# CET – CHEMISTRY – 2012

## VERSION CODE: A – 2

1. The ore that is concentrated by the Froth floatation process is

   a) Chalcopyrites  b) Cryolite  c) Cuprite  d) Calamine

**Ans: (a)**

Because it is a sulphide ore ($CuFeS_2$)

2. The equivalent mass of a certain bivalent metal is 20. The molecular mass of its anhydrous chloride is

   a) 91  b) 111  c) 55.5  d) 75.5

**Ans: (b)**

Atomic mass = 20 x 2 = 40

$$\text{Valency} = \frac{\text{Atomic mass}}{\text{Eq. mass}} = \frac{40}{20} = 2$$

Mol. Formula of its chloride = $MCl_2$

$\therefore$ mol. Mass = 40 + 71 = 111

3. 2 moles of $N_2O_{4\ (g)}$ is kept in a closed container at 298 K and under 1 atm pressure. It is heated to 596 K when 20% by mass of $N_2O_{4(g)}$ decomposes to $NO_2$. The resulting pressure is

   a) 2.4 atm  b) 1.2 atm  c) 4.8 atm  d) 2.8 atm

**Ans: (a)**

$$N_2O_4 \rightleftharpoons 2NO_2$$

Initial moles  2  0  20% of 2 moles = $2 \times \frac{20}{100} = 0.4$

Moles at eqm  2 – x  2x  x = 0.4

1.6  8.8

Total no. of moles at eqm = 2.4

2 mole - 1 atm

2.4 moles - 1.2 atm

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{1.2}{298} = \frac{P_2}{596}$$

$$P_2 = \frac{596}{298} \times 1.2$$

= 2.4 atm

4. Sucrose is NOT a reducing sugar since

   a) it is chemically stable

   b) it contains no free aldehydes or keto group adjacent to a CHOH group

   c) it is built up of a fructose unit

   d) it is optically active

**Ans: (b)**

In sucrose molecule, 1$^{st}$ carbon atom of glucose reducing part react with 2$^{nd}$ carbon atom of fructose reducing part and eliminated as water molecule. Hence it does not contain reducing group.

5. Which one of the following contains ionic, covalent and co-ordinate bonds?

a) NaOH b) NaCl c) NaCN d) NaNC

**Ans: (d)**

$Na^+ [N \equiv C]^-$

6. Dialysis can be used to separate

a) glucose and fructose b) protein and starch

c) glucose and protein d) glucose and NaCl

**Ans: (c)**

Glucose is a true solution & protein is a colloid

7. The percentage of p-character of the hybrid orbitals in graphite and diamond are respectively

a) 33 and 25 b) 50 and 75 c) 67 and 75 d) 33 and 75

**Ans: (c)**

Graphite is $sp^2$ hybridised – s – character 33% & p – character 67%

Diamond is $sp^3$ hybridised – s – character 25% & p – character 75%

8. A gas expands from a volume of $1m^3$ to a volume of 2 $m^3$ against an external pressure of $10^5$ $Nm^{-2}$.

The work done by the gas will be

a) $10^5$ kJ b) $10^2$ kJ c) $10^2$ kJ d) $10^3$ kJ

**Ans: (b)**

$W = Pexf (\Delta V)$

$= 10^5 (2-1) = 10^5$ Joules $= 10^2$ kJ

9. The mass of a non-volatile solute of molar mass 40 g $mol^{-1}$ that should be dissolved in 114 g of octane to lower its vapour pressure by 20% is

a) 10 g b) 11.4 g c) 9.8 g d) 12.8 g

**Ans: (a)**

$$\frac{P^0 - P}{P^0} = \frac{\frac{x}{40}}{\frac{114}{114} + \frac{x}{40}}$$

$$\frac{20}{100} = \frac{\frac{x}{40}}{1 + \frac{x}{40}}$$

$$\frac{20}{100} = \frac{\frac{x}{40}}{\frac{40 + x}{40}}$$

$$\frac{20}{100} = \frac{x}{40 + x}$$

$20(40+x) = 100x$

$800 + 20x = 100x$

$800 = 80x$

$x = \frac{800}{80} = 10$ g

10. During the adsorption of a gas on the surface of a solid, which of the following is true?

a) $\Delta G < O, \Delta H > O, \Delta S < O$ b) $\Delta G > O, \Delta H < O, \Delta S < O$

c) $\Delta G < O, \Delta H < O, \Delta S < O$ d) $\Delta G < O, \Delta H < O, \Delta S > O$

**Ans: (c)**

For an adsorption of a gas on the surface of a solid, $\Delta H$ is –ve and $\Delta S$ is –ve. The reaction is spontaneous. $\therefore \Delta G$ = -ve

11. The approximate time duration in hours to electroplate 30 g of calcium from molten calcium chlriode using a current of 5 amp is

[At. Mass of Ca = 40]

a) 8 b) 80 c) 10 d) 16

**Ans: (a)**

$W = Z\,It$

$t = \frac{W}{ZI}$

$t = \frac{W}{E} x \frac{96500}{I} = \frac{30}{20} x \frac{96500}{5}$

$t = \frac{28950}{60x60} = 8$

12. The pH of the solution obtained by mixing 100 ml of a solution of pH = 3 with 400 ml of a solution of pH = 4 is

a) 3 – log 2.8 b) 7 – log 2.8 c) 4 – log 2.8 d) 5 – log 2.8

**Ans: (c)**

$[H^+] = \frac{100x10^{-3} + 400x10^{-4}}{500} = 2.8x10^{-4}$

pH = $-\log 2.8 \times 10^{-4}$

pH = 4 – log 2.8

13. The equilibrium constant of the reaction:

$A_{(s)} + 2B^+_{(aq)} \rightleftharpoons A^{2+}_{(aq)} + 2B_{(s)}$ . $E^o_{cell}$ = 0.0295 V is

$\left[\frac{2.303RT}{F} = 0.059\right]$

a) 10 b) $2 \times 10^2$ c) $3 \times 10^2$ d) $2 \times 10^5$

**Ans: (a)**

$2.303\ RT \log K_p = nFE^0$

$\log k_p = \frac{E^0 xnF}{2.303RT} = \frac{0.0295x2}{0.0591} = 1$

$\log k_p = 1$

$k_p = 10$

14. An oxygen containing organic compound was found to contain 52% carbon and 13% of hydrogen. Its vapour density is 23. The compound reacts with sodium metal to liberate hydrogen. A functional isomer of this compound is

a) Ethanol b) Ethanal c) Methoxy Metane d) Methoxy Ethane

**Ans: (c)**

Mol. Mass = 2 x V.D

= 2 x 23 = 46

molecular formula = $C_2H_5OH$ by analysis of % C, % H & % O

functional isomer of $C_2H_5OH$ is $CH_3 – O – CH_3$


EXPERT
COACHING CLASSES

15. Which one of the following is NOT true regarding electromeric effect?

a) It results in the appearance of partial charges on the carbon atoms

b) It is a temporary effect

c) It operates on multiple bonds

d) It requires an attacking reagent

**Ans: (a)**

Partial charge separation is called Inductive effect

16. Which one of the following is NOT formed when a mixture of methyl bromide and bromobenzene is heated with sodium metal in the presence of dry Ether?

a) Ethane b) Diphenyl c) Propane d) Toluene

**Ans: (c)**

Ethane, diphenyl & Toluene are formed

17. Power alcohol is a mixture of

a) 80% Petrol + 20% Benzene + Small quantity of Ethanol

b) 80% Petrol + 20% Ethanol + Small quantity of Benzene

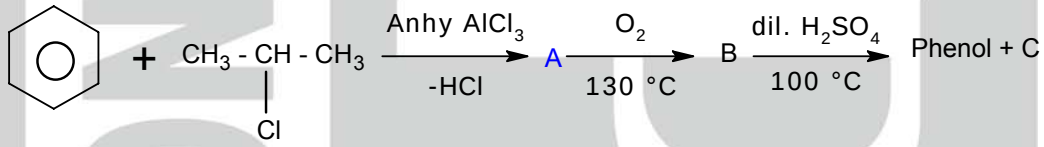
c) 80% Ethanol + 20% Benzene + Small quantity of Petrol

d) 50% Petrol + 50% Ethanol + Small quantity of Benzene

**Ans: (b)**

Power of alcohol is mixture of absolute alcohol and petrol

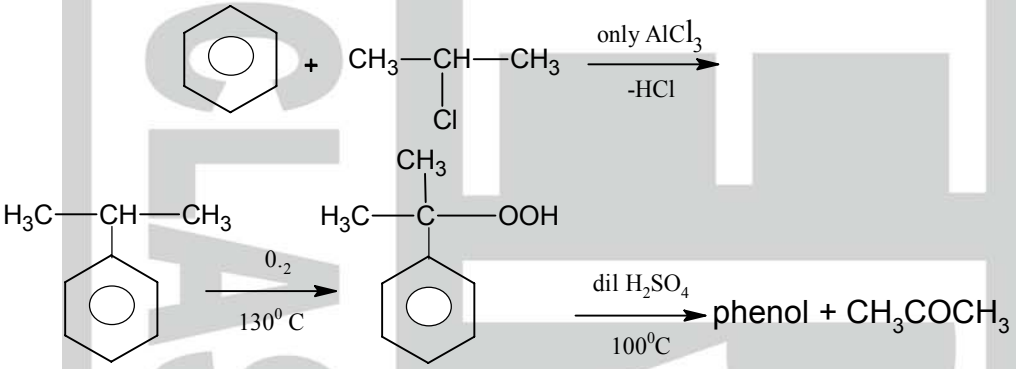
18. Identify 'C' in the following




a) Water b) Ethanol

c) Propanone d) Cumene hydroperoxide

**Ans: (c)**




19. 20 ml of methane is completely burnt using 50 ml of oxygen. The volume of the gas left after cooling to room temperature is

a) 80 ml b) 40 ml c) 60 ml d) 30 ml

**Ans: (d)**

$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

20 ml 40 ml 20 ml

Volume of oxygen unreacted = 50 – 40 = 10 ml

Total volume of the gas left after cooling = 10 ml of $O_2$ + 20 ml of $CO_2$ = 30 ml

20. 100 ml of 0.1 M acetic acid is completely neutralized using a standard solution of NaOH. The volume of Ethane obtained at STP after the complete electrolysis of the resulting solution is

a) 112 ml b) 56 ml c) 224 ml d) 560 ml

**Ans: (a)**

$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O \mid 2CH_3COONa \rightarrow C_2H_6 + NaOH + CO_2 + H_2$

0.1 0.1 0.01 0.005

$\therefore$ No. of gram equivalent of $CH_3COONa = \frac{100x0.1}{1000} = 0.01$

$\therefore$ 0.01 mole of $CH_3COONa$ gives 0.005 mole of $C_2H_6$

1 mole of $C_2H_6$ = 22400 $cm^3$ at STP

$\therefore$ 0.005 mole of $C_2H_6$ = ?

$\therefore$ Volume of $C_2H_6 = \frac{0.005x22400}{1} = 112\ cm^3$

21. Saccharin, an artificial sweetner, is manufactured from

a) Cellulose b) Toluene c) Cyclohexane d) Starch

**Ans: (b)**

22. Which of the following is NOT TRUE for $S_N1$ reaction?

a) Favoured by polar solvents

b) $3^o$ – alkyl halides generally react through $S_N1$ reaction

c) The rate of reaction does not depend upon the molar concentration of the nucleophile

d) $1^o$ – alkyl halides generally react through $S_N1$ reaction

**Ans: (d)**

$1^o$ alkyl halide react through $S_N2$ reaction

23. Oil of winter green is

a) an ester b) a carboxylic acid c) an alcohol d) a ketone

**Ans: (a)**

Methyl salicylate is an ester

24. An organic compound 'A' burns with a sooty flame. It is negative towards Tollen's reagent test and positive for Borsche's reagent test. The compound 'A' is

a) Benzaldehyde b) Acetophenone c) Acetone d) Salicylic acid

**Ans: (b)**

Aromatic compound, not an aldehyde but a carbonyl compound

25. For a reaction : A + B $\rightarrow$ Products, the rate of the reaction at various concentrations given below :

| Expt No | [A] | [B] | Rate (mol $dm^{-3}$ $s^{-1}$) |
|---|---|---|---|
| 1 | 0.2 | 0.2 | 2 |
| 2 | 0.2 | 0.4 | 4 |
| 3 | 0.2 | 0.4 | 36 |

The rate law for the above reaction is

a) $r = K[A]^2[B]$ b) $r = K[A][B]^2$ c) $r = K[A]^3[B]$ d) $r = K[A]^2[B]^2$

**Ans: (a)**

$2 = [A]^x [B]^y$ ----- (1)

$4 = [A]^x [2B]^y$ ------ (ii)

$36 = [3A]^x [2B]^y$ ----- (iii)

from (ii) / (i)

$2^y = 2 \Rightarrow y = 1$

(iii) / (ii)

$\frac{36}{4} = 3^x$

$9 = 3^x$

$\therefore 3^2 = 3^x \therefore x = 2$

$r = K [A]^2 [B]$

26. Which one of the following has NO unpaired electrons?

a) $O_2$ b) $O_2^-$ c) $O_2^+$ d) $O_2^{--}$

**Ans: (d)**

$O_2^{2-}$ KK $\sigma 2s^2 \sigma 2s^2 \sigma 2p_2^2 \pi 2px^2 \pi 2py^2 \pi^2 2px^2 \pi 2py^2$

unpaired electron is zero

27. The atomic number of cobalt is 27. The EAN of cobalt in $Na_3[Co(NO_2)_4Cl_2]$ is

a) 35 b) 24 c|) 36 d) 34

**Ans: (c)**

EAN = Z – X + Y

= 27 – 3 +12

EAN = 36

28. The "spin only" magnetic moment of $Ni^{2+}$ in aqueous solution would be [At. No. of Ni = 28]

a) $\sqrt{6}$ BM B) $\sqrt{15}$ BM c) $\sqrt{2}$ BM d) $\sqrt{8}$ BM

**Ans: (d)**

$Ni^{+2}$ [Ar] $3d^8 45^0$

2 unpaired electron are present

$\mu = \sqrt{n(n+2)} = \sqrt{8}$ BM

29. Impossible orbital among the following is

a) 2s b) 3 f c) 2p d) 4 d

**Ans: (b)**

When n = 3, the values of 'l' are 0, 1, 2

For 'f' orbital l = 3

30. The total number of electrons in 18 ml of water (density = 1 g $ml^{-1}$) is

a) $6.02 \times 10^{23}$ b) $6.02 \times 10^{25}$ c) $6.02 \times 10^{24}$ d) $6.02 \times 18 \times 10^{23}$

**Ans: (c)**

18 ml of water contains $10 \times 6.022 \times 10^{23}$ electrons

$= 6.022 \times 10^{24}$ electrons

31. The number of moles of hydrogen that can be added to 1 mole of an oil is the highest in

a) Linseed oil b) Groundnut oil c) Sunflower seed oil d) Mustard oil

**Ans: (a)**

Linseed oil is highly unsaturated

32. The reaction between sodium and water can be made less vigorous by

a) lowering the temperature b) adding a little alcohol

c) amalgamating sodium d) adding a little acetic acid

**Ans: (c)**

33. All colloidal dispersions have

a) very high osmotic pressure b) low osmotic pressure

c) no osmotic pressure d) high osmotic pressure

**Ans: (c)**

Because colloidal dispersions do not contain any dissolved ions

34. Silver iodide is used for producing artificial rain because AgI

a) is easy to spray at high altitude

b) is easy to synthesize

c) has crystal structure similar to ice

d) is insoluble in water

**Ans: (c)**

In cloud seeding very small particle of AgI are used as artificial ice nuclei to form ice crystals.

35. The equilibrium constant of a reaction is 0.008 at 298 K. The standard free energy change of the reaction at the same temperature is

a) +11.96 kJ b) -11.96 kJ c) -5.43 kJ d) -8.46 kJ

**Ans: (a)**

$\Delta G^0 = -2.303\ RT \log k_p$

$= -2.303 \times 8.314 \times 298 \times \log 8 \times 10^{-3}$

$\Delta G^0 = +11.96$ kJ

36. The function of potassium ethyl xanthate in froth floatation process is to make the ore

a) attracted towards water b) water repellant

c) lighter d) heavier

**Ans: (b)**

Which increase the non wettability of ore particles

37. The correct order of electronegativities of N, O, F & P is

a) F > N > P > O b) F > O > P > N c) F > O > N > P d) N > O > F > P

**Ans: (c)**

F > 0 > N > P

38. The s-block element used as a catalyst in the manufacture of Buna –S rubber is

a) Mg b) Ca c) Ba d) Na

**Ans: (d)**

Sodium is used as a catalyst in the manufacture of Buna –S

39. Which of the following is NOT a characteristic of a covalent compound?

a) Low melting point

b) No definite geometry

c) Insoluble in polar solvent

d) Small difference in electronegativity between the combining atoms

**Ans: (a)**

Covalent compounds have high melting points

40. The volume of 0.1 M oxalic acid that can be completely oxidized by 20 ml of 0.025 M $KMnO_4$ solution is

a) 125 ml b) 25 ml c) 12.5 ml d) 37.5 ml

**Ans: (c)**

$V_1N_1 = V_2N_2$

Oxalic acid $KMnO_4$

$V_1 \times 0.2 = 20 \times 0.125$

Volume of oxalic acid = 12.5 ml

0.1 M = 0.2 N

Oxalic acid

0.025 = 0.125 N

$KMnO_4$

41. A ligand is

a) Lewis acid b) Bronsted acid

c) either a Lewis acid or a Lewis base d) Lewis base

**Ans: (d)**

A ligand donates a pair of electrons. Therefore it is a Lewis base

42. The vapour pressures of two liquids A and B in their pure states are in the ratio of 1 : 2. A binary solution of A and B contains A and B in the mole proportion of 1 : 2. The mole fraction of A in the vapour phase of the solution will be

a) 0.33 b) 0.2 c) 0.25 d) 0.52

**Ans: (b)**

$P_A = X_A \times P_A^0$

$P_A = \frac{1}{3} x1 = \frac{1}{3}$

$P_B = \frac{2}{3} x2 = \frac{4}{3}$

$= \frac{\frac{1}{3}}{\frac{5}{3}} = 0.2$

43. Which of the following statements is TRUE?

a) The total entropy of the universe remains constant

b) The total entropy of the universe is continuously decreasing

c) The total energy of the universe is continuously decreasing

d) The total energy of the universe remains constant

**Ans: (d)**

The total energy of the universe remains constant

44. 5 ml of 0.4 N NaOH is mixed with 20 ml of 0.1 N HCl. The pH of the resulting solution will be

a) 6 b) 7 c) 8 d) 5

**Ans: (b)**

The mixture will form a neutral solution

$\therefore$ pH = 7

45. On adding which of the following, the pH of 20 ml of 0.1 N HCl will not alter?

a) 1 ml of 1 N HCl

b) 20 ml of distilled water

c) 1 ml of 0.1 N NaOH

d) 500 ml of HCl of pH = 1

**Ans: (d)**

If pH = 1 then $[H^+]$ = 0.1 M

0.1 N HCl = 0.1 M HCl

When two solutions of same strength are mixed pH does not change.

46. Which one of the following has a potential more than zero?

a) Pt, $\frac{1}{2}H_2$ (1 atm) | HCl (1 M)

b) Pt, $\frac{1}{2}H_2$ (1 atm) | HCl (2 M)

c) Pt, $\frac{1}{2}H_2$ (1 atm) | HCl (0.1 M)

d) Pt, $\frac{1}{2}H_2$ (1 atm) | HCl (0.5 M)

**Ans: (b)**

Pt, $\frac{1}{2}H_2$ (1atm) / HCl (2M)

47. HCHO was treated with a reagent X. The product formed upon hydrolysis in the presence of an acid gave $C_2H_5OH$. The reagent X is

a) aqueous KOH b) alcoholic KOH c) alcoholic KCN d) $CH_3$ MgI

**Ans: (d)**

$HCHO + CH_3MgI \rightarrow CH_3 - CH_2O\ MgI$

$Mg\begin{matrix} I \\ OH \end{matrix} + CH_3CH_2OH \xleftarrow{H_2O / H^+}$

48. Benzylamine is a stronger base than aniline because

a) The lone pair of electrons on the nitrogen atom in benzylamine is delocalised

b) The lone pair of electrons on the nitrogen atom in aniline is delocalized

c) The lone pair of electrons on the nitrogen atom in aniline is not involved in resonance

d) Benzylamine has a higher molecular mass than aniline

**Ans: (b)**

The lone pair of electrons on the nitrogen atom in aniline is delocalized

49. The relative acidic strengths of benzoic acid, o-toluic acid and p-toluic acid is of the decreasing order:

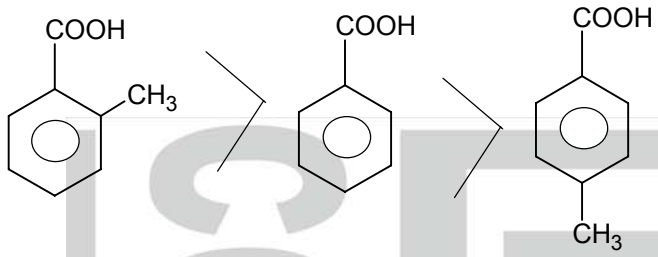
a) p-toluic acid > o-toluic acid > benzoic acid

b) o-toluic acid > p-toluic acid > benzoic acid

c) p-toluic acid > benzoic acid > o-toluic acid

d) o-toluic acid > benzoic acid > p-toluic acid

**Ans: (d)**




50. The C-H bond C-C bond in ethane are formed by which of the following types of overlap?

a) $sp^3$-s and $sp^3$-$sp^3$ b) $sp^2$-s and $sp^2$-$sp^2$ c) sp-s and sp-sp d) p-s and p-p

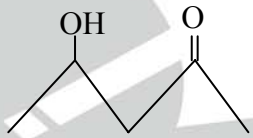
**Ans: (a)**

Carbon in ethane is $sp^3$ hybridised

Carbon bond with H through $sp^3$ –s

C – C bond is formed through $sp^3$ – $sp^3$

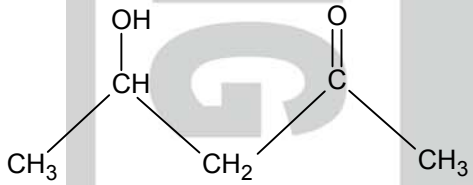
51. The IUPAC name of




a) 4-Hydroxy-2-pentanone b) 2-Hydroxy-4-pentanone

c) 2-Oxo-4-pentanol d) 4-Keto-2-pentanol

**Ans: (a)**




52. A first order reaction is 60% complete in 20 minutes. How long will the reaction take to be 84% complete?

a) 54 mins b) 68 mins c) 40 mins d) 76 mins

**Ans: (c)**

$$k = \frac{2.303}{20} x \log \frac{100}{40} = \frac{2.303}{20} x \log 2.5$$

$$k = \frac{2.303}{20} x 0.3979$$

$$t_{84\%} = \frac{2.303}{\frac{2.303}{20} x 0.3979} x \log \frac{100}{16}$$

$$t_{84\%} = \frac{20 x 0.7958}{0.3979} = 40 \text{ min}$$

53. A given sample of milk turns sour at room temperature ($27^0$C) in 5 hours. In a refrigerator at $-3^0$C, it can be stored 10 times longer. The energy of activation for the souring of milk is

a) 2.303 x 10 R kJ . $mol^{-1}$ b) 2.303 x 5 R kJ . $mol^{-1}$

c) 2.303 x 3 R kJ . $mol^{-1}$ d) 2.303 x 2.7 R kJ . $mol^{-1}$

**Ans: (d)**

$$\log \frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$$

$$\log 10 = \frac{Ea}{2.303R}\left[\frac{30}{300x270}\right]$$

Ea = 2.303 R x 2.700 kJ

54. At 300 K, a gaseous reaction:

$A \rightarrow B + C$

Was found to follow first order kinetics. Starting with pure A, the total pressure at the end of 20 minutes was 100 mm of Hg. The total pressure after the completion of the reaction is 180 mm of Hg. The partial pressure of A (in mm of Hg) is

a) 100 b) 90 c) 180 d) 80

**Ans: (d)**

$A \rightarrow B + C$

1 2x

90 – x x x

Initial pressure = 90

90 – x + 2x = 100

90 + x = 100

Total no. of moles x = 10

$\therefore$ 90 – x = 80

$p_A$ = 80

55. From the Ellingham graphs on carbon, which of the following statements is FALSE?

a) $CO_2$ is more stable than CO at less than 983 K

b) CO reduces $Fe_2O_3$ to Fe at less than 983 K

c) CO is less stable than $CO_2$ at more than 983 K

d) CO reduces $Fe_2O_3$ to Fe in the reduction zone of Blast furnace

**Ans: (c)**

CO is more stable than $CO_2$ at more than 983 K

56. Which of the following is a negatively charged bidentate ligand?

a) Dimethyl glyoximato b) Cyano

c) Ethylene diamine d) Acetato

**Ans: (a)**

57. The secondary valency of platinum in tetra ammine dichloroplatinum (IV) chloride is

a) +4 b) +2 c) 3 d) 6

**Ans: (d)**

$[Pt\ Cl_2\ (NH_3)_4]\ Cl_2$

secondary valency is 6

58. Which one of the following has a magnetic moment of 1.75 BM?

a) $Ti^{3+}$ b) $V^{3+}$ c) $Cr^{3+}$ d) $Fe^{3+}$

**Ans: (a)**

$Ti^{+3}$ : [Ar] $3d' \; 4s^0$

n = 1

$\mu = \sqrt{n(n+2)} = \sqrt{3} = 1.732BM$

59. The correct order of ionisation energy of C, N, O & F is

a) F < N < C < O b) C < N < O < F c) C < O < N < F d) F < O < N < C

**Ans: (c)**

Ionisation energy increases along the period and nitrogen has half filled electronic configuration.

60. The correct set of four quantum numbers for the outermost electron of sodium (Z = 11) is

a) 3, 1, 0, $\frac{1}{2}$ b) 3, 1, 1, $\frac{1}{2}$ c) 3, 2, 1, $\frac{1}{2}$ d) 3, 0, 0, $\frac{1}{2}$

**Ans: (d)**

For sodium Z = 11

$1s^2 \; 2s^2 \; 2p^6 \; 3s^1$ , For outermost electron

n = 3

l = 0

m = 0

s = $\frac{1}{2}$