

Test Booklet No.

21834584

Subject : CHEMISTRY

Code : 306 E (New)

Medium : English

Test Booklet Code

D

(Do not open this Test Booklet until you are asked to do so)

Time Allowed : 60 minutes	Maximum Marks : 200	Total Questions : 50	Number of questions to be answered : 40
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Kindly read the Instructions given on this Page and Back Page carefully before attempting this Question Paper.

Important Instructions for the Candidates :

1. This Test Booklet contains 50 questions printed in English. Out of these, the candidate is required to answer any 40 questions. If a candidate answers more than 40 questions, the first 40 answered questions will be considered for evaluation.
2. When you are given the OMR Answer Sheet, fill in your particulars on it carefully with **blue/black** ball point pen only.
3. Use only Blue/Black Ball Point Pen for marking responses.
4. The CODE for this Test Booklet is **D**. Make sure that the CODE printed on the OMR Answer Sheet is the same as that on this Test Booklet. Also ensure that your Test Booklet No. and OMR Answer Sheet No. are exactly the same. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the OMR Answer Sheet. No claim in this regard will be entertained after five minutes from the start of the examination.
5. Before attempting the question paper kindly check that this Test Booklet has total 16 pages and OMR Answer Sheet consists of one sheet. At the start of the examination within first five minutes, candidates are advised to ensure that all pages of Test Booklet and OMR Answer Sheet are properly printed and they are not damaged in any manner.
6. Each question has four answer options. Out of these four options choose the **MOST APPROPRIATE OPTION** and darken/blacken the corresponding circle on the OMR Answer Sheet with a Blue/Black Ball Point Pen.
7. Five (5) marks will be given for each correct answer. One (1) mark will be deducted for each incorrect answer. If more than one circle is found darkened/blackened for a question, then it will be considered as an incorrect answer. Unanswered questions will be given no mark.

P.T.O.

Name of the Candidate (in Capital Letters) : AMAN KUMAR

Application Number (in figures) : 243550557288

Roll Number (in figures) : 2001939020

Centre of Examination (in Capital Letters) : _____

Candidate's Signature : Aman Invigilator's Signature : _____

Facsimile signature stamp of Centre Superintendent : [Signature]

1. Which of the following gases at 298 K and 1 atm pressure is having maximum solubility in water?

(1) Methanal, $K_H = 0.000018$

(2) Argon, $K_H = 40.3$

(3) Methane, $K_H = 0.41$

(4) CO_2 , $K_H = 1.6$

2. Which of the following is/are the bases of DNA?

(A) Adenine

(B) Uracil

(C) Thymine

(D) Cytosine

Choose the correct answer from the options given below:

(1) (A), (B) and (C) only

(2) (B) and (C) only

(3) (A), (C) and (D) only

(4) (A) and (B) only

3. Match List-I with List-II:

List-I (Amino Acid)	List-II (Nature of Amino Acid)
(A) Valine	(I) Basic amino acid
(B) Glycine	(II) Neutral optically active amino acid
(C) Lysine	(III) Acidic amino acid
(D) Glutamic acid	(IV) Neutral optically inactive amino acid

Choose the correct answer from the options given below:

(1) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

(2) (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

(3) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)

(4) (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

SPACE FOR ROUGH WORK

$K_H \propto \text{solubility}$

4. Which of the following solvents is having its lowest Ebullioscopic constant?

Solvent	Boiling Point (K)
Chloroform	334.4
Diethyl Ether	307.8
Benzene	353.3
Carbon disulphide	319.4

(1) Chloroform

(3) Benzene

(2) Diethyl Ether

(4) Carbon disulphide

Read the following passage and answer the next five questions based on it.

Aldehydes are generally more reactive than ketones in nucleophilic addition reactions due to steric and electronic reasons. Sterically, the presence of two large groups in ketones hinders the attack of nucleophile to carbonyl carbon than in aldehydes. Electronically, aldehydes are more reactive than ketones because two alkyl groups reduce the electrophilicity of the carbonyl carbon more effectively than in the former.

5. Which among the following compound is formed, when aldehyde reacts with HCN in presence of base?

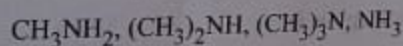
(1) Cyanide

(2) Isocyanide

(3) Cyanohydrin

(4) Hydrogen cyanide

6. The correct decreasing order of basic strength of following amines in aqueous solution is:

(1) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > \text{NH}_3 > (\text{CH}_3)_3\text{N}$ (2) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{NH}_3$ (3) $\text{NH}_3 > (\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2$ (4) $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N} > \text{NH}_3$

SPACE FOR ROUGH WORK

$$\Delta T_b \rightarrow 1000 = k_b \frac{w_2 \times 1000}{M_2 \times w_1}$$

$$M_2 = \frac{\Delta T_b \times 1000 \times M_1}{k_b \times w_2}$$

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7. A new C-C bond formation is possible in :

- (A) Cannizzaro reaction
- (B) Friedel-Crafts alkylation
- (C) Clemmensen reduction
- (D) Reimer-Tiemann reaction

Choose the correct answer from the options given below :

- (1) (B) and (D) only
- (2) (A), (B) and (D) only
- (3) (B), (C) and (D) only
- (4) (A), (B), (C) and (D)

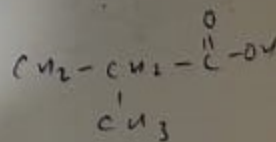
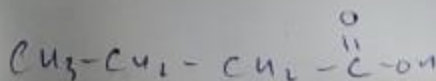
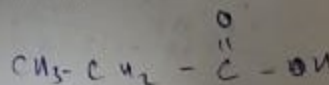
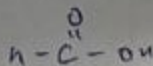
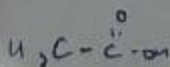
8. Which of the following will respond to Tollen's test ?

- (1) Ethanoic acid
- (2) Methanoic acid
- (3) Propanoic acid
- (4) Butanoic acid

9. The order of reactivity of the given haloalkanes towards nucleophile is

- (1) $RI > RBr > RCl$
- (2) $RCl > RBr > RI$
- (3) $RBr > RCl > RI$
- (4) $RBr > RI > RCl$

SPACE FOR ROUGH WORK



Read the following passage and answer the next five questions based on it.

The transition metals are very hard and have low volatility. Their melting and boiling points are high. In any row, the melting points of these metals rise to a maximum at d^5 and fall regularly as atomic number increases. The high melting points of these metals are attributed to the involvement of greater number of electrons from $(n-1)d$ in addition to ns electrons in the interatomic metallic bonding.

10. Which transition metal is liquid at room temperature?

(1) Hg

(2) Cu

(3) Ag

(4) Au

11. Which is the hardest metal ?

(1) Zn

(2) Cu

(3) Hg

(4) Cd

12. In any row, melting points of these metals rise to a maximum at d^5 . Which transition metal is an exception ?

(1) Ti

(2) V

(3) Cr

(4) Mn

13. Which transition metal has the highest melting point ?

(1) Hf

(2) Ta

(3) W

(4) Re

14. How many electrons are needed in reduction of $Cr_2O_7^{2-}$ to Cr^{3+} ?

(1) One

(2) Six

(3) Five

(4) Eight

SPACE FOR ROUGH WORK

15. Which among the following compounds show metal excess defect due to anionic vacancy ?
- (1) ZnO (2) NaCl
(3) FeO (4) CdO
16. Molal elevation constant is also known as :
- (1) Ebullioscopic constant (2) Gas constant
(3) Henry's constant (4) Cryoscopic constant
17. What is the overall order of the reaction ?
- $$\text{Rate} = k[A]^{1/2}[B]^{3/2}$$
- (1) 2 (2) 0
(3) 1 (4) 0.5
18. Which term of molar conductivity is used when the concentration of electrolyte approaches to zero ?
- (1) Infinite molar conductivity
(2) Zero molar conductivity
(3) Standard molar conductivity
(4) Limiting molar conductivity
19. Kohlrausch law is related to which of the following term ?
- (1) Osmosis (2) Diffusion
(3) Effusion (4) Migration of ions
20. Which factor in Arrhenius equation, corresponds to fraction of molecules having kinetic energy greater than activation energy ?
- (1) $\ln k$ (2) $\ln A$
(3) RT (4) $e^{-E_a/RT}$
21. What is the another term used for probability factor (P) in collision theory ?
- (1) Temperature factor (2) Compressibility factor
(3) Steric factor (4) Concentration factor

SPACE FOR ROUGH WORK

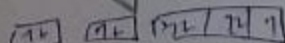
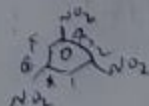
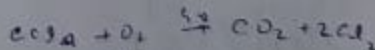
$$R \rightarrow 1.5 + 0.5$$

$$\rightarrow 2$$

$$e^{-E_a/RT}$$

22. Why does Fluorine exhibit only -1 oxidation state ?
- It is a halogen.
 - It is a non-metal.
 - It is small in size.
 - It has no d orbitals.
23. Which among the following halogen exists in liquid state at room temperature ?
- Fluorine
 - Chlorine
 - Bromine
 - Iodine
24. The central atoms/ions in the coordination compounds are referred as _____.
- Lewis base
 - Lewis acid
 - Bronsted acid
 - Bronsted base
25. What is the IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$?
- Diamminechloridonitrito-N-platinum(II)
 - Diamminechloridenitrito-N-platinum(III)
 - Diamminechloridonitrito-O-platinum(II)
 - Diammonia chloridonitrito-N-platinum(II)
26. What product is obtained when chloroform reacts with oxygen in presence of light ?
- Phosgene gas
 - Phosphine gas
 - Chlorine gas
 - Hydrogen gas
27. Which among the following is a trihydric alcohol ?
- Ethanol
 - Glycerol
 - Ethylene Glycol
 - Phenol
28. Aspirin is also known as :
- Salicylic acid
 - Ethyl Salicylic acid
 - Methyl Salicylic acid
 - Acetyl Salicylic acid
29. What is the IUPAC name of picric acid ?
- 2-Nitrophenol
 - 2,4,6-Trinitrophenol
 - Ethyl Salicylic acid
 - 2 aminophenol

SPACE FOR ROUGH WORK



30. What is the product when glucose reacts with bromine water ?

- (1) Gluconic acid (2) Glyceraldehyde
(3) Saccharic acid (4) Oxime

31. Match List I with List II for the oxidation state of central atoms :

List-I	List-II
(A) $\text{Cr}_2\text{O}_7^{2-}$	(I) +3
(B) MnO_4^-	(II) +5
(C) VO_3^-	(III) +7
(D) FeF_6^{3-}	(IV) +6

Choose the correct answer from the options given below :

- (1) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(2) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(3) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
(4) (A) - (IV), (B) - (I), (C) - (III), (D) - (II)

32. What is the colour of copper compound formed in Fehling's test for aliphatic aldehydes ?

- (1) Green (2) Blue
(3) Yellow (4) Red brown

33. What is the major product formed when diazonium salt undergoes Gatterman reaction ?

- (1) Haloarene (2) Aryl amine
(3) Phenol (4) Diphenyl ether

34. What is the major product of Carbylamine reaction ?

- (1) Cyanide (2) Isocyanide
(3) Nitrile (4) Alkane

35. Which among the following is an essential amino acid ?

- (1) Glycine (2) Alanine
(3) Valine (4) Serine

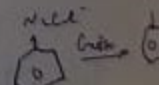
SPACE FOR ROUGH WORK

$2n-14 \rightarrow 2$

$n-8 \rightarrow 1$

$n \rightarrow 5$

$2n-6 \rightarrow 5$



36. Arrange the following in increasing order of their pH values :

(A) p-Nitrophenol

(B) m-Cresol

(C) m-Nitrophenol

(D) Phenol

Choose the correct answer from the options given below :

(1) $(A) < (B) < (C) < (D)$ (2) $(A) < (C) < (D) < (B)$ (3) $(B) < (A) < (D) < (C)$ (4) $(C) < (B) < (D) < (A)$

37. Which among the following is a biodegradable polymer ?

(1) PVC

(2) Freon

(3) Nylon

(4) PHBV

38. Which among the following is an antacid ?

(1) Aspirin

(2) Zantac

(3) Equanil

(4) Noradrenaline

39. What is the numerical value of one Faraday in Coulombs ?

(1) 96587

(2) 96487

(3) 99500

(4) 6.023

40. A first order reaction has a half-life of 693 sec. What will be its rate constant ?

(1) 0.01 sec^{-1} (2) 1 sec^{-1} (3) 0.001 sec^{-1} (4) 0.1 sec^{-1}

41. For S_N2 reaction, the increasing order of the reactivity of the following alkyl halides is :

(A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ (B) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$ (C) $(\text{CH}_3)_3\text{CBr}$ (D) $(\text{CH}_3)_2\text{CHCH}_2\text{Br}$

Choose the correct answer from the options given below :

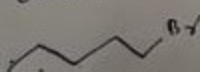
(1) $(A) < (B) < (C) < (D)$ (2) $(A) < (C) < (B) < (D)$ (3) $(B) < (A) < (D) < (C)$ (4) $(C) < (B) < (D) < (A)$

42. Which among the following is a strong field ligand ?

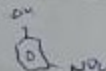
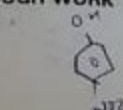
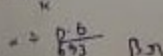
(1) I^- (2) Cl^- (3) NH_3 (4) SCN^-

SPACE FOR ROUGH WORK

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$



$\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$



$$\frac{0.6}{600} = \frac{1000}{1000}$$

$$\Rightarrow \frac{600}{1000} = 0.6$$

43. Arrange the following in increasing order of their osmotic pressure generation at 298 K :

(The cell wall is permeable to water and not to the solute molecules)

- (A) If a cell containing 0.5 moles of solute dissolved in 1 L of water is immersed in pure water.
 (B) If a cell containing 0.25 moles of solute dissolved in 1 L of water is immersed in pure water.
 (C) If a cell containing 0.1 moles of solute dissolved in 0.01 L of water is immersed in pure water.
 (D) If a cell containing 0.2 moles of solute dissolved in 0.05 L of water is immersed in pure water.

Choose the correct answer from the options given below :

- (1) (C) < (B) < (A) < (D) (2) (D) < (A) < (B) < (C)
 (3) (B) < (A) < (D) < (C) (4) (C) < (A) < (B) < (D)

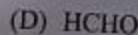
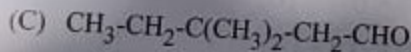
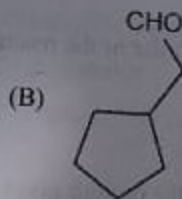
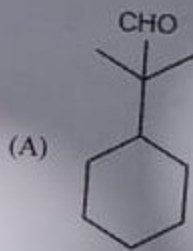
44. Arrange the following rate constant units in increasing order of their order of reaction :

- (A) sec^{-1} (B) $\text{mol L}^{-1} \text{sec}^{-1}$
 (C) $\text{mol}^{-1} \text{L sec}^{-1}$ (D) $\text{mol}^{-2} \text{L}^2 \text{sec}^{-1}$

Choose the correct answer from the options given below :

- (1) (C) < (A) < (B) < (D) (2) (C) < (B) < (A) < (D)
 (3) (B) < (A) < (C) < (D) (4) (A) < (B) < (C) < (D)

45. Which of the following compounds will undergo Aldol condensation reaction ?



Choose the correct answer from the options given below :

- (1) (A), (C) and (D) only (2) (B) and (C) only
 (3) (B), (C) and (D) only (4) (A), (B), (C) and (D)

SPACE FOR ROUGH WORK

Handwritten calculations for rough work:

$$\frac{0.5}{1} \times \frac{100}{10} = 5$$

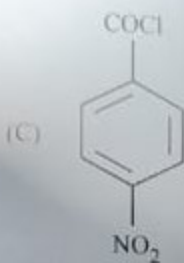
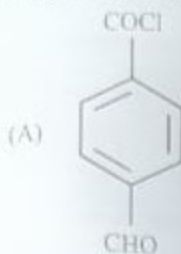
$$\frac{0.25}{1} \times \frac{100}{10} = 2.5$$

$$\frac{0.1}{0.01} \times \frac{100}{10} = 10$$

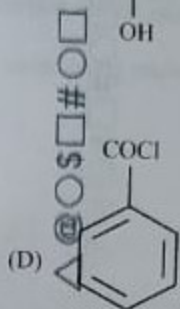
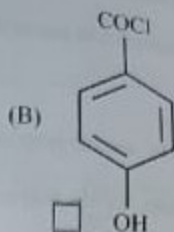
$$\frac{0.2}{0.05} \times \frac{100}{10} = 4$$

$$\Rightarrow \frac{20}{5} A$$

46. Consider the following compounds :



(11)



Arrange these compounds in the increasing order of rate of hydrolysis :

- (1) (B) < (D) < (C) < (A)
 (2) (B) < (D) < (A) < (C)
 (3) (D) < (B) < (A) < (C)
 (4) (A) < (D) < (B) < (C)

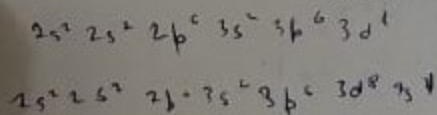
47. Which of the following ions will be coloured in the aqueous solution ?

- (A) Ti^{3+} (B) Nb^{3+}
 (C) Cu^+ (D) Y^{3+}

Choose the correct answer from the options given below :

- (1) (C) and (D) only
 (2) (A), (B) and (D) only
 (3) (A) and (B) only
 (4) (A), (B), (C) and (D)

SPACE FOR ROUGH WORK



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48. The correct statement/statements from the options given below is/are :

- (A) Diazonium salts of aromatic amines are less stable than diazonium salts of aliphatic amines.
 (B) Ethylamine is insoluble in water.
 (C) Gabriel phthalimide synthesis can be used to prepare primary amines.
 (D) Because of +R-effect of $-NH_2$ group, aniline will undergo Friedel-Crafts acylation reaction.

Choose the correct answer from the options given below :

- (1) (A) and (B) only
 (2) (A), (C) and (D) only
 (3) (A) and (C) only
 (4) (B), (C) and (D) only

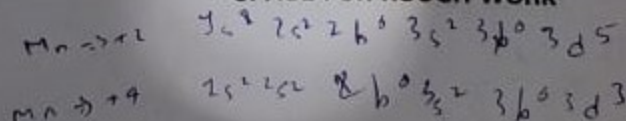
49. Match List-I with List-II :

List-I	List-II
(A) Mn^{2+}	(I) Pyrolusite ore
(B) Spin only Magnetic Moment	(II) An alloy of 4f metal, iron and traces of S, C, Al and Ca
(C) MnO_2	(III) $\mu_s = \sqrt{n(n+2)}$ BM
(D) Misch metal	(IV) Highest oxidation states

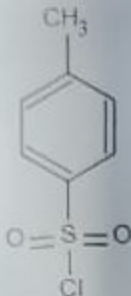
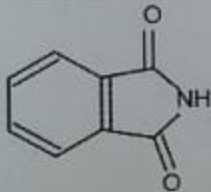
Choose the correct answer from the options given below :

- (1) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
 (2) (A) - (III), (B) - (III), (C) - (I), (D) - (IV)
 (3) (A) - (IV), (B) - (III), (C) - (I), (D) - (II)
 (4) (A) - (I), (B) - (III), (C) - (IV), (D) - (II)

SPACE FOR ROUGH WORK



50. Match List-I with List-II :

List-I (Compound)	List-II (Property)
(A) COCl_2	(I) To distinguish between primary, secondary and tertiary amines
(B) 	(II) Poisonous gas
(C) 	(III) Synthesis of primary amines
(D) 	(IV) Zwitter ion

Choose the correct answer from the options given below :

- (1) (A) - (II), (B) - (I), (C) - (IV), (D) - (III)
- (2) (A) - (II), (B) - (I), (C) - (III), (D) - (IV)
- (3) (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
- (4) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

SPACE FOR ROUGH WORK