

CUET Chemistry Solved Paper-2023

Held on 23 May 2023, (Shift-III)

1. Increasing order of reducing power of following hydrides would be

A. SbH_3 B. AsH_3 C. NH_3 D. PH_3
E. BiH_3

Choose the correct answer from the options given below:

- (a) $\text{E} < \text{A} < \text{B} < \text{D} < \text{C}$ (b) $\text{C} < \text{D} < \text{B} < \text{A} < \text{E}$
(c) $\text{C} < \text{D} < \text{A} < \text{B} < \text{E}$ (d) $\text{A} < \text{E} < \text{D} < \text{B} < \text{C}$
2. Identify the reagent which can be used to convert benzamide into aniline in a single step:
- (a) $\text{NaNO}_2 + \text{dil. HCl}$ at 0°C
(b) $\text{I}_2 + \text{aq. NaOH}$
(c) $\text{Br}_2 + \text{aq. NaOH}$
(d) $\text{Br}_2 + \text{CH}_3\text{COOH}$
3. Complete hydrolysis of DNA does not yield
- (a) Phosphoric acid
(b) Pentose sugar
(c) Nitrogen containing compound
(d) Secondary alcohol
4. Potassium (K) and Rubidium (Rb) forms
- (a) Suboxides (b) Peroxides
(c) Superoxides (d) Dioxides
5. Which aldehyde is used to preserve biological specimens?
- (a) Acetaldehyde (b) Benzaldehyde
(c) Butanal (d) Formaldehyde
6. What will be the hybridisation of highlighted carbon in the given haloarene

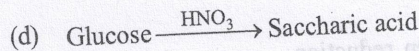
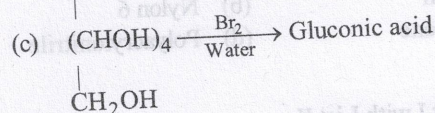
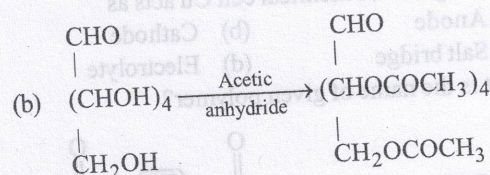
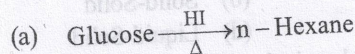


- (a) sp^2 (b) sp^3 (c) sp (d) sp^3d
7. The purest form of commercial iron is
- (a) Cast Iron (b) Wrought Iron
(c) Pig Iron (d) Steel
8. Arrange the following hydrides in decreasing order of their thermal stability.
- A. H_2S B. H_2Se C. H_2O D. H_2Te
E. H_2Po

Choose the correct answer from the options given below:

- (a) $\text{E} > \text{C} > \text{B} > \text{D} > \text{A}$ (b) $\text{C} > \text{A} > \text{B} > \text{D} > \text{E}$
(c) $\text{E} > \text{D} > \text{B} > \text{A} > \text{C}$ (d) $\text{C} > \text{B} > \text{A} > \text{E} > \text{D}$
9. Which of the following hormones is produced under the condition of stress which stimulates glycogenolysis in the liver of human beings?
- (a) Thyroxine (b) Estradiol
(c) Adrenaline (d) Insulin

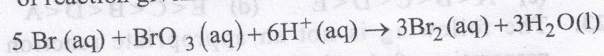
10. Which of the following reactions show that glucose contains five 'OH' groups?



11. Given below are the steps involved in the process of zone refining for removing impurities which are more soluble in the melt than solid state of the metal.
- A. Impurities get concentrated at one end.
B. As the heater moves forward, the pure metal crystallises out of the melt left behind and the impurities pass to the next zone.
C. A mobile heater surrounding the rod of impure metal is fixed at its one end.
D. The end is cut off.
E. The molten zone moves along with the heater which is moved forward.

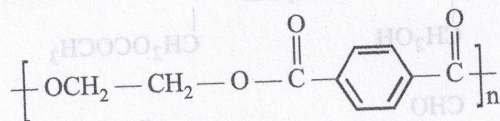
Choose the correct answer from the options given below:

- (a) E, B, C, D, A (b) E, B, C, A, D
(c) C, E, B, A, D (d) C, B, E, A, D
12. Pentan-2-one and pentan-3-one can be distinguished by
- (a) Iodoform test (b) Neutral FeCl_3 test
(c) Blue litmus test (d) Lucas reagent test
13. Which of the following expression is correct for the rate of reaction given below?



(a) $\frac{\Delta[\text{Br}^-]}{\Delta t} = 5 \frac{\Delta[\text{H}^+]}{\Delta t}$ (b) $\frac{\Delta[\text{Br}^-]}{\Delta t} = \frac{6}{5} \frac{\Delta[\text{H}^+]}{\Delta t}$
(c) $\frac{\Delta[\text{Br}^-]}{\Delta t} = \frac{5}{6} \frac{\Delta[\text{H}^+]}{\Delta t}$ (d) $\frac{\Delta[\text{Br}^-]}{\Delta t} = 6 \frac{\Delta[\text{H}^+]}{\Delta t}$

14. Following is a property of *p*-type semiconductor
 (a) Each atom forms four covalent bonds.
 (b) Fifth electron is extra and becomes delocalised.
 (c) The place where the 4th valence electron is missing is called hole.
 (d) Increase in conductivity is due to negatively charged electron.
15. Amalgam of mercury with sodium belongs to which solute-solvent combination
 (a) Solid-Gas (b) Solid-Solid
 (c) Gas-Solid (d) Liquid-Solid
16. In Cu-Ag electrochemical cell Cu acts as
 (a) Anode (b) Cathode
 (c) Salt bridge (d) Electrolyte
17. What is the name of given polymer?



- (a) Teflon (b) Nylon 6
 (c) Terylene (d) Polyacrylonitrile

21. Match List I with List II

List - I

- A. Stephen reduction
 B. Clemensen reduction
 C. Wolf Kishner reduction
 D. Rosenmund reduction

Choose the correct answer from the options given below:

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

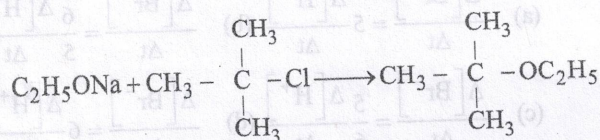
22. For the equimolar solutions, increasing order of osmotic pressure is

- A. 1 m C₆H₅COOH (b) 1 m BaCl₂
 C. 1 m KCl (d) 1 m glucose
 E. 1 m H₃PO₄

Choose the correct answer from the options given below:

- (a) A < D < C < B < E (b) E < B < C < D < A
 (c) A < B < C < D < E (d) E < C < B < D < A

23. The following is not an appropriate reaction for preparation of *t*-butyl ethyl ether because:



18. What does a negative E° (standard reduction potential) value of a redox couple indicate?

- (a) Redox couple is a stronger reducing agent than couple H⁺/H₂ couple.
 (b) Redox couple is a weaker reducing agent than the H⁺/H₂ couple.
 (c) Redox couple is a stronger oxidising agent than the H⁺/H₂ couple.
 (d) Redox couple carry equivalent oxidising power as H⁺/H₂ couple.

19. Samples of benzaldehyde and acetaldehyde can be distinguished by using

- (a) 2, 4 Dinitrophenylhydrazine
 (b) Tollen's reagent
 (c) Mixture of Fehling solution A + B
 (d) Zn-Hg/HCl

20. The osmotic pressure of a solution prepared by dissolving 50 mg of H₂SO₄ in 2 liters of water at 25° C will be

- (a) 5.2700 atm (b) 0.0187 atm
 (c) 187.3 atm (d) 0.527 atm

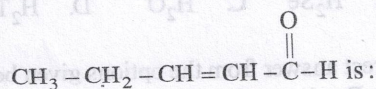
List-II

- I. $\text{PhCOCl} \xrightarrow[\text{Pd/BaSO}_4]{\text{H}_2} \text{PhCHO} + \text{HCl}$
 II. $>\text{C}=\text{O} + \text{HCl} \xrightarrow[\text{Hg}]{\text{Zn}} >\text{CH}_2 + \text{H}_2\text{O}$
 III. $\text{RCN} \xrightarrow[\text{SnCl}_2]{\text{HCl}} \text{RCH}=\text{NH} \xrightarrow{\text{H}_3\text{O}^+} \text{RCHO}$
 IV. $>\text{C}=\text{O} \xrightarrow{\text{NH}_2\text{NH}_2} >\text{C}=\text{N} \cdot \text{NH}_2 \xrightarrow[\text{glycol}]{\text{KOH}} >\text{CH}_2 + \text{N}_2$

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

- (a) Sodium ethoxide is a weak base
 (b) Alkyl halide is tertiary in nature
 (c) Sodium ethoxide is a strong base
 (d) The ether formed is very bulky

24. Correct IUPAC name of



- (a) pent-2-enal (b) pent-2-enol
 (c) pent-3-enal (d) pent-3-enol

25. Arrange the following carboxylic acids in increasing order of their acid strength.

- A. CH₃COOH (b) CH₃CH₂COOH
 C. C₆H₅CH₂COOH (d) C₆H₅COOH

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Choose the correct answer from the options given below:

- (a) $A > B > D > C$ (b) $A > B > C > D$
 (c) $D > C > A > B$ (d) $C > D > B > A$

26. The complex $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2]\text{Cl}$ exhibits.

- A. Coordination isomerism
 B. Linkage isomerism
 C. Solvate isomerism
 D. Ionisation isomerism
 E. Geometrical isomerism

Choose the correct answer from the options given below:

- (a) B, D and E only (b) B, A and D only
 (c) C, A and D only (d) D, E and C only

27. $E^\circ_{\text{K}^+/\text{K}} = -2.93\text{V}$, $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.8\text{V}$, $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34\text{V}$,

$E^\circ_{\text{Ni}^{2+}/\text{Ni}} = -0.25\text{V}$, $E^\circ_{\text{Li}^+/\text{Li}} = -3.05\text{V}$

Arrange these following metals in increasing order of their reducing power.

- A. K B. Ag C. Cu D. Ni
 E. Li

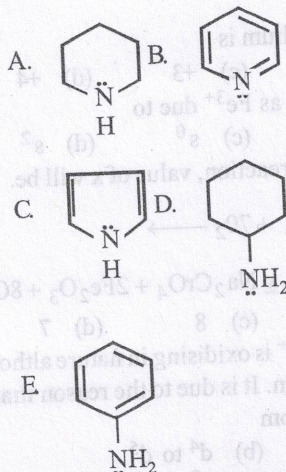
Choose the correct answer from the options given below:

- (a) $B < C < A < D < E$ (b) $B < C < E < A < D$
 (c) $B < C < D < A < E$ (d) $B < C < A < E < D$

28. Helium and element 'X' have outer electron configuration of ns^2 . Identify the element 'X'.

- (a) Na (b) B (c) Be (d) Ne

29. Nitrogen containing compounds are basic in nature and their basic strength depends on ease of availability of lone pair of electrons on nitrogen atoms. For the following nitrogen containing compounds what will be correct order of basicity?



Choose the correct answer from the options given below:

- (a) $A > B > D > C > E$ (b) $B > A > D > E > C$
 (c) $B > D > A > C > E$ (d) $A > D > B > E > C$

30. An element 'Y' has a body centred cubic (bcc) structure with a cell edge of 144 pm. The density of the element is 3.6g/cm^3 . How many atoms are present in 720 g of the element?

- (a) 14.24×10^{23} atoms
 (b) 10.42×10^{25} atoms
 (c) 24.16×10^{23} atoms
 (d) 13.42×10^{25} atoms

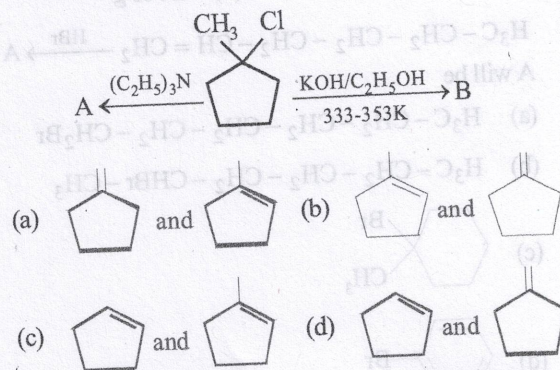
31. Which of the following statement is correct about the half-life period?

- A. It is proportional to initial concentration of zero order reaction.
 B. Half-life period can be used to determine the order of the reaction.
 C. Half-life period for 1st order reaction is independent of concentration.
 D. Catalyst does not affect half-life time period.
 (a) A and B only
 (b) A, B and D only
 (c) A, B and C only
 (d) B, C and D only

32. Aspartame is used in cold foods and soft drinks even though it is roughly 100 times as sweet as cane sugar and can pose a health hazard because:

- (a) It is stable at cooking temperature.
 (b) It is a monomer.
 (c) It is bitter in taste.
 (d) It is unstable at cooking temperature.

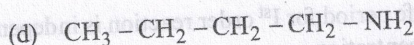
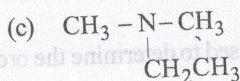
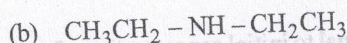
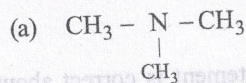
33. Identify A and B respectively in the following equation.



34. If we plot graph for first order reaction involving reactant R, then it will be a straight line if plotted for:

- (a) $\frac{[R]}{[R]_0}$ against time, t
 (b) $[R]_0$ against time, t
 (c) $\log \frac{[R]}{[R]_0}$ against time, t
 (d) $\log \frac{[R]}{[R]_0}$ against time, t

35. The correct structure representing N, N - dimethyl ethanamine is



36. Which one of the following ligands forms a chelate?

- (a) Cyanide (b) Water
(c) Oxalate (d) Chloride

37. Which of the following have lowest value of pK_b in their aqueous solution?

- (a) $(\text{CH}_3)_2\text{NH}$ (b) $(\text{CH}_3)_3\text{N}$
(c) CH_3NH_2 (d) NH_3

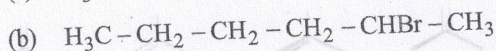
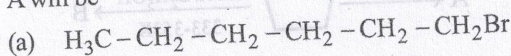
38. Sulphur molecule at room temperature is

- (a) Diatomic (b) Tetraatomic
(c) Triatomic (d) Octatomic

39. What amount of bromine will be required to convert 6 g of phenol into 2, 4, 6-tribromophenol?

- (a) 30.63 g (b) 40.64 g
(c) 20.38 g (d) 15.63 g

40. $\text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH} = \text{CH}_2 \xrightarrow{\text{HBr}} \text{A}$
A will be



DIRECTIONS : (Qs. 41 - 45) : Answer the following questions on the basis of passage given below :

Adsorption is the phenomenon of attracting and retaining the molecules of a substance on the surface of a solid resulting into a higher concentration on the surface than in the bulk. The substance adsorbed is known as adsorbate and the substance on which adsorption takes place is called adsorbent. In physisorption adsorbate is held to the adsorbent by weak van der Waals forces and in chemisorption by strong chemical bond.

41. Out of Milk, butter, ice cream, fruit juice and lemonade. Identify the one which is not a colloid.

- (a) Milk (b) Lemonade
(c) Fruit juice (d) Butter

42. Argyrol is a medicine used for

- (a) Curing Kalaazar (b) Stomach disorders
(c) Eye Lotion (d) Intramuscular injection

43. The process of absorption is accompanied by

- (a) Increase in entropy
(b) Decrease in entropy
(c) Increase in enthalpy
(d) Increase in Gibbs free energy

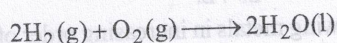
44. In coagulation of a positive sol, the flocculating power will be in the order

- A. PO_4^{3-} B. Cl^-
C. $\text{Fe}(\text{CN}_6)^{4-}$ D. SO_4^{2-}

Choose the correct answer from the options given below:

- (a) $\text{C} > \text{A} > \text{D} > \text{B}$ (b) $\text{C} > \text{A} > \text{B} > \text{D}$
(c) $\text{C} > \text{D} > \text{B} > \text{A}$ (d) $\text{B} > \text{D} > \text{A} > \text{C}$

45. In the given reaction, catalyst used is



- (a) Cu (b) Ni (c) Pt (d) Pd

DIRECTIONS : (Qs. 46 - 50) : Answer the following questions on the basis of passage given below :

One of the notable features of the transition element is the great variety of oxidation states it may show in its compounds. The elements which give the greatest number of oxidation states occur in or near the middle of the series. Manganese, for example exhibits all the oxidation states from +2 to +7. The lesser number of oxidation states at the extreme ends is either due to losing or sharing of few electrons (Sc, Ti) or too many d electrons of higher valence. Early in the First series scandium (II) is virtually unknown and titanium (IV) which is more stable than Ti (III) or Ti (II). On the other end, the only oxidation state of zinc is +2.

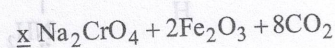
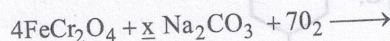
46. Oxidation state of scandium is

- (a) +1 (b) +2 (c) +3 (d) +4

47. Fe shows extra stability as Fe^{3+} due to

- (a) d^{10} (b) d^5 (c) s^0 (d) s^2

48. For balancing the given reaction, value of x will be.



- (a) 2 (b) 4 (c) 8 (d) 7

49. Cr^{2+} is reducing but Mn^{3+} is oxidising in nature although both have d^4 configuration. It is due to the reason that Cr configuration changes from

- (a) d^4 to d^3 (b) d^4 to d^5
(c) d^2 to d^3 (d) d^9 to d^{10}

50. Ambidentate ligand among the following is

- A. NCS B. $\text{C}_2\text{O}_4^{2-}$
C. SCN D. $\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$
E. NO_2

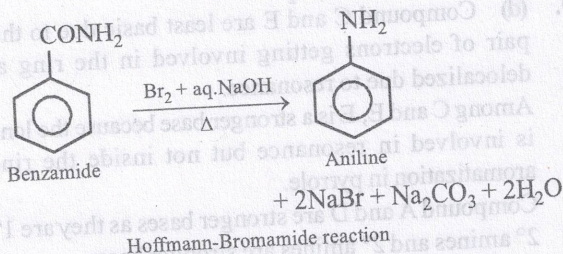
Choose the correct answer from the options given below:

- (a) A, C and E only (b) A, B and C only
(c) B, C and D only (d) A, C and D only

Hints & Explanations

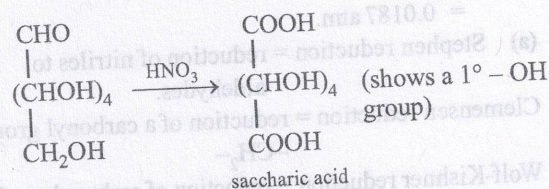
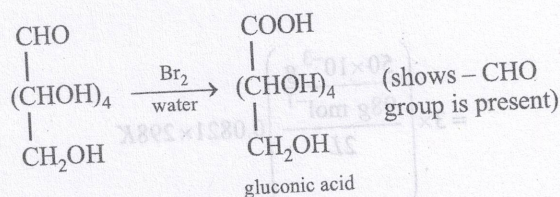
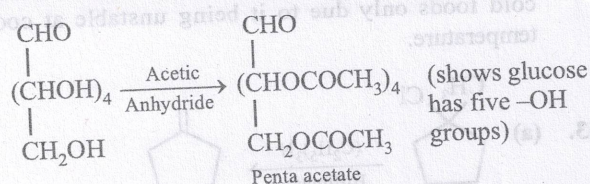
1. (b) The correct reducing order is:
 $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3 < \text{BiH}_3$
 This is due to decrease in the E-H bond strength, due to increasing atomic size down the group.

2. (c)

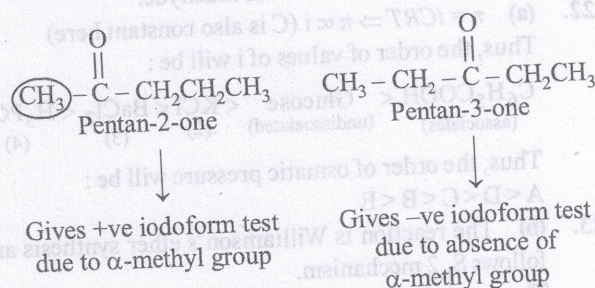


3. (d) DNA = deoxyribonucleic acid
 = Pentose sugar + Nitrogenous base + PO₄³⁻
4. (c) Potassium and rubidium are highly electropositive metals that are able to stabilize the superoxide ion O₂⁻ and hence they form superoxides.
 Li forms normal oxide and Na forms peroxides.
5. (d) Formaldehyde or methanal (HCHO) is used as a preservative for biological specimens (40% solution).
6. (a) Hybridization state
 = No. of bond pairs + no. of lone pairs
 = 3 + 0 = 3 = sp²
 (Double bond is treated as a single bond)
7. (b) Purest form = Wrought Iron (C = 0.02 – 0.05%)
 Cast Iron = 2.25 – 4.5% carbon
 Pig Iron = 3.0 – 4.0% carbon
 Steel = 0.2 – 1.0% carbon
8. (b) Thermal stability order:
 $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te} > \text{H}_2\text{Po}$.
 This is due to decreasing H-E Bond Strength down the group.
9. (c) Adrenaline or epinephrine is a stress hormone that stimulate glycogenolysis (increase in blood glucose) in the liver.

10. (b) Glucose $\xrightarrow[\Delta]{\text{HI}}$ n-Hexane (shows glucose has 6 carbons in a chain)



11. (c) C → E → B → A → D.
 12. (a)



13. (c) According to the given equation :

$$-\frac{1}{5} \frac{\Delta[\text{Br}^-]}{\Delta t} = \frac{1}{6} \frac{\Delta[\text{H}^+]}{\Delta t} \Rightarrow \frac{\Delta[\text{Br}^-]}{\Delta t} = \frac{5}{6} \frac{\Delta[\text{H}^+]}{\Delta t}$$

14. (c) Group 13 elements are electron-deficient and form p-type semiconductors.
 Holes are the electrical carriers in these semiconductors.
15. (d) Hg is liquid and the solute here while Na is solid and the solvent here.
16. (a) $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = +0.337\text{V}$, $E^\circ_{\text{Ag}^+/\text{Ag}} = +0.80\text{V}$

Thus, Cu acts as the anode and Ag as the cathode.

17. (c) The given polymer is terylene whose monomers are dimethyl terephthalate and dimethylene glycol.
18. (a) A negative value of the standard reduction potential indicates that the redox couple does not prefer to get reduced but prefers to get oxidized.
 Thus, it acts as a better reducing agent than H⁺/H₂.
19. (c) Acetaldehyde has α-hydrogens due to which it gives positive Fehling's test while benzaldehyde does not have an α-hydrogen so it gives a negative test.

$$20. (b) \pi = iCRT = i \left(\frac{m}{V} \right) RT$$

$$= 3 \times \left(\frac{50 \times 10^{-3} \text{ g}}{98 \text{ g mol}^{-1}} \right) \frac{0.0821 \times 298 \text{ K}}{2 \text{ L}}$$

$$= 0.0187 \text{ atm.}$$

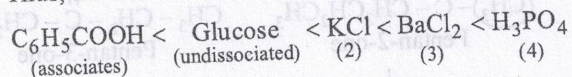
21. (a) Stephen reduction = reduction of nitriles to aldehydes.

Clemensen reduction = reduction of a carbonyl group to $-\text{CH}_2-$

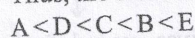
Wolf-Kishner reduction = reduction of carbonyl to $-\text{CH}_2-$ using NH_2NH_2 and KOH/glycol .

Rosenmund reduction = Reduction of acyl chloride to an aldehyde.

22. (a) $\pi = iCRT \Rightarrow \pi \propto i$ (C is also constant here)
Thus, the order of values of i will be:

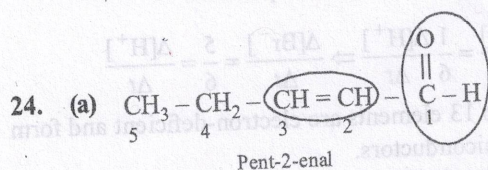


Thus, the order of osmotic pressure will be:



23. (b) The reaction is Williamson's ether synthesis and it follows $\text{S}_{\text{N}}2$ mechanism.

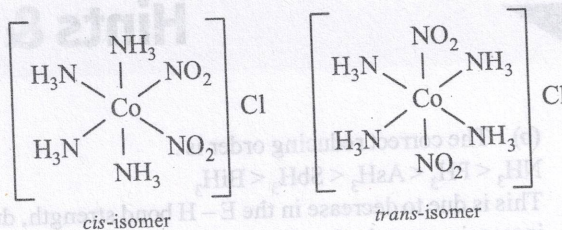
Thus, a tertiary halide will cause steric hindrance and the reaction will not be feasible.



25. (c) The presence and mass of the alkyl group decreases the acidity of the carboxylic acid.
Due to sp^2 -hybrid carbon of benzene ring in benzoic acid, COO^- is more stabilized and hence $\text{C}_6\text{H}_5\text{COOH}$ is the strongest acid.

The $-\text{C}_6\text{H}_5$ group increases the acidity, so $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$ is a stronger acid than CH_3COOH and $\text{CH}_3\text{CH}_2\text{COOH}$.
Among CH_3COOH and $\text{CH}_3\text{CH}_2\text{COOH}$, CH_3COOH is a stronger acid due to smaller $-\text{R}$ group.

26. (a) $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2]\text{Cl}$ and $[\text{Co}(\text{NH}_3)_4(\text{ONO})_2]\text{Cl}$
= Linkage isomers.
 $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2]\text{Cl}$ and $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]\text{NO}_2$
= ionization isomers.



27. (c) Reduction potential $\downarrow$, Reducing power $\uparrow$.
28. (c) $4\text{Be} = 1s^2 2s^2$ and $2\text{He} = 1s^2$.
29. (d) Compound C and E are least basic due to the lone pair of electrons getting involved in the ring and is delocalized due to resonance.

Among C and E, E is a stronger base because the lone pair is involved in resonance but not inside the ring for aromatization in pyrrole.

Compound A and D are stronger bases as they are 1° and 2° amines and 2° amines are stronger bases.

Compound B is pyridine which is a weaker base than amines.

$$30. (d) d = \frac{Z \times M}{a^3 \times N_A} \Rightarrow M = \frac{d \times a^3 \times N_A}{Z}$$

$$\text{Thus, } M = \frac{(3.6) (144 \times 10^{-10} \text{ cm})^3 (6.022 \times 10^{23})}{2}$$

$$= \frac{6.473}{2} = 3.2 \text{ g mol}^{-1}.$$

$$\Rightarrow n = \frac{m}{M} = \frac{720 \text{ g}}{3.2 \text{ g mol}^{-1}} = 225 \text{ mol.}$$

$$\Rightarrow \text{Number of atoms of 'Y'} = 225 \times 6.022 \times 10^{23} = 1.354 \times 10^{26} = 13.54 \times 10^{25}$$

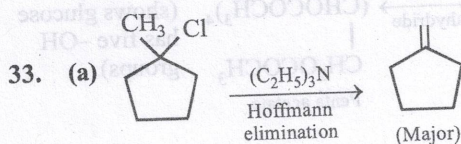
$$31. (c) t_{1/2}(\text{zero order}) = \frac{[A]_0}{2k}, t_{1/2}(\text{1st order}) = \frac{0.693}{k}$$

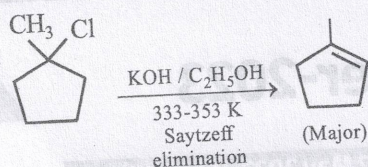
Thus, (A) and (C) are correct.

Using these formulas, we can deduce the corresponding order of reactions. Thus, (B) is also correct.

A catalyst affects the rate and hence the rate constant of a reaction. Thus, half-life period will also be affected. Thus, (D) is incorrect.

32. (d) Aspartame is an artificial sweetener that is used in cold foods only due to it being unstable at cooking temperature.



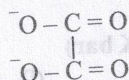


34. (c) $\log \frac{[R]_0}{[R]} = \frac{k}{2.303} t$ ($y = mx + C$) ($C = 0$ here)

or $\log \frac{[R]}{[R]_0} = \frac{-k}{2.303} t$ (a straight line curve)

35. (c) The name N, N-dimethylethanamine represents two methyl groups on the amino nitrogen along with an ethyl group.

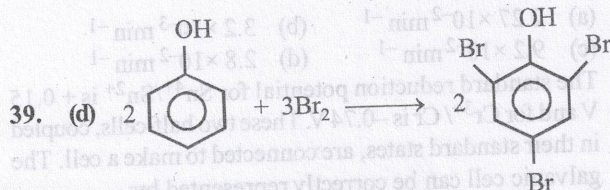
36. (c) Oxalate ($\text{C}_2\text{O}_4^{2-}$) is a bidentate ligand that forms a chelate with a metal atom or ion using two O-atoms.



37. (a) Lowest value of pK_b means highest value of K_b which means strongest base.

In aqueous solutions, a secondary amine has the balance of electronic effects and solvation (H-bonding). Thus, a secondary amine is the strongest base in aqueous solution and therefore $(\text{CH}_3)_2\text{NH}$ is the strongest base or has the lowest pK_b value.

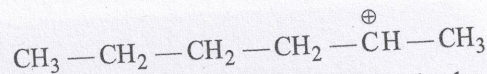
38. (d) Sulphur at room temperature = S_8
Sulphur at high temperatures ($\sim 530^\circ\text{C}$) = S_2



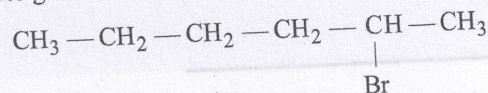
Thus, to convert 2 moles of phenol into 2, 4, 6-tribromophenol, we need 3 moles of Br_2 or 6 moles of Br. In terms of mass, for $2 \times 94.11 = 188.22$ g of phenol, we need $6 \times 80 = 480$ g of bromine.
 $\Rightarrow$ For 6 g of phenol, the mass of bromine required

$$= \frac{480 \times 6}{188.22} = 15.301 \text{ g}$$

40. (b) Addition of HBr to the given alkene follows Markovnikov rule and thus H^+ adds to the terminal carbon giving a carbocation intermediate –



In the next step, Br^- attacks the positively-charged carbon to give the final product –



No suitable reagents & conditions are present for cyclisation or aromatization.

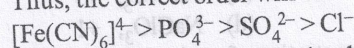
41. (b) Lemonade forms a true solution as the constituent particles are smaller than the size of colloidal particles. Milk is an emulsion type of colloid, butter is an emulsion, and fruit juice (concentrated) is a sol type of colloid.

42. (c) Argyrol is a silver sol (colloid) used by ophthalmologists as an eye lotion.

43. (b) When a substance is absorbed or adsorbed, the degree of randomness decreases, so the value of entropy decreases.

44. (a) According to Hardy-Schulze rule, the Flocculating power is directly proportional to the charge or valency of the ion of the electrolyte.

Thus, the correct order will be –



45. (c) Pt catalyst is used for the direct combination of H_2 and O_2 gas to give $\text{H}_2\text{O}(l)$.

Pd can also be used but it is less preferred due to higher activity of catalysis that can immobilize molecules.

46. (c) ${}_{21}\text{Sc} = [\text{Ar}] 3d^1 4s^2 \Rightarrow \text{Sc}^{3+} = [\text{Ar}]$.
Thus, it exhibits a stable +3 state.

47. (b) ${}_{26}\text{Fe} = [\text{Ar}] 3d^6 4s^2 \Rightarrow \text{Fe}^{3+} = [\text{Ar}] 3d^5$ (half-filled).

48. (c) $4 \text{FeCr}_2\text{O}_4 + 8 \text{Na}_2\text{CO}_3 + 7 \text{O}_2 \longrightarrow 8 \text{Na}_2\text{CrO}_4 + 2 \text{Fe}_2\text{O}_3 + 8 \text{CO}_2$
Thus, $x = 8$

49. (a) ${}_{24}\text{Cr} = [\text{Ar}] 3d^5 4s^1 \Rightarrow \text{Cr}^{2+} = [\text{Ar}] 3d^4$ (low effective nuclear charge, prefers to lose electrons)

${}_{25}\text{Mn} = [\text{Ar}] 3d^5 4s^2 \Rightarrow \text{Mn}^{3+} = [\text{Ar}] 3d^4$
(greater effective nuclear charge)
Thus, for Cr^{3+} , $d^4 \longrightarrow d^3$ (as Cr^{3+} with half-filled t_{2g})

50. (a) Ambidentate ligands = $\text{NCS}^-/\text{SCN}^-$, $\text{NO}_2^-/\text{O}=\text{N}=\text{O}$