

Test Booklet No.

Subject : CHEMISTRY

Test Booklet Code

Code : 306 E (New)

Medium : English

21834573

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

A

|                           |                     |                      |                                         |
|---------------------------|---------------------|----------------------|-----------------------------------------|
| Time Allowed : 60 minutes | Maximum Marks : 200 | Total Questions : 50 | Number of questions to be answered : 40 |
|---------------------------|---------------------|----------------------|-----------------------------------------|

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 A. 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.

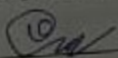
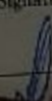
P.T.O.

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Candidate's Signature:  Invigilator's Signature: Facsimile signature stamp of Centre Superintendent: 

1. What product is obtained when chloroform reacts with oxygen in presence of light ?  
☒ (1) Phosgene gas (2) Phosphine gas  
(3) Chlorine gas (4) Hydrogen gas
2. Which among the following is a trihydric alcohol?  
(1) Ethanol ☒ (2) Glycerol  
(3) Ethylene Glycol (4) Phenol
3. Aspirin is also known as :  
☒ (1) Salicylic acid (2) Ethyl Salicylic acid  
(3) Methyl Salicylic acid (4) Acetyl Salicylic acid
4. What is the IUPAC name of picric acid ?  
(1) 2-Nitrophenol (2) 2,4,6-Trinitrophenol  
(3) Ethyl Salicylic acid (4) 2 aminophenol
5. Why does Fluorine exhibit only  $-1$  oxidation state ?  
(1) It is a halogen. (2) It is a non-metal.  
(3) It is small in size. (4) It has no d orbitals.
6. Which among the following halogen exists in liquid state at room temperature ?  
(1) Fluorine  
☒ (2) Bromine (3) Chlorine  
(4) Iodine
7. The central atoms/ions in the coordination compounds are referred as \_\_\_\_\_.  
☒ (1) Lewis base (2) Lewis acid  
(3) Bronsted acid (4) Bronsted base
8. What is the IUPAC name of  $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$ ?  
(1) Diamminechloridonitrito-N-platinum(II)  
☒ (2) Diamminechloridenitrito-N-platinum(III)  
(3) Diamminechloridonitrito-O-platinum(II)  
(4) Diammonia chloridonitrito-N-platinum(II)

SPACE FOR ROUGH WORK

9. What is the product when glucose reacts with bromine water ?
- (1) Gluconic acid (2) Glyceraldehyde  
(3) Saccharic acid (4) Oxime

10. 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) $\text{MnO}_4^-$             | (II) $+5$  |
| (C) $\text{VO}_3^-$              | (III) $+7$ |
| (D) $\text{FeF}_6^{3-}$          | (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)
11. What is the colour of copper compound formed in Fehling's test for aliphatic aldehydes ?
- (1) Green (2) Blue  
(3) Yellow (4) Red brown
12. What is the major product formed when diazonium salt undergoes Gatterman reaction ?
- (1) Haloarene (2) Aryl amine  
(3) Phenol (4) Diphenyl ether
13. What is the major product of Carbylamine reaction ?
- (1) Cyanide (2) Isocyanide  
(3) Nitrile (4) Alkane
14. Which among the following is an essential amino acid ?
- (1) Glycine (2) Alanine  
(3) Valine (4) Serine

SPACE FOR ROUGH WORK

15. 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) &lt; (B) &lt; (C) &lt; (D)

(2) (A) &lt; (C) &lt; (D) &lt; (B)

(3) (B) &lt; (A) &lt; (D) &lt; (C)

(4) (C) &lt; (B) &lt; (D) &lt; (A)

16. Which among the following is a biodegradable polymer ?

☒ (1) PVC

(2) Freon

(3) Nylon

(4) PHBV

17. Which among the following is an antacid ?

(1) Aspirin

(2) Zantac

(3) Equanil

(4) Noradrenaline

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

(1) 96587

☒ (2) 96487

(3) 99500

(4) 6.023

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

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

20. 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) &lt; (B) &lt; (C) &lt; (D)

(2) (A) &lt; (C) &lt; (B) &lt; (D)

(3) (B) &lt; (A) &lt; (D) &lt; (C)

(4) (C) &lt; (B) &lt; (D) &lt; (A)

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

(1)  $\text{I}^-$ (2)  $\text{Cl}^-$ (3)  $\text{NH}_3$ ☒ (4)  $\text{SCN}^-$

22. 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)

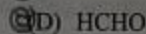
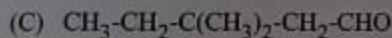
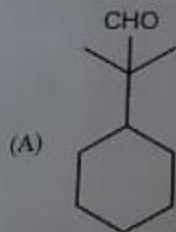
23. Arrange the following rate constant units in increasing order of their order of reaction :

- (A)  $\text{sec}^{-1}$       (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)

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

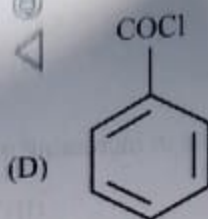
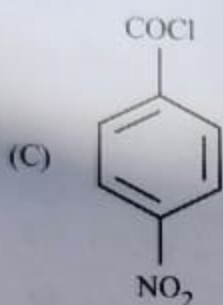
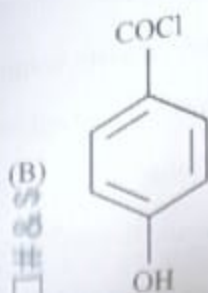
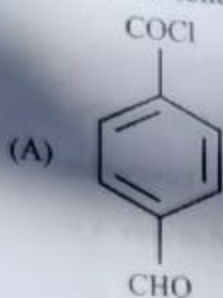


Choose the correct answer from the options given below :

- (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

25. Consider the following compounds :



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)

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

(A)  $\text{Ti}^{3+}$

(B)  $\text{Nb}^{3+}$

(C)  $\text{Cu}^+$

(D)  $\text{Y}^{3+}$

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

27. 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  $-\text{NH}_2$  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

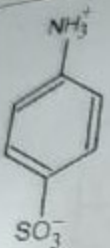
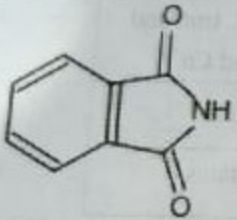
28. Match List-I with List-II :

| List-I                        | List-II                                                       |
|-------------------------------|---------------------------------------------------------------|
| (A) $\text{Mn}^{2+}$          | (I) Pyrolusite ore                                            |
| (B) Spin only Magnetic Moment | (II) An alloy of 4f metal, iron and traces of S, C, Al and Ca |
| (C) $\text{MnO}_2$            | (III) $\mu_s = \sqrt{n(n+2)} \text{ BM}$                      |
| (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) - (II), (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

| 306 E (New) A<br>Match List-I with List-II<br>List-I<br>(Compound)                     | List-II<br>(Property)                                             |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| (A) $\text{COCl}_2$                                                                    | (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)

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30. Which of the

(A) Adenine

(C) Thymine

Choose the

(1) (A), (B)

(A), (C)

31. Match List-

| List-II<br>(Amino Acid) |
|-------------------------|
| (A) Valine              |
| (B) Glycine             |
| (C) Lysine              |
| (D) Glutamine           |

Choose the

(1) (A) -

(2) (A) -

(3) (A) -

(4) (A) -

32. Which

(A) Me

(2) Ar

(3) Me

(4) CO

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

- (A) Adenine  
(C) Thymine

- (B) Uracil  
(D) Cytosine

Choose the correct answer from the options given below :

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

- (2) (B) and (C) only  
(4) (A) and (B) only

31. Match List-I with List-II :

| List-I<br>(Amino Acid) | List-II<br>(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)

32. 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)  $\text{CO}_2$ ,  $K_H = 1.6$

SPACE FOR ROUGH WORK

33. 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  
(2) 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.

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

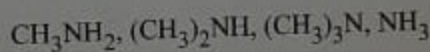
(1) Cyanide

(2) Isocyanide

(3) Cyanohydrin

(4) Hydrogen cyanide

35. 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

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.

39. Which transition metal is liquid at room temperature?

☒ (1) Hg

☐ (2) Cu

☐ (3) Ag

☐ (4) Au

40. Which is the hardest metal?

☐ (1) Zn

☒ (2) Cu

☐ (3) Hg

☐ (4) Cd

41. 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

42. Which transition metal has the highest melting point?

☐ (1) Hf

☒ (2) Ta

☐ (3) W

☐ (4) Re

43. 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

Which among the following compounds show metal excess defect due to anionic vacancy ?

- (1) ZnO  
(3) FeO

- (2) NaCl  
(4) CdO

Molal elevation constant is also known as :

- (1) Ebullioscopic constant  
(3) Henry's constant

- (2) Gas constant  
(4) Cryoscopic constant

What is the overall order of the reaction ?

$$\text{Rate} = k[A]^{1/2} [B]^{3/2}$$

- (1) 2  
(3) 1

- (2) 0  
(4) 0.5

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

Kohlrausch law is related to which of the following term ?

- (1) Osmosis  
(3) Effusion

- (2) Diffusion  
(4) Migration of ions

Which factor in Arrhenius equation, corresponds to fraction of molecules having kinetic energy greater than activation energy ?

- (1)  $\ln k$   
(3)  $RT$

- (2)  $\ln A$   
(4)  $e^{-E_a/RT}$

What is the another term used for probability factor (P) in collision theory ?

- (1) Temperature factor  
(3) Steric factor

- (2) Compressibility factor  
(4) Concentration factor

SPACE FOR ROUGH WORK