

1. In case of phosphorus,  $\text{PCl}_3$  and  $\text{PCl}_5$  are possible while nitrogen forms  $\text{NCl}_3$  and not  $\text{NCl}_5$ . This is due to:

1. Nitrogen is a gas while phosphorus is solid at room temperature.
2. Nitrogen does not have vacant d-orbitals in its valence shell.
3. Electronegativity of nitrogen is higher than phosphorus.
4. Nitrogen atom is smaller than phosphorus atom.

(A) 145

(I)  $\text{CO}_2$ 

(B) 89

(II) He

(C) 76.5

(III)  $\text{N}_2$  (293 K)

(D) 1.67

(IV)  $\text{N}_2$  (303 K)

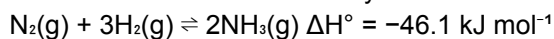
2. The standard reduction potentials of  $\text{Sn}^{4+}/\text{Sn}^{2+}$  is +0.15 V and  $\text{Cr}^{3+}/\text{Cr}$  is -0.74 V. These two half cells are connected to make a galvanic cell. The galvanic cell can be represented as:

1.  $\text{Sn}^{2+}(\text{aq})|\text{Sn}^{4+}(\text{aq})||\text{Cr}^{3+}(\text{aq})|\text{Cr}(\text{s})$
2.  $\text{Sn}^{4+}(\text{aq})|\text{Sn}^{2+}(\text{aq})||\text{Cr}^{3+}(\text{aq})|\text{Cr}(\text{s})$
3.  $\text{Cr}(\text{s})|\text{Cr}^{3+}(\text{aq})||\text{Sn}^{4+}(\text{aq})|\text{Sn}^{2+}(\text{aq})$
4.  $\text{Cr}(\text{s})|\text{Cr}^{3+}(\text{aq})||\text{Sn}^{2+}(\text{aq})|\text{Sn}^{4+}(\text{aq})$

Options:

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

3. Ammonia is manufactured by:



The steps involved are:

- (A) Condensation of mixture of gases
- (B) Passing gaseous mixture over catalyst
- (C) Compression of gaseous mixture
- (D) Recirculation of gaseous mixture

Correct order is:

1. (C), (B), (A), (D)
2. (B), (C), (D), (A)
3. (A), (D), (C), (B)
4. (B), (A), (D), (C)

4. Match List-I with List-II.

**List-I (K<sub>H</sub> values / K bar)**

**List-II (Gas)**

5. The correct IUPAC name of  $\text{CH}_3\text{-CH}(\text{C}_2\text{H}_5)\text{-CH}_2\text{-Br}$  is:

1. 1-Bromo-2-methylbutane
2. 1-Bromo-2-ethylpropane
3. 1-Bromo-2-ethyl-2-methyl ethane
4. 2-Methyl-1-bromobutane

6. The quantity of charge required to obtain **2 mol of  $\text{Mn}^{2+}$  from  $\text{MnO}_4^-$**  is:

1. 2 F
2. 10 F
3. 5 F
4. 1 F

7. Which of the following reactions will **not produce ketones**?

1. Hydrolysis of alkynes
2. Ozonolysis of substituted alkenes
3. Treating nitrite with Grignard reagent
4. Stephen's reaction

8. Basic hydrolysis of esters produces:

1. Carboxylates
2. Carboxylic acids
3. Aldehydes
4. Ketones

9. Chemical formula of **laughing gas** is:

1. NO
2. N<sub>2</sub>O
3. N<sub>2</sub>O<sub>3</sub>
4. N<sub>2</sub>O<sub>4</sub>

10. In amines, nitrogen atom is **A** and **B** hybridised, making geometry **C**. A, B and C respectively are:

1. Trivalent, sp<sup>2</sup>, trigonal
2. Tetravalent, sp<sup>3</sup>, tetrahedral
3. Trivalent, sp<sup>3</sup>, pyramidal
4. Tetravalent, sp<sup>2</sup>, pyramidal

11. The minimum concentration of an electrolyte in millimoles per litre required to cause precipitation of a sol in two hours is called:

1. Coagulation value
2. Gold number
3. Congorubrin number
4. Flocculation

12. Which alloy is used for making bullets and lighter flints?

1. Shell metal
2. Misch metal
3. Gun metal
4. Monel metal

13. Acetaldehyde and benzaldehyde can be distinguished by:

1. 2,4-DNP test
2. Tollens' test

3. Sodium bicarbonate test
4. Fehling's test

14. Aspartame is most successful artificial sweetener but is limited to cold food because:

1. Control of sweetness is difficult
2. Too many calories are released at high temperature
3. Releases acetic acid in non-cold medium
4. Unstable at cooking temperature

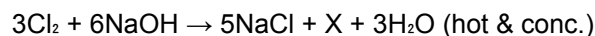
15. In cyanide extraction of silver the oxidising and reducing agents are respectively:

1. O<sub>2</sub> and CO
2. O<sub>2</sub> and Zn dust
3. H<sub>2</sub>O and Zn dust
4. H<sub>2</sub>O and NaCN

16. The appropriate reagent for the following conversion (benzene → chlorobenzene) is:

1. SO<sub>2</sub>Cl<sub>2</sub>
2. N-Chlorosuccinimide
3. Cl<sub>2</sub>/FeCl<sub>3</sub>
4. SOCl<sub>2</sub>

17. Identify **X** with oxidation state of halogen:



1. NaClO<sub>2</sub>, +3
2. NaClO<sub>3</sub>, +5
3. NaClO<sub>2</sub>, +7
4. NaClO<sub>3</sub>, +1

18. Match List-I with List-II.

**List-I**

**List-II**

- (A) Electrolytic reduction (I) Iron
- (B) Bessemerisation (II) Zinc
- (C) Smelting (III) Aluminium
- (D) Reduction from oxide (IV) Copper

Options:

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

19. Half-life of a **first order reaction** is 25 minutes. Rate constant is:

1.  $2.27 \times 10^{-2} \text{ min}^{-1}$
2.  $3.2 \times 10^{-3} \text{ min}^{-1}$
3.  $9.2 \times 10^{-2} \text{ min}^{-1}$
4.  $2.8 \times 10^{-2} \text{ min}^{-1}$

20. The oxoacid of sulphur which has **one lone pair** on sulphur is:

1.  $\text{H}_2\text{SO}_4$
2.  $\text{H}_2\text{SO}_3$
3.  $\text{H}_2\text{S}_2\text{O}_8$
4.  $\text{H}_2\text{S}_2\text{O}_7$

21. A drop of volume 0.05 mL contains  $(3.0 \times 10^{-6})$  mol  $\text{H}^+$  ions.

If rate of disappearance of  $\text{H}^+$  is  $(1.0 \times 10^{-7})$  mol  $\text{L}^{-1} \text{ s}^{-1}$ , time required is:

1.  $(6 \times 10^{-8})$  s
2.  $(6 \times 10^{-9})$  s
3.  $(6 \times 10^{-7})$  s
4.  $(6 \times 10^{-10})$  s

22. The vapour pressure of mixture of ethanol and acetone is higher because:

1. Weakening of intermolecular interactions
2. Strengthening of interactions
3. New hydrogen bonds formed
4. Molecules cannot escape solution

23. Which of the following is **not an expression of Dalton's law of partial pressures**?

1.  $(P = P_1 + P_2)$
2.  $(P = P_1^{x_1})$
3.  $(P = P_1^{x_1} + (P_2^{x_2} - P_1^{x_2})x_2)$
4.  $(P_1 = P - P_2)$

24. A compound forms hexagonal close packed structure. Number of tetrahedral voids in **0.8 mol** is:

1.  $(1.5055 \times 10^{23})$
2.  $(2.4088 \times 10^{23})$
3.  $(9.635 \times 10^{23})$
4.  $(3.011 \times 10^{23})$

25. Which electrolyte has **maximum coagulating value** for  $\text{AgI}/\text{Ag}^+$  sol?

1.  $\text{Na}_2\text{S}$
2.  $\text{Na}_3\text{PO}_4$
3.  $\text{Na}_2\text{SO}_4$
4.  $\text{NaCl}$

26. Analytically pure  $\text{C}_5\text{H}_{11}\text{Br}$  gives two isomeric alkenes on dehydrohalogenation. Ozonolysis gives  $\text{CH}_3\text{CHO}$ ,  $\text{CH}_3\text{COCH}_3$  and  $\text{HCHO}$ . Alkyl halide is:

1. 3-Bromopentane
2. 2-Bromo-3-methylbutane
3. 2-Bromo-2-methylbutane
4. 1-Bromo-2,2-dimethylpropane

27. Glucose does **not react** with:

1. Conc.  $\text{HNO}_3$
2. Acetic anhydride
3. Hydroxylamine
4. Sodium bisulphite

28. Which statement is **not correct**?

1. La belongs to transition series rather than lanthanoid series
2.  $\text{La}(\text{OH})_3$  less basic than  $\text{Lu}(\text{OH})_3$
3.  $\text{Ln}^{3+}$  ionic radius decreases in lanthanoid series
4. Atomic radii of Zr and Hf are same due to lanthanoid contraction

29. Positive **carbylamine test** is shown by:

1. N-Methylaniline
2. N,N-Dimethylaniline
3. Triethylamine
4. p-Methylbenzylamine

30. Which statement is correct about catalyst?

1. Catalyst required in large quantity
2. Same reactants may give different products with different catalysts
3. Catalytic activity does not depend on chemisorption
4. Catalyst does not remain same after reaction

31. The hormone which controls the processes of burning of fats, proteins and carbohydrates, with liberation of energy in the body is:

1. Thyroxine
2. Insulin
3. Adrenaline
4. Estradiol

32.  $\text{CH}_3\text{CHO}$  does not give a silver mirror with Tollens' reagent but forms an oxime with hydroxylamine. It can give positive:

1. Iodoform test
2. Fehling's test
3. Schiff's test
4. Carbylamine test

33. Arrange the following amines in the order of **decreasing basic character in gaseous phase**:

- (A)  $\text{NH}_3$   
(B)  $\text{CH}_3\text{NH}_2$   
(C)  $(\text{CH}_3)_2\text{NH}$   
(D)  $(\text{CH}_3)_3\text{N}$

Options:

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

34. Which of the following is **not correct about the order of a reaction**?

1. Order of a reaction is the sum of powers of molar concentration of reactants in rate law expression.
2. Order of reaction is always equal to the sum of stoichiometric coefficients in balanced equation.
3. Order of reaction can be fractional.
4. Order of reaction is experimentally determined.

35. D(+)-Glucose reacts with hydroxylamine and forms **oxime**.

The correct structure of the oxime is:

1. Structure (1)
2. Structure (2)
3. Structure (3)
4. Structure (4)

36. The cell reaction occurring at **anode** in the electrolysis of aqueous NaCl solution is:

- $(H^+(aq) + e^- \rightarrow \frac{1}{2}H_2(g))$
- $(Cl^-(aq) \rightarrow \frac{1}{2}Cl_2(g) + e^-)$
- $(Na^+(aq) + e^- \rightarrow Na(s))$
- $(2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-)$

(D) Ni-Cd Cell      (IV) Gives steady potential

Options:

- A-I, B-IV, C-III, D-II
- A-III, B-I, C-IV, D-II
- A-III, B-IV, C-II, D-I
- A-IV, B-I, C-II, D-III

 37. In Freundlich adsorption isotherm, the value of  $(1/n)$  is:

- 1 in case of chemisorption
- 1 in case of physisorption
- Between 0 and 1 in all cases
- Between 2 and 4 in all cases

 38. Amongst the following, identify the **condensation polymers**:

- Bakelite
- Teflon
- Melamine formaldehyde resin
- Nylon-2 nylon-6
- Buna-S

Options:

- (B) and (E) only
- (A), (C) and (D) only
- (C) and (D) only
- (A), (B) and (E) only

39. Match List-I with List-II.

List-I	List-II
(A) Fuel Cell	(I) Rechargeable
(B) Mercury Cell	(II) Reaction at anode: $Zn \rightarrow Zn^{2+} + 2e^-$
(C) Leclanche Cell	(III) Cell reaction: $2H_2 + O_2 \rightarrow 2H_2O$

 40. Which of the following defects are shown by **KCl crystal**?

- Schottky defect
- Frenkel defect
- Metal excess defect
- Metal deficiency defect

Options:

- (A) and (B) only
- (A) and (C) only
- (B) and (C) only
- (B) and (D) only

41. Two complexes of nickel having same geometry but different magnetic behaviour are:

- $[Ni(CN)_4]^{2-}$
- $[Ni(CO)_4]$
- $[NiCl_4]^{2-}$
- $[Ni(NH_3)_6]^{2+}$

Options:

- (A) and (B) only
- (B) and (D) only
- (B) and (C) only
- (A) and (D) only

 42. Which complexes are **correctly matched with hybridisation**?

- $[Ni(H_2O)_6]^{2+} - sp^3d^2$
- $[CoF_6]^{3-} - sp^3d^2$
- $[Cu(NH_3)_4]^{2+} - dsp^2$

CUET UG 2023  
**Previous Year Question**

4.  $[\text{MnCl}_4]^{2-}$  –  $dsp^2$

1. o-Dihydroxybenzoic acid
2. p-Hydroxybenzoic acid
3. m-Hydroxybenzoic acid
4. Salicylic acid (o-hydroxybenzoic acid)

43. Among the following, which should have the **highest magnetic moment**?

1.  $[\text{NiCl}_4]^{2-}$
2.  $[\text{Mn}(\text{CN})_6]^{4-}$
3.  $[\text{Cr}(\text{NH}_3)_6]^{3+}$
4.  $[\text{CoF}_6]^{3-}$

47. Name the reaction shown (Phenol  $\rightarrow$  Salicylaldehyde using  $\text{CHCl}_3/\text{NaOH}$ ):

1. Williamson synthesis
2. Kolbe's reaction
3. Reimer-Tiemann reaction
4. Sandmeyer reaction

44. The compound  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$  exhibits:

1. Geometrical isomerism
2. Linkage isomerism
3. Ionisation isomerism
4. Coordination isomerism

48. The IUPAC name of the compound shown is:

1. 1-Methyl-2-phenyl ethanol
2. 1-Methyl-1-phenyl ethanol
3. 2-Phenylpropan-2-ol
4. 1,1-Dimethyl-1-phenyl methanol

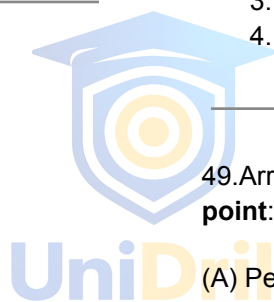
45. Match the following ions with their colours.

List-I	List-II
(A) $\text{Mn}^{2+}$	(I) Yellow
(B) $\text{Fe}^{3+}$	(II) Green
(C) $\text{Ni}^{2+}$	(III) Blue
(D) $\text{Cu}^{2+}$	(IV) Pink

Options:

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

46. Aspirin is an acetylation product of:



49. Arrange the following in **increasing order of boiling point**:

- (A) Pentan-1-ol
- (B) n-Butane
- (C) Pentan-1-al
- (D) Ethoxyethane

Options:

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