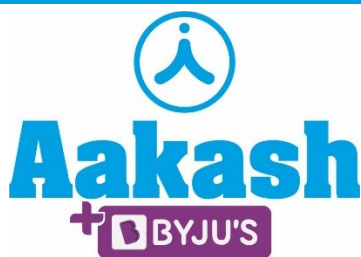


23/05/2023



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Answers & Solutions

Time : 45 min.

M.M. : 200

for CUET UG-2023 (Chemistry)

IMPORTANT INSTRUCTIONS:

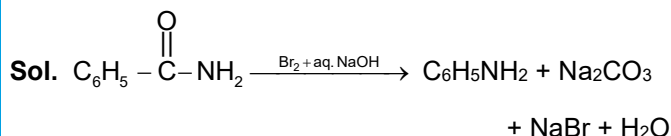
1. The test is of 45 Minutes duration.
2. The test contains 50 Questions out of which 40 questions need to be attempted.
3. Marking Scheme of the test:
 - a. Correct answer or the most appropriate answer: Five marks (+5)
 - b. Any incorrect option marked will be given minus one mark (–1).
 - c. Unanswered/Marked for Review will be given no mark (0).

Choose the correct answer :

1. Identify the reagent which can be used to convert benzamide into aniline in a single step :

- (1) $\text{NaNO}_2 + \text{dil. HCl}$ at 0°C
- (2) $\text{I}_2 + \text{aq. NaOH}$
- (3) $\text{Br}_2 + \text{aq. NaOH}$
- (4) $\text{Br}_2 + \text{CH}_3\text{COOH}$

Answer (3)



Above reaction is called Hoffmann bromomide degradation reaction

2. In Cu – Ag electrochemical cell Cu acts as

- (1) Anode
- (2) Cathode
- (3) Salt bridge
- (4) Electrolyte

Answer (1)

Sol. As per E°_{SRP} values of electrodes $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$

$$E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V}$$

So, Ag^+/Ag electrode acts as a cathode while Cu^{2+}/Cu electrode acts as anode.

3. 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.

- Impurities get concentrated at one end.
- As the heater moves forward, the pure metal crystallises out of the melt left behind and the impurities pass to the next zone.
- A mobile heater surrounding the rod of impure metal is fixed at its one end.
- The end is cut off.
- The molten zone moves along with the heater which is moved forward.

Choose the correct answer from the options given below:

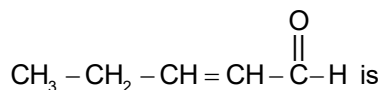
- E, B, C, D, A
- E, B, C, A, D
- C, E, B, A, D
- C, B, E, A, D

Answer (4)

Sol. In zone refining that works on the principle that impurities has more attraction towards molten metal than the solid metal following steps are followed.

- A mobile heater surrounding the rod of impure metal is fixed at its one end.
 - As the heater moves forward, the pure metal crystallises out of the melt left behind and the impurities pass to the next zone.
 - The molten zone moves along with the heater which is moved forward.
 - Impurities get concentrated at one end.
 - The end is cut off.
- C, B, E, A, D

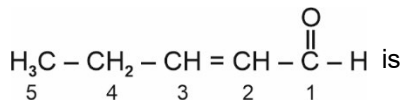
4. Correct IUPAC name of



- pent-2-enal
- pent-2-enol
- pent-3-enal
- pent-3-enol

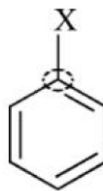
Answer (1)

Sol. Correct IUPAC name of following compound



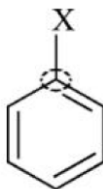
pent-2-enal

5. What will be the hybridisation of highlighted carbon in the given haloarene?



- sp^2
- sp^3
- sp
- sp^3d

Answer (1)



Sol.

Highlighted C in the benzene ring is sp^2 hybridized

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

- SbH_3
- AsH_3
- NH_3
- PH_3
- BiH_3

Choose the correct answer from the options given below:

- $\text{E} < \text{A} < \text{B} < \text{D} < \text{C}$
- $\text{C} < \text{D} < \text{B} < \text{A} < \text{E}$
- $\text{C} < \text{D} < \text{A} < \text{B} < \text{E}$
- $\text{A} < \text{E} < \text{D} < \text{B} < \text{C}$

Answer (2)

Sol. In group 15 hydrides, moving down the group basic strength decreases, acidic strength increases so the reducing power also increases. So, correct order of reducing power is



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

- It is proportional to initial concentration of zero order reaction.
- Half life period can be used to determine the order of the reaction.
- Half life period for 1st order reaction is independent of concentration.
- Catalyst does not affect half life time period.

- A and B only
- A, B and D only
- A, B and C only
- B, C and D only

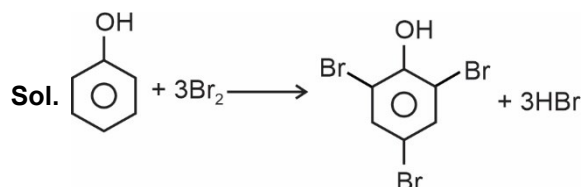
Answer (3)

- Sol.** • For a zero order reaction $t_{1/2} = \frac{a_0}{2k}$
- For an n^{th} order reaction
- $$t_{1/2} \propto (\text{Concentration})^{1-n}$$
- $t_{1/2}$ for a first order reaction = $\frac{0.693}{k}$

It is independent of concentration.

8. What amount of bromine will be required to convert 6 g of phenol into 2,4,6-tribromophenol?
- (1) 30.63 g (2) 40.64 g
- (3) 20.38 g (4) 15.63 g

Answer (1)

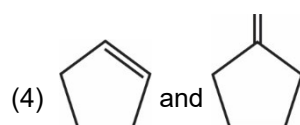
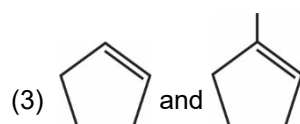
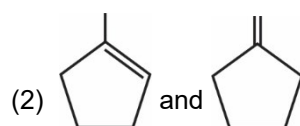
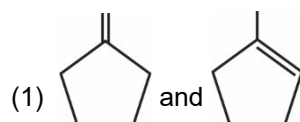
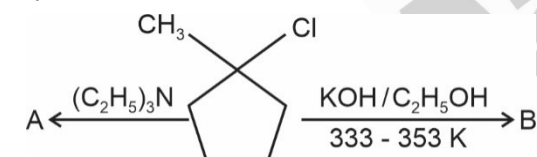


$$\text{Mole of phenol} = \frac{6}{94}$$

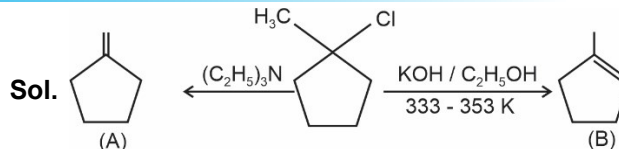
$$\text{Mole of Br}_2 \text{ reacted} = \frac{6}{94} \times 3 = \frac{18}{94}$$

$$\text{Mass of Br}_2 \text{ reacted} = \frac{18}{94} \times 160 = 30.63 \text{ g}$$

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



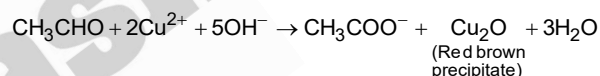
Answer (1)



- $(\text{C}_2\text{H}_5)_3\text{N}$: is sterically hindered base, hence less substituted alkenes will be formed in major yield.
 - OH^- is a small base, hence, more substituted alkene will be formed as major product.
10. Samples of benzaldehyde and acetaldehyde can be distinguished by using
- (1) 2,4 Dinitrophenylhydrazine
- (2) Tollen's reagent
- (3) Mixture of Fehling solution A + B
- (4) Zn-Hg/HCl

Answer (3)

Sol. Acetaldehyde gives positive Fehling's test while benzaldehyde does not respond to the Fehling's reagent.



11. Match List-I with List-II

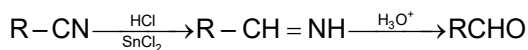
LIST-I		LIST-II	
A.	Stephen reduction	I.	$\text{PhCOCl} \xrightarrow[\text{Pd/BaSO}_4]{\text{H}_2} \text{PhCHO} + \text{HCl}$
B.	Clemmensen reduction	II.	$\text{>C=O} + \text{HCl} \xrightarrow[\text{Hg}]{\text{Zn}} \text{>CH}_2 + \text{H}_2\text{O}$
C.	Wolff Kishner reduction	III.	$\text{RCN} \xrightarrow[\text{SnCl}_2]{\text{HCl}} \text{RCH=NH} \xrightarrow[\text{glycol}]{\text{H}_3\text{O}^+} \text{RCHO}$
D.	Rosenmund reduction	IV.	$\text{>C=O} \xrightarrow{\text{NH}_2\text{NH}_2} \text{>C=N.NH}_2 \xrightarrow[\text{glycol}]{\text{KOH}} \text{>CH}_2 + \text{N}_2$

Choose the correct answer from the options given below:

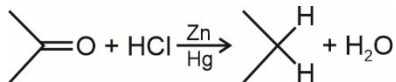
- (1) A-III, B-II, C-IV, D-I
- (2) A-III, B-II, C-I, D-IV
- (3) A-II, B-III, C-I, D-IV
- (4) A-II, B-III, C-IV, D-I

Answer (1)

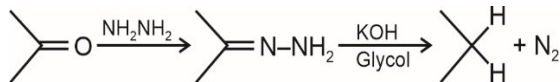
Sol. • Stephen reduction



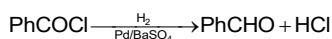
• Clemmensen reduction



• Wolff-Kishner reduction



• Rosenmund reduction



12. Potassium (K) and Rubidium (Rb) forms

- (1) Suboxides (2) Peroxides
(3) Superoxides (4) Dioxides

Answer (3)

Sol. K and Rb form superoxide. The superoxide ion (O_2^-) is stable only in the presence of large cations such as K^+ , Rb^+ , Cs^+ .

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

- (1) Redox couple is a stronger reducing agent than couple H^+/H_2 couple.
(2) Redox couple is a weaker reducing agent than the H^+/H_2 couple.
(3) Redox couple is a stronger oxidising agent than the H^+/H_2 couple.
(4) Redox couple carry equivalent oxidising power as H^+/H_2 couple.

Answer (1)

Sol. If standard reduction potential (E°) of a redox couple is negative. It means the species will be easily oxidised hence will be stronger reducing agent than H^+/H_2 couple.

14. Which aldehyde is used to preserve biological specimens?

- (1) Acetaldehyde (2) Benzaldehyde
(3) Butanal (4) Formaldehyde

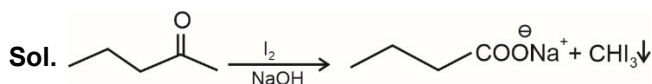
Answer (4)

Sol. Formaldehyde is well known as formalin (40%) solution used to preserve biological specimens.

15. Pentan-2-one and pentan-3-one can be distinguished by

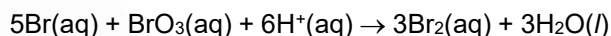
- (1) Iodoform test
(2) Neutral FeCl_3 test
(3) Blue litmus test
(4) Lucas reagent test

Answer (1)



Pentan-2-one will give yellow precipitate of CHI_3 on reaction with I_2/NaOH but pentan-3-one does not.

16. Which of the following expression is correct for the rate of reaction given below?



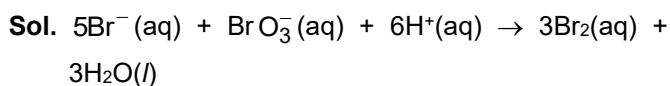
(1) $\frac{\Delta[\text{Br}^-]}{\Delta t} = 5 \frac{\Delta[\text{H}^+]}{\Delta t}$

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

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

(4) $\frac{\Delta[\text{Br}^-]}{\Delta t} = 6 \frac{\Delta[\text{H}^+]}{\Delta t}$

Answer (3)



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

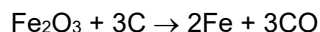
$$= \frac{\Delta[\text{Br}^-]}{\Delta t} = \frac{5}{6} \frac{\Delta[\text{H}^+]}{\Delta t}$$

17. The purest form of commercial iron is

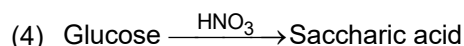
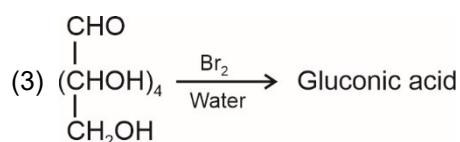
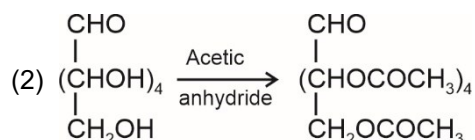
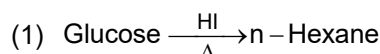
- (1) Cast Iron (2) Wrought Iron
(3) Pig Iron (4) Steel

Answer (2)

Sol. Wrought Iron is the purest form of commercial iron and is prepared from cast iron by oxidising impurities in a reverberatory furnace lined with haematite.

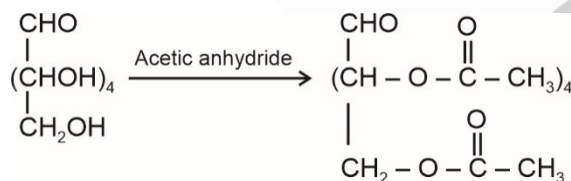


18. Which of the following reactions show the glucose contains five 'OH' groups?



Answer (2)

Sol. Acetylation of glucose with acetic anhydride gives glucose pentaacetate which confirms the presence of five -OH groups.



19. Amalgam of mercury with sodium belongs to which solute-solvent combination.

- (1) Solid-Gas (2) Solid-Solid
(3) Gas-Solid (4) Liquid-Solid

Answer (4)

Sol. Amalgam of mercury with sodium is an example of liquid in solid type solution.

Amalgam of mercury – Liquid

Sodium – Solid

20. Complete hydrolysis of DNA does not yield.

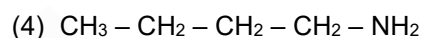
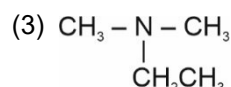
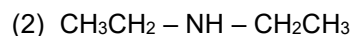
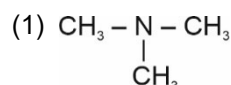
- (1) Phosphoric acid
(2) Pentose sugar
(3) Nitrogen containing compound
(4) Secondary alcohol

Answer (4)

Sol. Complete hydrolysis of DNA yields a pentose sugar, phosphoric acid and nitrogen containing compounds (called bases).

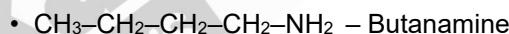
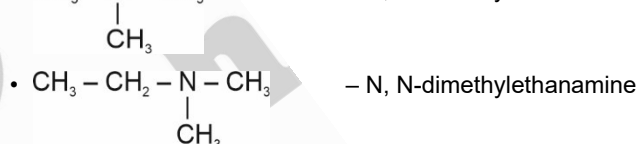
In DNA molecules, the sugar moiety is β -D-2deoxyribose.

21. The correct structure representing N, N-dimethylethanamine is



Answer (3)

Sol.



22. The osmotic pressure of a solution prepared by dissolving 50 mg of H_2SO_4 in 2 liters of water at 25°C will be

- (1) 5.2700 atm (2) 0.0187 atm
(3) 187.3 atm (4) 0.527 atm

Answer (2)

Sol. Mass of H_2SO_4

$$= 50 \text{ mg}$$

$$= 50 \times 10^{-3} \text{ g}$$

$$\text{Molar mass of } \text{H}_2\text{SO}_4 = 98 \text{ g mol}^{-1}$$

$$T = 273 + 25 = 298 \text{ K}$$

$$i = 1 + (n - 1)\alpha$$

$$\text{For } \text{H}_2\text{SO}_4, n = 3 [\alpha = 1, 100\% \text{ dissociation}]$$

$$i = 1 + 2 = 3$$

$$\pi = i \times \text{CRT}$$

$$\pi = 3 \times \frac{50 \times 10^{-3}}{98 \times 2} \times 0.0821 \times 298 = 0.0187 \text{ atm}$$

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

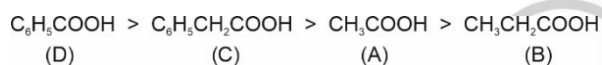
- A. CH_3COOH
- B. $\text{CH}_3\text{CH}_2\text{COOH}$
- C. $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$
- D. $\text{C}_6\text{H}_5\text{COOH}$

Choose the correct answer from the options given below:

- (1) $A > B > D > C$
- (2) $A > B > C > D$
- (3) $D > C > A > B$
- (4) $C > D > B > A$

Answer (3)

Sol. The correct order of acidic strength is



Smaller the pK_a value, the stronger the acid.

Electron withdrawing groups increase the acidity of carboxylic acids by stabilising the conjugate base through delocalisation of negative charge by inductive / resonance effect.

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

- (1) $\frac{[R]}{[R]_0}$ against time, t
- (2) $[R]_0$ against time, t
- (3) $\log \frac{[R]}{[R]_0}$ against time, t
- (4) $[R]$ against time, t

Answer (3)

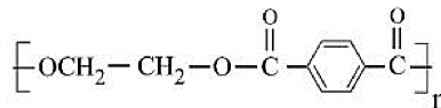
Sol. For first order reaction:

$$\log \frac{[R]}{[R]_0} = \frac{-kt}{2.303}$$

If we plot a graph between $\log \frac{[R]}{[R]_0}$ vs t, the slope is

$$\frac{-k}{2.303}$$

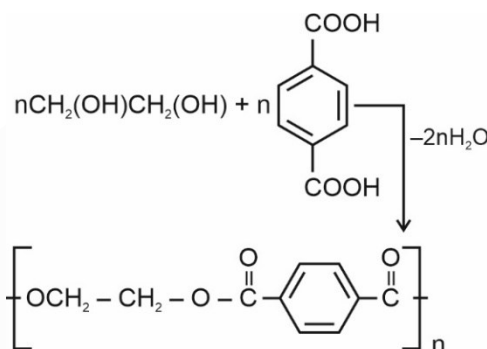
25. What is the name of given polymer?



- (1) Teflon
- (2) Nylon 6
- (3) Terylene
- (4) Polyacrylonitrile

Answer (3)

Sol. Terylene is a condensation polymer of Terephthalic acid and ethylene glycol



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

- (1) 14.24×10^{23} atoms
- (2) 10.42×10^{25} atoms
- (3) 24.16×10^{23} atoms
- (4) 13.42×10^{25} atoms

Answer (4)

Sol. Density of unit cell = $\frac{M \times Z}{N_A \times a^3}$

$$3.6 = \frac{M \times 2}{6.02 \times 10^{23} \times (144 \times 10^{-10})^3}$$

$$M = 3.26$$

$$\text{mol} = \frac{W}{M} = \frac{720}{3.26}$$

$$\text{No. of atom} = \text{mol} \times N_A$$

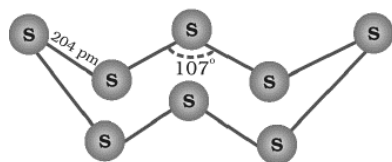
$$= \frac{720}{3.26} \times 6.02 \times 10^{23} = 13.42 \times 10^{25} \text{ atoms}$$

27. Sulphur molecule at room temperature is

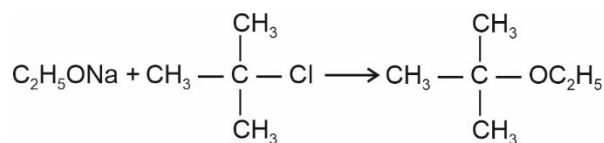
- (1) Diatomic (2) Tetratomic
(3) Triatomic (4) Octatomic

Answer (4)

Sol. Sulphur exists as S_8 at room temperature



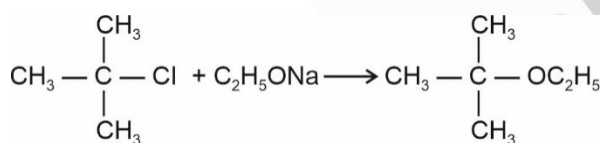
28. The following is not an appropriate reaction for preparation of t-butyl ethyl ether because:



- (1) Sodium ethoxide is a weak base
(2) Alkyl halide is tertiary in nature
(3) Sodium ethoxide is a strong base
(4) The ether formed is very bulky

Answer (2)

Sol.



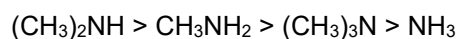
Reaction given above is not appropriate for preparation of t-butyl ethyl ether because alkyl halide given is tertiary in nature and it will prefer elimination reaction in presence of C_2H_5ONa , and will give 2-methyl propene as product.

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

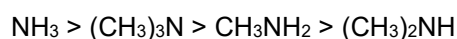
- (1) $(CH_3)_2NH$ (2) $(CH_3)_3N$
(3) CH_3NH_2 (4) NH_3

Answer (1)

Sol. As the basic strength increases pK_b decreases order of basicity.



Hence order of pK_b



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

- A. 1 m C_6H_5COOH
B. 1 m $BaCl_2$
C. 1 m KCl
D. 1 m glucose
E. 1 m H_3PO_4

Choose the correct answer from the options given below:

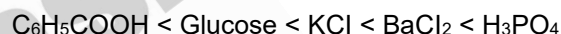
- (1) $A < D < C < B < E$ (2) $E < B < C < D < A$
(3) $A < B < C < D < E$ (4) $E < C < B < D < A$

Answer (1)

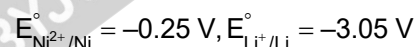
Sol. • C_6H_5COOH gets dimerise hence $i = \frac{1}{2}$

- $BaCl_2$ will get dissociated hence $i = 3$
- KCl will get dissociated hence $i = 2$
- Glucose is non electrolyte hence $i = 1$
- H_3PO_4 will get dissociated hence $i = 4$

Hence order of osmotic pressure



31. $E_{K^+/K}^\circ = -2.93 V$, $E_{Ag^+/Ag}^\circ = 0.8 V$, $E_{Cu^{2+}/Cu}^\circ = 0.34 V$,



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

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

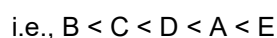
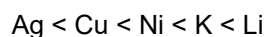
Choose the correct answer from the options given below:

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

Answer (3)

Sol. Lower is the standard reduction potential value, more will be the reducing power of the metal

\therefore Order of reducing power of metals is



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

- (1) Cyanide (2) Water
(3) Oxalate (4) Chloride

Answer (3)

Sol. Among the following, oxalate, $C_2O_4^{2-}$ is a chelating ligand

\therefore Oxalate will form a chelate.

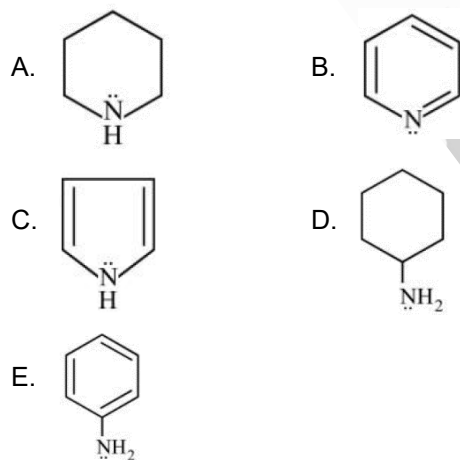
33. Aspartame is used in cold foods and soft drinks even though it is roughly 100 times as sweet as cane sugar and can pose a health hazard because:

- (1) It is stable at cooking temperature
(2) It is a monomer
(3) It is bitter in taste
(4) It is unstable at cooking temperature

Answer (4)

Sol. It is limited to cold foods and soft drink because it is unstable at cooking temperature.

34. Nitrogen containing compounds are basic in nature & 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:

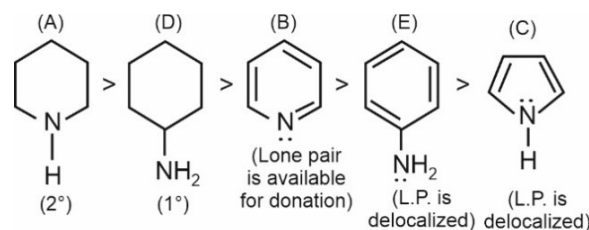
- (1) $A > B > D > C > E$
(2) $B > A > D > E > C$
(3) $B > D > A > C > E$
(4) $A > D > B > E > C$

Answer (4)

Sol. More is the number of alkyl groups attached on N-atom, more will be the basicity

Delocalization of e^- , decreases the basicity

\therefore Order of basic strength is



35. Following is a property of *p*-type semiconductor


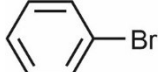
- (1) Each atom forms four covalent bonds
(2) Fifth electron is extra and becomes delocalised
(3) The place where the 4th valence electron is missing is called hole
(4) Increase in conductivity is due to negatively charged electron

Answer (3)

Sol. In a *p*-type semiconductor, a trivalent impurity is added to a tetravalent semiconductor.

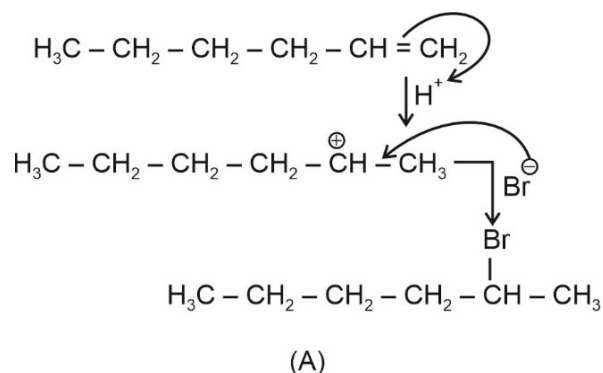
The place where the 4th valence electron is missing is called hole.

36. $H_3C - CH_2 - CH_2 - CH_2 - CH = CH_2 \xrightarrow{HBr} A$
A will be

- (1) $H_3C - CH_2 - CH_2 - CH_2 - CH_2 - CH_2Br$
(2) $H_3C - CH_2 - CH_2 - CH_2 - CHBr - CH_3$
(3)  (4) 

Answer (2)

Sol.



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

- (1) Na
- (2) B
- (3) Be
- (4) Ne

Answer (3)

Sol. Be ($Z = 4$) : $1s^2 2s^2$

So, Be has outer electronic configuration – ns^2

38. Which of the following hormones is produced under the condition of stress which simulates glycogenolysis in the liver of human beings?

- (1) Thyroxin
- (2) Estradiol
- (3) Adrenaline
- (4) Insulin

Answer (3)

Sol. Hormones released by adrenal cortex play very important role in the functions of the body and are involved in reaction to stress.

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

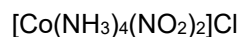
- A. Coordination isomerism
- B. Linkage isomerism
- C. Solvate isomerism
- D. Ionisation isomerism
- E. Geometrical isomerism

Choose the correct answer from the options given below:

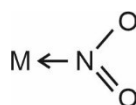
- (1) B, D and E only
- (2) B, A and D only
- (3) C, A and D only
- (4) D, E and C only

Answer (1)

Sol. For the complex



NO_2 is an ambidentate ligand. Which has 2 different donor atoms.

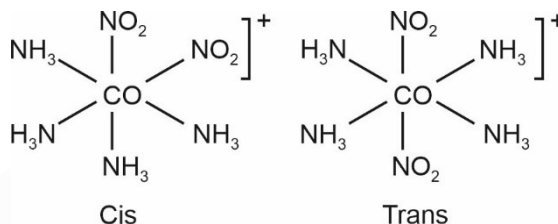


nitrito – N

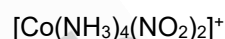


nitrito – O

* So, it can show linkage isomerism



* Geometrical isomers (cis and trans) of



* It can show ionisation isomerism also.



So, B, D and E are correct.

40. 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:

- (1) $\text{E} > \text{C} > \text{B} > \text{D} > \text{A}$
- (2) $\text{C} > \text{A} > \text{B} > \text{D} > \text{E}$
- (3) $\text{E} > \text{D} > \text{B} > \text{A} > \text{C}$
- (4) $\text{C} > \text{B} > \text{A} > \text{E} > \text{D}$

Answer (2)

Sol. Thermal stability of hydrides of group 16 elements decreases as we move down the group, owing to the decrease in enthalpy for the dissociation of H–E bond down the group.



Paragraph for Question Nos. 41 & 45

Answer the question 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.

- (1) Milk
- (2) Lemonade
- (3) Fruit Juice
- (4) Butter

Answer (2)

Sol. • Lemonade is a homogeneous mixture.

- Milk, Butter, Fruit Juice are colloids.

42. Argyrol is a medicine used for

- (1) Curing Kalaazar
- (2) Stomach disorders
- (3) Eye Lotion
- (4) Intramuscular injection

Answer (3)

Sol. Argyrol is a silver sol used as an eye lotion.

43. The process of absorption is accompanied by

- (1) Increase in entropy
- (2) Decrease in entropy
- (3) Increase in enthalpy
- (4) Increase in Gibbs free energy

Answer (2)

Sol. For the process of adsorption.

$$\Delta S < 0, \Delta G < 0 \text{ and } \Delta H < 0$$

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-}

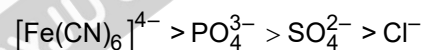
Choose the correct answer from the options given below:

- (1) $C > A > D > B$
- (2) $C > A > B > D$
- (3) $C > D > B > A$
- (4) $B > D > A > C$

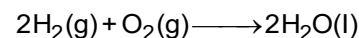
Answer (1)

Sol. It has been observed that, generally, the greater the valence of the flocculating ion added, the greater is its power to cause precipitation.

So, for the coagulation of a positive solution, the flocculating power is in the order:

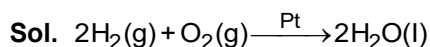


45. In the given reaction, catalyst used is



- (1) Cu
- (2) Ni
- (3) Pt
- (4) Pd

Answer (3)



It has been found that for hydrogenation reaction, the catalytic activity increases from Group 5 to Group 11 metals with maximum activity being shown by groups 7 – 9 elements of the periodic table.

Paragraph for Question Numbers Q. 46 to Q. 50

Answer the question on the basis of passage given below:

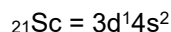
One of the notable features of the transition element is the great variety of oxidation states it may show in its compounds. The elements which give the greatest number of oxidation states occur in or near the middle of the series. Manganese, for example exhibits all the oxidation states from +2 to +7. 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

- | | |
|--------|--------|
| (1) +1 | (2) +2 |
| (3) +3 | (4) +4 |

Answer (3)

Sol. Electronic configuration of scandium:



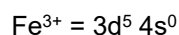
So, general oxidation state of Sc \Rightarrow +3

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

- (1) d^{10}
 (2) d^5
 (3) s^0
 (4) s^2

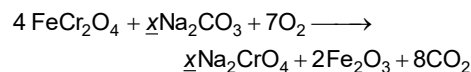
Answer (2)

Sol. $26\text{Fe} = 3d^6 4s^2$



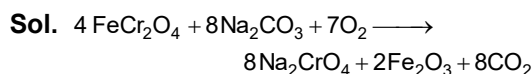
Extra stability of Fe in Fe^{3+} state is due to $3d^5$ (half filled) configuration.

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



- | | |
|-------|-------|
| (1) 2 | (2) 4 |
| (3) 8 | (4) 7 |

Answer (3)



$$\therefore x = 8$$

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

- | | |
|--------------------|-----------------------|
| (1) d^4 to d^3 | (2) d^4 to d^5 |
| (3) d^2 to d^3 | (4) d^9 to d^{10} |

Answer (1)

Sol. Cr^{2+} is reducing as its configuration changes from d^4 to d^3 as d^3 configuration is aligned with half filled t_{2g} level (stable).

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.

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

Answer (1)

Sol. Ambidentate ligand: Ligand which has two different donor atoms and either of two ligates in the complex.

A - NCS can ligate with either N or S.

C - SCN can ligate with either N or S.

E - NO_2 can ligate through either N or O.

