KCET Board Exam – 2022

Subject: Chemistry **CODE: _____**

1. The correct IUPAC name of cis- platin is

   (A) dichloride diammine platinum (B) diammine dichloride platinum (II)

   (C) diammine dichloride platinum (IV) (D) diammine dichloride platinum (0)

   Sol: Diamminedichloridoplatinum(II)

   Ans: (B)

2. Crystal Field Splitting Energy (CFSE) for $[CoCl_6]^{4-}$ is $18000\,cm^{-1}$. The Crystal Field splitting Energy (CFSE) for $[CoCl_4]^{2-}$ will be

   (A) $10,000\,cm^{-1}$ (B) $18000\,cm^{-1}$ (C) $16000\,cm^{-1}$ (D) $8000\,cm^{-1}$

   Sol: $\Delta_t = \frac{4}{9}\Delta_0$

   $= \frac{4}{9} \times 18000 = 8000\ cm^{-1}$

   Ans: (D)

3. The complex hexammineplatinum (IV) chloride will give _____ number of ions on ionization.

   (A) 2 (B) 5 (C) 4 (D) 3

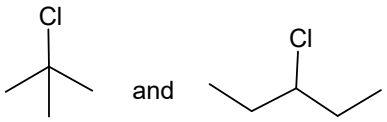
   Sol: Hexammineplatinum(IV) chloride $\rightarrow [Pt(NH_3)_6]Cl_4$

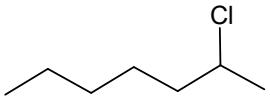
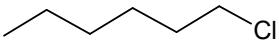
   $[Pt(NH_3)_6]Cl_4 \rightleftharpoons [Pt(NH_3)_6]^{4+} + 4Cl^-$

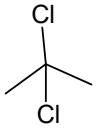
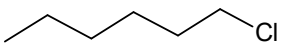
   $\therefore$ No of ions $\rightarrow 5$

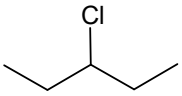
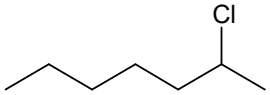
   Ans: (B)

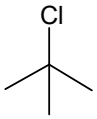
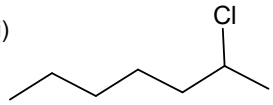
4. In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?

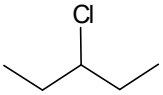
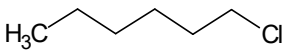
(i)  and

(ii)  and 

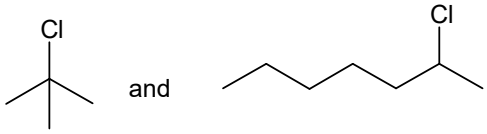
(A) (i)  (ii) 

(B) (i)  (ii) 

(C) (i)  (ii) 

(D) (i)  (ii) 

Sol: The reactivity order for S_{N^1} is $3° > 2° > 1°$



Ans: (C)

5. The only Lanthanoid which is radioactive

(A) Praseodymium (B) Lanthanum (C) Cerium (D) Promethium

Sol: Promethium

Ans: (D)

6. All $Cu(II)$ halides are known, except the iodide, the reason for it is that

(A) Cu^{+2} ion has smaller size

(B) Iodide is bulky ion

(C) Cu^{+2} oxidises iodide to iodine

(D) Cu^{+2} has much more negative hydration enthalpy

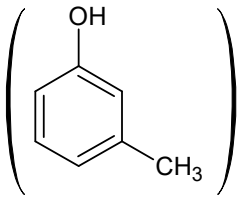
Sol: Cu^{2+} oxidises iodide to iodine

Ans: (C)

7. An organic compound with molecular formula C_7H_8O dissolves in $NaOH$ and gives a characteristic colour with $FeCl_3$. On treatment with bromine, it gives a tribromo derivative $C_7H_5OBr_3$. The compound is

(A) p- Cresol (B) Benzyl alcohol (C) o- Cresol (D) m- Cresol

Sol:

Only m-cresol  can give tribromo derivative

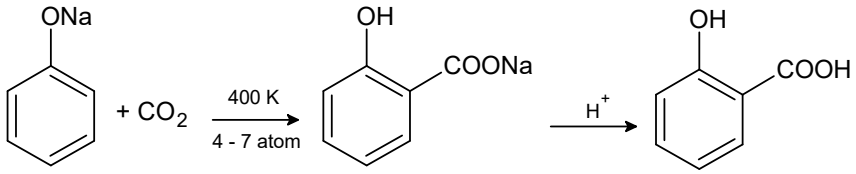
Ans: (D)

8. In Kolbes reaction the reacting substances are

(A) Phenol and $CHCl_3$ (B) Sodium phenate and CO_2

(C) Phenol and CCl_4 (d) Sodium phenate and CCl.

Sol:



Ans: (B)

9. The major product obtained when ethanol is heated with excess of conc. H_2SO_4 at 443K is

(A) methane (B) ethene (C) ethyne (D) ethane

Sol: $C_2H_5OH \xrightarrow[443\,K]{\text{con}H_2SO_4} CH_2 = CH_2$

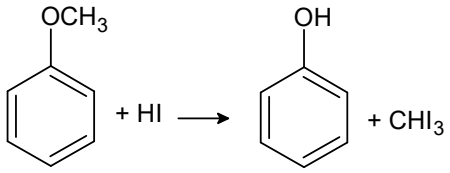
Ans: (B)

10. Among the following, the products formed by the reaction of anisole with HI are:

(A) Phenol + Methane (B) Phenol + Iodomethane

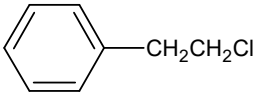
(C) Sodium phenate + Methanol (D) Benzene + Methanol

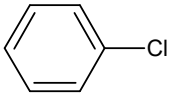
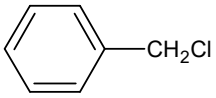
Sol:



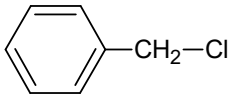
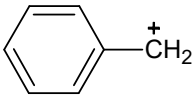
Ans: (B)

11. Which one of the following Chlorohydrocarbon readily undergoes solvolysis?

(A)  (B) $CH_2 = CHCl$

(C)  (D) 

Sol:

 readily undergo solvolysis as  formed is very stable.

Ans: (D)

12. Identify the products A and B in the reactions:

$R-X+AgCN \rightarrow A+AgX$

$R-X+KCN \rightarrow B+KX$

(A) $A=RNC; B=RNC$ (B) $A=R-CN; B=RCN$

(C) $A=RCN; B=RCN$ (D) $A=RNC; B=RCN$

Sol: A: RNC B: RCN

Ans: (D)

13. Reaction by which benzaldehyde cannot be prepared is

(A) Benzoyl chloride $+H_2 \xrightarrow[\Delta]{N-BaSO_4}$ (B) Benzene $+CO+HCl \xrightarrow{\text{anhydrous } AlCl_3}$

(C) Benzoic acid $\xrightarrow{Zn-Hg \text{ and } con.HCl}$ (D) Toluene $\xrightarrow[(ii)\ \ H_3O^+]{(i)\ \ CrO_2Cl_2 \text{ in } CS_2}$

Sol: Benzoic acid cannot be reduced with $Zn-Hg$ and Con. HCl

Ans: (C)

14. The test to differentiate between pentan –2 – one and pentan –1 – one is

(A) Iodoform test (B) Baeyer's test (C) Benedict's test (D) Fehling's test

Sol: Iodoform test

Ans: (A)

15. In Carbyl;amine test for primary amines the resulting foul smelling product is

(A) $COCl_2$ (B) CH_3NCl_2 (C) CH_3CN (D) CH_3NC

Sol: CH_3NC is the foul smelling product obtained

Ans: (D)

16. Ethanoic acid undergoes Hell-Volhard Zelinsky reaction but Methanoic acid does not, because of

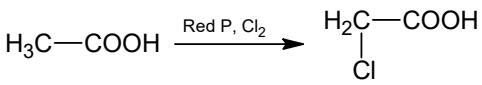
(A) higher acidic strength of ethanoic acid than methanoic acid

(B) presence of $\alpha-H$ atom in ethanoic acid

(C) presence of $\alpha-H$ atom in ethanoic acid

(D) absence of $\alpha-H$ atom in ethanoic acid

Sol: Presence of $\alpha-H$ in ethanoic acid



Ans: (C)

17. The general name of the compound formed by the reaction between aldehyde and alcohol is

(A) Acetate (B) Ester (C) Acetal (D) Glycol

Sol: Acetals are formed

Ans: (C)

18. Which institute has approved the emergency use of 2-deoxy-D-Glucose as additive therapy for COVID – 19 patients?

    (A) Drug Controller General of India

    (B) Indian Council of Medical Research

    (C) World Health Organisation

    (D) Ministry of Health and Family Welfare

    Sol: Indian Council of medical research

    Ans: (B)

19. A Nucleic acid, whether DNA or RNA gives on complete hydrolysis, two purine bases, two pyrimidine bases, a pentose sugar and phosphoric acid. Nucleotides which are intermediate products in the hydrolysis contain

    (A) Purine or pyrimidine base, a pentose sugar and ortho-phosphoric acid

    (B) purine or pyrimidine base and pentose sugar.

    (C) a purine base, pentose sugar and ortho-phosphoric acid

    (D) purine or pyrimidine base and ortho-phosphoric acid

    Sol: Nucleotides are madeup of purine or pyramidine base, pentose sugar and orthophosphoric acid

    Ans: (A)

20. A secondary amine is

    (A) a compound in which 2 of the hydrogen of NH_3 have been replaced by organic groups

    (B) an organic compound with two NH_2 group

    (C) a compound with two carbon atom and an NH_2 group

    (D) a compound with an NH_2 group on the carbon atom in number 2 position

    Sol: Secondary amines $(R_2 - NH)$ is a compound in which 2 hydrogens of NH_3 replaced by alkyl group or aryl groups

    Ans: (A)

21. Which of the following is correctly matched?

    (A) Polyster – tetrafluoroethene (B) Nylon – acrylonitrile

    (C) Teflon – copralactum (D) Bakelite - Novolac

    Sol: Bakelite – Novolac

    Ans: (D)

22. Elements X, Y and Z have atomic numbers $19, 37$ and 55 respectively. Which of the following statements is true about them?

    (A) Y would have the highest ionization potential

    (B) Their ionisation potential would increase with increasing atomic number.

    (C) Y would have an ionisation potential between those of X and Z.

    (D) Z would have the highest ionisation potential.

Sol: Given elements are $K\left(19,\ 419\ \text{kJ mol}^{-1}\right)$, $Rb\left(37,\ 403\ \text{kJ mol}^{-1}\right)$ and $Cs\left(55,\ 374\ \text{kJ mol}^{-1}\right)$ belong to I group Rb has IE between K and Cs.

Ans: (C)

23. In oxygen and carbon molecule the bonding is

(A) $O_2 : 0\sigma, 2\pi; C_2 : 2\sigma, 0\pi$ (B) $O_2 : 1\sigma, 1\pi; C_2 : 1\sigma, 1\pi$

(C) $O_2 : 2\sigma, 0\pi; C_2 : 0\sigma, 2\pi$ (D) $O_2 : 1\sigma, 1\pi; C_2 : 0\sigma, 2\pi$

Sol: $O_2 : 1\sigma,\ 1\pi$ and $C_2 : 0\sigma,\ 2\pi$ bonds

Ans: (D)

24. Which is most VISCOUS?

(A) Glycerol (B) Methanol (C) Ethanol (D) Ethylene glycol

Sol: Glycerol is more viscous because of higher number of hydrogen bonds

Ans: (A)

25. The volume of $2.8\ g$ of CO at $27\ ^\circ C$ and 0.821 atm . pressure is $\left(R = 0.08210\ \text{lit.atm.}K^{-1}mol^{-1}\right)$

(A) 30 litres (B) 0.3 litres (C) 1.5 litres (D) 3 litres

Sol: $PV = nRT$

$$V = \frac{nRT}{P} = \frac{\frac{2.8}{28} \times 0.0821 \times 300}{0.821} = 3\ \text{L}$$

Ans: (D)

26. The work done when 2 moles of an ideal gas expands reversibly and isothermally from a volume of $1L$ to $10L$ at $300\ K$ is $\left(R = 0.0083 kJ\ K\ mol^{-1}\right)$

(A) $58.5\ kJ$ (B) $11.5 kJ$ (C) $5.8\ kJ$ (D) $0.115\ kJ$

Sol: $w = -2.303 nRT \log \frac{v_2}{v_1} = -2.303 \times 0.0083 \times 2 \times 300 \log \frac{10}{1} = -11.46$ kJ

Ans: (B)

27. An aqueous solution of alcohol contains $18\ g$ of water and $414\ g$ of ethyl alcohol. The mole fraction of water is

(A) 0.9 (B) 0.1 (C) 0.4 (D) 0.7

Sol: $n_{H_2O} = \frac{18}{18} = 1 \quad n_{C_2H_5OH} = \frac{414}{46} = 9$

$$\chi_{H_2O} = \frac{1}{1+9} = \frac{1}{10} = 0.1$$

Ans: (B)

28. If wavelength of photon is $2.2 \times 10^{-11} m$ and $h = 6.6 \times 10^{-34} J\ s$, then momentum of photon

(A) $6.89 \times 10^{+43} kg\ m s^{-1}$ (B) $3 \times 10^{-23} kg\ m s^{-1}$

(C) $3.33 \times 10^{-22} kg\ m s^{-1}$ (D) $1.452 \times 10^{-44} kg\ m s^{-1}$

Sol: According de-Broglie's equation

$\lambda = \frac{h}{p}$

$2.2\times10^{-11} = \frac{6.6\times10^{-34}}{P}$ or $P = 3.0\times10^{-23}\ \text{kg ms}^{-1}$

Ans: (B)

29. In which of the following compounds, an element exhibits two different oxidation states?

(A) N_3H (B) NH_2CONH_2 (C) NH_4NO_3 (D) N_2H_4

Sol: $\overset{-3}{N}H_4\overset{+5}{N}O_3$

$NH_4^+ = x + 4(1) = 1$ or $x = -3$

$NO_3^- = x + 3(-2) = -1$ or $x = +5$

Ans: (C)

30. Which of the following hydrides is electron deficient?

(A) B_2H_6 (B) NaH (C) CaH_2 (D) CH_4

Sol: B_2H_6 is electron deficient

Ans: (A)

31. Amphoteric oxide among the following

(A) SnO_2 (B) BeO (C) CO_2 (D) Ag_2O

Sol: Both SnO_2 and BeO amphoteric

Ans: (A) and (B)

32. Which property of CO_2 makes it biologically and geo-chemically important?

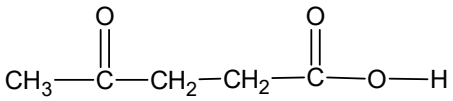
(A) Its high compressibility (B) Its acidic nature

(C) Its colourless and odourless nature (D) Its low solubility in water

Sol: Low solubility of CO_2 in water

Ans: (D)

33. The IUPAC name for



(A) 4 – oxopentanoic acid (B) 1 – hydroxy pentance –1, 4 – dione

(C) 1,4 – dioxopentanol (D) 1 – carboxybutan –3 – one

Sol: 4- Oxopentanoic acid

Ans: (A)

34. 1 mole of HI is heated in a closed container of capacity of $2L$. At equilibrium half a mole of HI is dissociated. The equilibrium constant of the reaction is

(A) 0.35 (B) 1 (C) 0.5 (D) 0.25

Sol: $2HI \rightleftharpoons H_2 + I_2$

1 mole - -

$\frac{1}{2}$ mole $\frac{1}{2}$ mole $\frac{1}{2}$ mole

$\therefore K_c = \frac{\frac{1}{2\times 2}\times\frac{1}{2\times 2}}{\left[\frac{1}{2\times 2}\right]^2} = 1$

Ans: (B)

35. Which among the following has higest pH?

(A) $0.1\,M\ NaOH$ (B) $1\,M\ HCI$ (C) $1\,M\ NaOH$ (D) $1\,M\ H_2SO_4$

Sol: $\left[OH^-\right] = 1 \quad \therefore POH = -\log(1) = 0$

$\therefore pH = 14 - 0 = 14$

Ans: (C)

36. How many number of atoms are there in a cube based unit cell, having one atom on each corner and 2 atom on each body diagonal of cube?

(A) 9 (B) 8 (C) 6 (D) 4

Sol: The contribution from corner particle $= 8\times\frac{1}{8} = 1$

The contribution from body diagonal $2\times 4 = 8$

Total number of particles $= 1 + 8 = 9$

Ans: (A)

37. Which of the following is NOT true about the amorphous solids?

(A) They are anisotropic nature.

(B) On heating they may become crystalline at certain temperature.

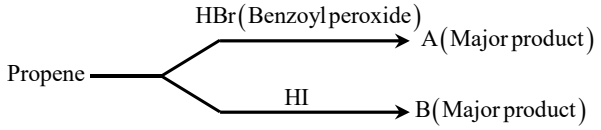
(C) They may become crystalline on keeping for long time.

(D) Amorphous solids can be moulded by heating.

Sol: Amorphous solids are isotropic in nature

Ans: (A)

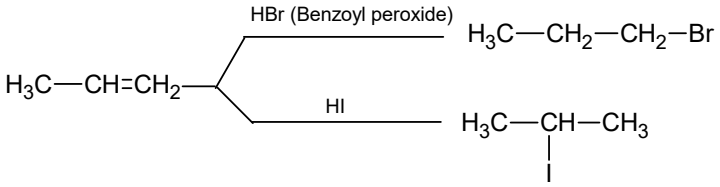
38. Identify A and B in the reaction



(A) $A: CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3\ ;\ B: CH_3 - \underset{\underset{I}{|}}{CH} - CH_3$ (B) $A: CH_3 - CH_2 - CH_2 - Br;\ B: CH_3 - CH_2 - CH_2 - I$

(C) $A: CH_3 - CH_2 - CH_2 - Br;\ B: CH_3 - \underset{\underset{I}{|}}{CH} - CH_3$ (D) $A: CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3\ ;\ B: CH_3 - CH_2 - CH_2 - I$

Sol:



Ans: (C)

39. Vacant space in body centered cubic lattice unit cell is about

(A) 46% (B) 32% (C) 10% (D) 23%

Sol: Vacant space in *bcc* lattice : 32%

Ans: (B)

40. The rise in boiling point of a solution containing $1.8g$ of glucose in $100\ g$ of solvent is $0.1\,°C$. The molal elevation constant of the liquid is

(A) $10\ K\ kg/mol$ (B) $0.1K\ kg/mol$ (C) $1\ K\ kg/mol$ (D) $2\ K\ kg/mol$

Sol: $\Delta T_f = \dfrac{1000 \times k_f \times w_2}{w_1 \times M_2}$

$0.1 = \dfrac{1000 \times k_f \times 1.8}{100 \times 180}$ or $k_f = 1\ K$ kg/mol

Ans: (C)

41. If $3\ g$ of glucose (molar mass $= 180\ g$) is dissolved in $60\ g$ of water at $15\,°C$, the osmotic pressure of the solution will be

(A) $5.57\ atm$ (B) $0.34\ atm$ (C) $0.65\ atm$ (D) $6.57\ atm$

Sol: $\pi = \dfrac{w_2 RT}{MV} = \dfrac{3 \times 0.0821 \times 288}{180 \times 60/100} = 6.57\ atm$

Ans: (D)

42. Which of the following colligative properties can provide molar mass of proteins, polymers and colloids with greater precision?

(A) Osmotic pressure (B) Relative lowering of vapour pressure

(C) Elevation in boiling point (D) Depression in freezing point

Sol: Osmotic pressure

Ans: (A)

43. In Fuel cells _____ are used as catalysts

(A) Lead - Manganese (B) Platinum – Palladium

(C) Nickel – Cadmium (D) Zinc - Mercury

Sol: Platinum – Pallidium

Ans: (B)

44. The molar conductivity is maximum for the solution of concentration

(A) $0.001\ M$ (B) $0.004\ M$ (C) $0.002\ M$ (D) $0.005\ M$

Sol: Molar conductivity increases with dilution.

$\therefore 0.001\text{M}$

Ans: (A)

45. Alkali haildes <u>do not</u> show dislocation defect because

(A) There is large difference in size of cation and anions.

(B) Cations and anions have low co-ordination number.

(C) Anions cannot be accommodated in vacant spaces.

(D) Cations and anions have almost equal size.

Sol: They are not found in alkali metal halides as the alkali metal ions cannot fit into the interstitial sites of all the options given option (D) is correct.

Ans: (D)

46. Solubility of a gas in a liquid increases with

(A) decrease of P and decrease of T (B) increase of P and increase of T

(C) decrease of P and increase of T (D) increase of P and decrease of T

Sol: Solubility of a gas in a liquid increases with increase in pressure and decrease in temperature.

Ans: (D)

47. For n^{th} order of reaction, Half-life period is directly proportional to

(A) a^{1-n} (B) $\frac{1}{a^{n-1}}$ (C) $\frac{1}{a^{1-n}}$ (D) a^{n-1}

Sol: $t_{\frac{1}{2}} \propto \frac{1}{a^{n-1}}$

Ans: (B)

48. half-life of a reaction is found to be inversely proportional to the fifth power of its initial concentration, the order of reaction is

(A) 6 (B) 3 (C) 4 (D) 5

Sol: $t_{\frac{1}{2}} \alpha \frac{1}{a^{n-1}}$

$\therefore n = 6$

Ans: (A)

49. A first order reaction is half completed in 45 min. How long does it need 99.9% of the reaction to be completed?

(A) 20 Hours (B) 5 Hours (C) 7.5 Hours (D) 10 Hours

Sol: $t_{99.9} = 10 \times t_{\frac{1}{2}}$

$= 10 \times 45 = 450$ or $7.5\,\text{hr}$

Ans: (C)

50. The rate of the reaction:

$CH_3COOC_2H_5+NaOH \rightarrow CH_3COONa+C_2H_5OH$ is given by the equation,

Rate $= K$ $=K[CH_3COOC_2H_5][NaOH]$. If concentration is expressed in $\text{mol}L^{-1}$, the unit of K is

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

Sol: If is a second order reaction

$\therefore$ unit of rate constant is $L\,\text{mol}^{-1}\,s^{-1}$

Ans: (D)

51. Colloidal solution commonly used in the treatment of skin disease is

(A) Colloidal Antimony (B) Colloidal Sulphur

(C) Colloidal Silver (D) Colloidal Gold

Sol: Colloidal Sulphur

Ans: (B)

52. Specific conductance of $0.1\,M\ HNO_3$ is 6.3×10^{-2} $\text{ohm}^{-1}\,\text{cm}^{-1}$. The molar conductance the solution is

(A) $63.0\ \text{ohm}^{-1}\text{cm}^2\ \text{mol}^{-1}$ (B) $630\ \text{ohm}^{-1}\ \text{cm}^2\,\text{mol}^{-1}$

(C) $315\text{ohm}^{-1}\text{cm}^2\ \text{mol}^{-1}$ (D) $6.300\ \text{ohm}^{-1}\text{cm}^2\ \text{mol}^{-1}$

Sol: $\wedge_m = \dfrac{1000\times K}{C} = \dfrac{1000\times6.3\times10^{-2}}{0.1}$

$= 630\ \text{ohm}^{-1}\text{m}^2\text{mol}^{-1}$

Ans: (B)

53. For spontaneity of a cell, which is correct?

(A) $\Delta G = -ve$ (B) $\Delta G = 0, \Delta E = 0$ (C) $\Delta G = -ve, \Delta E = 0$ (D) $\Delta G = +ve, \Delta E = +ve$

Sol: $\Delta G = -\text{ve}$

Ans: (A)

54. Which noble gas has least tendency to form compounds?

(A) Kr (B) He (C) Ne (D) Ar

Sol: He cannot form any compounds because very high ionization enthalpy.

Ans: (B)

55. $(NH_4)_2Cr_2O_7$ on heating liberates a gas. The same gas will be obtained by

(A) treating Mg_3N_2 with H_2O (B) hearing NH_4NO_3

(C) heating NH_4NO_2 (D) treating H_2O_2 with $NaNO_2$

Sol: $(NH_4)Cr_2O_7 \longrightarrow N_2\uparrow + Cr_2O_3 + 4H_2O$

$NH_4NO_2 \longrightarrow N_2\uparrow + 2H_2O$

Ans: (C)

56. The strong reducing property of hypophosphorous acid is due to

(A) presence of phosphorus in its highest oxidation state

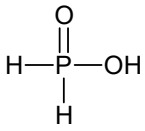
(B) its concentration

(C) the positive valence of phosphorus

(D) two $P-H$ bonds

Sol:

Two $P-H$ bonds.

Hypo phosphorus compounds 

Ans: (D)

57. A transition metal exists in its highest oxidation state. It is expected to behave as

(A) a reducing agent

(B) a chelating agent

(C) a central metal in a co-ordination compound

(D) an oxidation agent

Sol: A transition metal in its highest oxidation state behaves like a good oxidizing agent(If undergoes reduction easily).

Ans: (D)

58. What will be the value of x in Fe^{x+}, if the magnetic moment $\mu=\sqrt{24}\ BM$?

(A) $+1$ (B) $+2$ (C) $+3$ (D) 0

Sol: $\mu=\sqrt{n(n+2)}$

When $n=4$

$\mu=\sqrt{4(4+2)}=\sqrt{24}$

There should be 4 unpaired electrons

$\therefore$ ion is Fe^{2+} ($3d^6$ configuration)

Ans: (B)

59. Which can absorb larger volume of hydrogen gas?

(A) Colloidal $Fe(OH)_3$ (B) Finely divided nickel

(C) Colloidal solution of palladium (D) Finely divided platinum

Sol: Hydrogen gas is best absorbed by colloidal solution of palladium.

Ans: (C)

60. The property of halogens which is not correctly matched is

(A) $F>Cl>Br>I$ (electron gain enthalpy) (B) $F>Cl>Br>I$ (ionization enthalpy)

(C) $F>Cl>Br>I$ (electronegativity) (D) $I>Br>Cl>F$ (density)

Sol: $Cl>F>Br>I$

Ans: (A)

Key Answers:

1. B	2. D	3. B	4. C	5. D	6. C	7. D	8. B	9. B	10. B
11. D	12. D	13. C	14. A	15. D	16. C	17. C	18. B	19. A	20. A
21. D	22. C	23. D	24. A	25. D	26. B	27. B	28. B	29. C	30. A
31. A, B	32. D	33. A	34. B	35. C	36. A	37. A	38. C	39. B	40. C
41. D	42. A	43. B	44. A	45. D	46. D	47. B	48. A	49. C	50. D
51. B	52. B	53. A	54. B	55. C	56. D	57. D	58. B	59. C	60. A