- 45 minutes
- 90 minutes
- 180 minutes

3 Match Column-I with Column-II

	Column-I		Column-II
a.	Chloroform	(i)	$\text{H}_2\text{S}_2\text{O}_7$
b.	Mustard gas	(ii)	CHCl_3
c.	Phosgene	(iii)	$\text{ClCH}_2\text{CH}_2\text{SCH}_2\text{CH}_2\text{Cl}$
d.	Oleum	(iv)	COCl_2

- a(iv), b(iii), c(ii), d(i)
- a(ii), b(iii), c(i), d(iv)
- a(i), b(ii), c(iii), d(iv)
- a(ii), b(iii), c(iv), d(i)

4 The correct statement among the following is-

a.	Phenol is treated with bromine water, and 2,4,6-tribromophenol is formed as a yellow precipitate.
b.	Commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it a colour) and pyridine (a foul-smelling liquid).
c.	The boiling point of ether is larger than alcohol due to the presence of hydrogen bonding.
d.	The alkoxy group (-OR) is ortho, para directing and activates the aromatic ring towards electrophilic substitution.

- a, b
- b, d
- Only b
- d, c

5 Which kind of isomerism is exhibited by octahedral $\text{Co}(\text{NH}_3)_4\text{Br}_2\text{Cl}$?

- Geometrical and ionization
- Geometrical and optical
- Optical and ionization
- Geometrical only

6 $E_{\text{Cr}_2\text{O}_7^{2-}/\text{Cr}^{3+}}^\ominus = 1.33\text{V}$; $E_{\text{Cl}_2/\text{Cl}^\ominus}^\ominus = 1.36\text{V}$

$E_{\text{MnO}_4^-/\text{Mn}^{2+}}^\ominus = 1.51\text{V}$; $E_{\text{Cr}^{3+}/\text{Cr}}^\ominus = -0.74\text{V}$

Use the data given above to find out the most stable ion in its reduced form.

- Cl^\ominus
- Cr^{3+}
- Cr
- Mn^{2+}

7 Select the incorrect statement regarding mercury cell:

1.	It consists of zinc-mercury amalgam as anode.
2.	It consists of a paste of NH_4Cl and ZnCl_2 as electrolyte.
3.	It consists of paste of HgO and carbon as cathode.
4.	It is suitable for low current devices like hearing aids, watches etc.

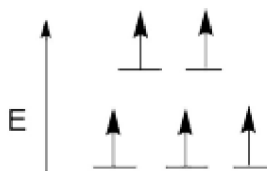
8 The electrolytic reduction process is used in the extraction of :-

1. alkali metal
2. alkaline earth metal
3. aluminium
4. All of the above

9 If 50 % of a zero-order reaction completes in 10 minutes, then 100 % of the same reaction will complete in :

1. 5 min
2. 10 min
3. 20 min
4. ∞ min

10 A complex of metal M^{n+} has the following electronic distribution in d orbitals,



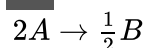
The neutral M has a ground state electronic configuration of $[Ar]4s^23d^6$. Which of the following complexes is consistent with the electronic distribution of M^{n+} (as described above)?

1. $[M(CN)_6]^{4-}$
2. $[MF_6]^{3-}$
3. $[MF_6]^{4-}$
4. $[M(CN)_6]^{3-}$

11 The shapes of $[NiCl_4]^{2-}$ and $[PtCl_4]^{2-}$, respectively, are

1. Tetrahedral and Tetrahedral
2. Tetrahedral and Square planar
3. Square planar and Tetrahedral
4. Square planar and Square planar

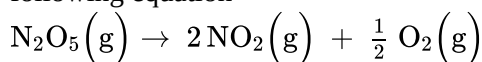
12 For the chemical reaction of the type



the correct relationship amongst the rate expressions is:

1. $-2 \frac{d[A]}{dt} = +\frac{1}{2} \frac{d[B]}{dt}$
2. $+2 \frac{d[A]}{dt} = -\frac{1}{2} \frac{d[B]}{dt}$
3. $-\frac{1}{2} \frac{d[A]}{dt} = +2 \frac{d[B]}{dt}$
4. $+\frac{1}{2} \frac{d[A]}{dt} = -2 \frac{d[B]}{dt}$

13 Gaseous N_2O_5 decomposes according to the following equation



The experimental rate law is $\frac{-\Delta N_2O_5}{\Delta t} = k[N_2O_5]$

At a certain temperature, the rate constant is $k = 5 \times 10^{-4} s^{-1}$. In how many seconds will the concentration of N_2O_5 decrease to one-tenth of its initial value?

1. $2 \times 10^3 s$
2. $4.6 \times 10^3 s$
3. $2.1 \times 10^2 s$
4. $1.4 \times 10^3 s$

14

Assertion (A):	Fluorine exhibits -1,+1,+3,+5, and +7 oxidation states.
Reason (R):	Halogens except fluorine have d-orbitals and thus can expand their octet.

1.	Both (A) and (R) are true and (R) is the correct explanation of (A).
2.	Both (A) and (R) are true but (R) is not the correct explanation of (A).
3.	(A) is true but (R) is false.
4.	(A) is false but (R) is true.

15 Match Column-I with Column-II and identify the correct option.

Column-I (Type of solids)	Column-II (Example)
a. Covalent solid	i. CaF_2
b. Metallic solid	ii. Cl_2
c. Ionic solid	iii. Diamond
d. Molecular solid	iv. Ag

1. a=iii, b=iv, c=i, d=ii
2. a=iii, b=i, c=iv, d=ii
3. a=ii, b=iv, c=iii, d=i
4. a=i, b=iii, c=ii, d=iv

16 Density of 3 M solution of NaCl is 1.25 g/mL. Calculate the volume of water required to make 1000 mL of this NaCl solution. [Consider the density of water as 1 g/mL].

1. 1074.5 mL
2. 824.5 mL
3. 1250 mL
4. 1000 mL

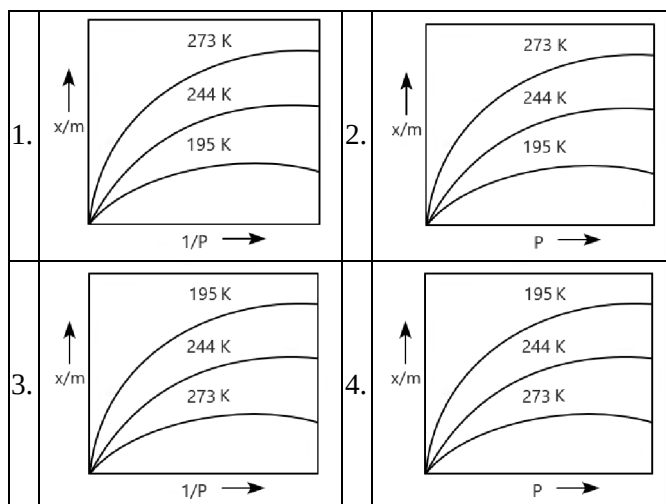
17 In the metallurgy of iron, the reduction in the upper zone of the blast furnace is

1. C
2. CO
3. Both 1 and 2
4. None of the above

18 Strongest oxidising agent among the following is

1. ClO^-
2. ClO_2^-
3. ClO_3^-
4. ClO_4^-

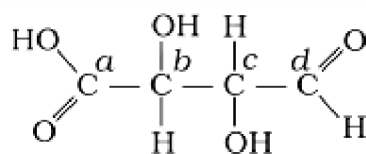
19 The correct graph for adsorption isotherm is:



20 Which of the following gas does not obey Henry's law?

1. Ar
2. H_2
3. O_2
4. NH_3

21 Which of the carbon atoms present in the molecule given below are asymmetric?



1. a, b, c, d
2. b, c
3. a, d
4. a, b, c

22 The incorrect statement among the following is:

1.	Lyophobic sols are irreversible sols.
2.	Lyophilic sols need stabilising agent.
3.	Lyophobic sols readily precipitated on the addition of small amounts of electrolyte.
4.	Starch is a Lyophilic sol.

23 Which of the following facts about the complex $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$ is wrong?

1. The complex is an outer orbital complex.
2. The complex gives a white precipitate with a silver nitrate solution.
3. The complex involves d^2sp^3 hybridization and is octahedral in shape.
4. The complex is paramagnetic.

24 Match list I with list II and identify the correct code

	List-I		List II
(i)	N_2O	(a)	Colourless, acidic solid
(ii)	N_2O_3	(b)	Colourless, neutral gas
(iii)	NO_2	(c)	Blue, acidic solid
(iv)	N_2O_5	(d)	Brown, acidic gas

	(i)	(ii)	(iii)	(iv)
1.	(a)	(b)	(c)	(d)
2.	(b)	(c)	(d)	(a)
3.	(b)	(c)	(a)	(d)
4.	(c)	(d)	(b)	(a)

25

Assertion (A):	Nitration of chlorobenzene occurs at ortho and para positions.
Reason (R):	Chlorine is a ring deactivator.

1. Both (A) and (R) are true and (R) is the correct explanation of (A).
2. Both (A) and (R) are true but (R) is not the correct explanation of (A).
3. (A) is true but (R) is false.
4. (A) is false but (R) is true.

26 The percentage by mass of solute in a solution obtained by mixing 300g of a 25% and 400g of a 40% the same solution is:

1. 33.6%
2. 65%
3. 30%
4. 60%

27 Metal 'M' forms a carbonyl compound in which it is present in its lower valence state. Which of the following bonding is possible in this metal carbonyl?

- 1.
- 2.
- 3.
- 4.

28 $\text{Mg(s)} + 2\text{Ag}^+(0.0001\text{M}) \rightarrow \text{Mg}^{2+}(0.130\text{M}) + 2\text{Ag(s)}$

If $E^\ominus(\text{cell})$ for the above mentioned cell is 3.17 V, then $E(\text{cell})$ value will be-
(log 13=1.1)

1. 2.87 V
2. 3.08 V
3. 2.96 V
4. 2.68 V

29 The molar conductivity of 0.1 M NH_4Cl is $20 \text{ S cm}^2 \text{ mol}^{-1}$. The molar conductivity of NH_4^+ and Cl^- at infinite dilution are 74 and $26 \text{ S cm}^2 \text{ mol}^{-1}$ respectively. The dissociation constant of NH_4Cl will be :

1. 10^{-2}
2. 2×10^{-3}
3. 4×10^{-3}
4. 5×10^{-3}

SECTION B

30 A compound $C_4H_{10}O$ (x) can react with sodium. On vigorous oxidation, the compound gives a carboxylic acid $C_4H_8O_2$ (y). The compound (x) can be

1. Ether
2. 3° Alcohol
3. 2° Alcohol
4. 1° Alcohol

31 The oxidation state of cobalt in $[Co(en)_2FBr]Cl$ is:

1. +2
2. +1
3. +3
4. +6

32 With F highest stable oxidation state of Mn is-

1. +6
2. +4
3. +7
4. +3

33 Which of the following oxidation state is common for all lanthanoids?

1. +2
2. +3
3. +4
4. +5

34 The crystal with $a \neq b \neq c$, $\alpha = \beta = \gamma = 90^\circ$ is:

1. Cubic
2. Orthorhombic
3. Tetragonal
4. Hexagonal

35 Which, of the following alcohols, is most reactive toward dehydration?

1.		2.	
3.		4.	

36 Consider the following statements

a.	Benzal chloride in reaction with water at 373 K gives benzoic acid.
b.	In the Gattermann-Koch reaction, benzene is converted to benzaldehyde.
c.	In the Etard reaction, chromyl chloride is used as a reagent.

The correct statements are:

1. (a) and (b) only
2. (b) and (c) only
3. (a) and (c) only
4. (a), (b), and (c)

37 The correct statement among the following is/are:

1. Sucralose is an artificial sweetener
2. Penicillin is a narrow-spectrum antibiotic
3. Phenol can be used as an antiseptic as well as disinfectant
4. All of these

38 Consider the following amines:

A.		B.	
C.		D.	

The basic strength of these amines in increasing order is:

1. $C < D < A < B$
2. $D < B < C < A$
3. $C < D < B < A$
4. $D < C < B < A$

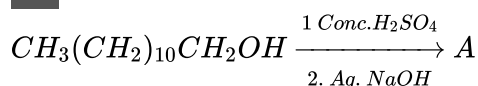
39 Given below are two statements:

Assertion (A):	The boiling points of aldehydes and ketones are higher than hydrocarbons of comparable molecular masses because of weak molecular association in aldehydes and ketones due to dipole-dipole interactions.
Reason (R):	The boiling points of aldehydes and ketones are lower than the alcohols of similar molecular masses due to the absence of H-bonding.

In the light of the above statements, choose the most appropriate answer from the options given below:

1.	Statement I is incorrect but Statement II is correct.
2.	Both Statement I and Statement II are correct.
3.	Both Statement I and Statement II are incorrect.
4.	Statement I is correct but Statement II is incorrect.

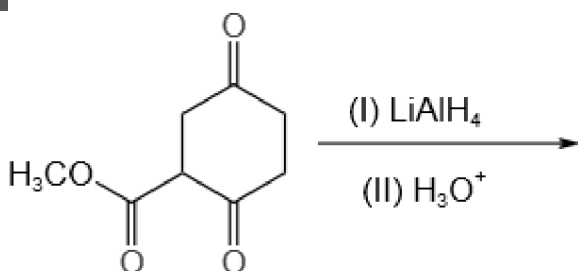
40 For the given reaction:



'A' is:

1. Sodium salt of alcohol
2. Non-ionic detergents
3. Cationic detergents
4. Anionic detergents

41



In major product of reaction, how many secondary alcoholic groups are attached to the ring?

1. Three
2. Four
3. Two
4. One

42

Statement I:	Natural rubber is a linear polymer of isoprene unit with cis isomer.
Statement II:	The polymer of isoprene is polar and has a coil-like structure.

1. Statement I is correct only.
2. Statement II is correct only.
3. Both statements I and II are correct.
4. None of the Statements are correct.

43

Statement I:	Pentaacetate of cyclic glucose reacts with hydroxylamine
Statement II:	Glucose on oxidation with nitric acid yields gluconic acid.

In light of the above statements, choose the correct answer.

1.	Statement I is correct but statement II is incorrect
2.	Statement I is incorrect but statement II is correct
3.	Both statement I and statement II are correct
4.	Both statement I and statement II are incorrect

44 Among the following carboxylic acids, most acidic in nature is:

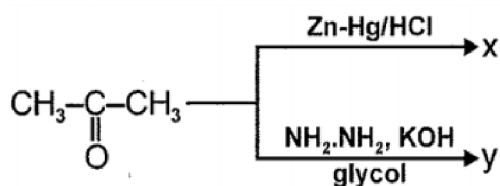
1. Butanoic acid
2. 2-Chlorobutanoic acid
3. 3-Chlorobutanoic acid
4. 4-Chlorobutanoic acid

45

Assertion (A):	Osmosis involves the movement of solvent molecules from its lower concentration to its higher concentration.
Reason (R):	Solutions having the same osmotic pressure are called isotonic solutions.

1.	Both (A) and (R) are true and (R) is the correct explanation of (A).
2.	Both (A) and (R) are true but (R) is not the correct explanation of (A).
3.	(A) is true but (R) is false.
4.	(A) is false but (R) is true.

46 Consider the following reaction,



x and y respectively are:

1.	$\text{CH}_3\text{C}(\text{OH})(\text{H})\text{CH}_3, \text{CH}_3\text{CH}_2\text{CH}_3$
2.	$\text{CH}_3\text{CH}_2\text{CH}_3, \text{CH}_3\text{C}(\text{OH})(\text{H})\text{CH}_3$
3.	$\text{H}_3\text{C}-\text{C}(\text{OH})(\text{H})-\text{CH}_3, \text{H}_3\text{C}-\text{C}(\text{OH})(\text{H})-\text{CH}_3$
4.	$\text{CH}_3\text{CH}_2\text{CH}_3, \text{CH}_3\text{CH}_2\text{CH}_3$

47 The term anomers of glucose refer to:

1.	Isomers of glucose that differ in configurations at carbons one and four (C-1 and C-4)
2.	A mixture of (D)-glucose and (L)-glucose
3.	Enantiomers of glucose
4.	Isomers of glucose that differ in configuration at carbon one (C-1)

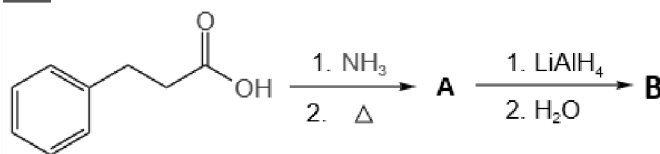
48 Which one of the following is a copolymer?

1. Buna-s
2. Teflon
3. Polyacrylonitrile
4. Neoprene

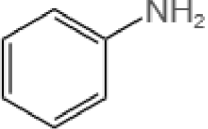
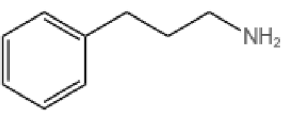
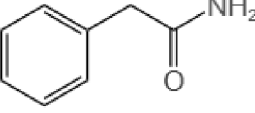
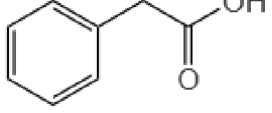
49 Butan-1-ol and 2-Methylbutan-2-ol can be differentiated by :

1. HCl-ZnCl₂ at room temperature.
2. HBr
3. SOCl₂
4. Both (2) and (3)

50 Consider the following reaction sequence



The major product (B) is:

1.		2.	
3.		4.	

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