NATIONAL STANDARD EXAMINATION IN CHEMISTRY 2018-19

ANSWER KEYS

SET No. C 321

1.	**C**	2.	**C**	3.	**D**	4.	**A & C**
5.	**A**	6.	**D**	7.	**D**	8.	**C**
9.	**C**	10.	**A**	11.	**C**	12.	**B**
13.	**A**	14.	**B**	15.	**B**	16.	**C**
17.	**D**	18.	**B**	19.	**C**	20.	**A**
21.	**D**	22.	**A**	23.	**C**	24.	**D**
25.	**B**	26.	**B**	27.	**C**	28.	**A**
29.	**B**	30.	**D**	31.	**C**	32.	**A**
33.	**D**	34.	**D**	35.	**B**	36.	**A**
37.	**C**	38.	**C**	39.	**B**	40.	**A**
41.	**D**	42.	**C**	43.	**D**	44.	**A**
45.	**D**	46.	**B**	47.	**D**	48.	**A**
49.	**C**	50.	**D**	51.	**D**	52.	**A**
53.	**C**	54.	**B**	55.	**B**	56.	**C**
57.	**D**	58.	**C**	59.	**C**	60.	**B**
61.	**B**	62.	**D**	63.	**C**	64.	**B**
65.	**C**	66.	**D**	67.	**C**	68.	**C**
69.	**C**	70.	**C**	71.	**C**	72.	**B**
73.	**C**	74.	**C**	75.	**A**	76.	**C**
77.	**D**	78.	**D**	79.	**D**	80.	**B**

HINTS & SOLUTIONS

1. C

Sol. Only threshold energy and activation energy are changed by using catalyst.

2. C

Sol. The configuration of alcohol as well as the substituted acid are fixed. Hence no change in optically activity.

3. D

Sol. $C_{60}(s) + 120\,O_2(g) \longrightarrow 60\,CO_2(g)$

$\Delta_{com}H^o$ = -25970 kJ mol^{-1}

$\Delta_f H^o$ of CO_2 = -393 kJ mol^{-1}

$\therefore$ -25970 = 60 × -393 ($\Delta_f H^o$ of C_{60} + 0)

$\therefore \Delta_f H^o$ C_{60} = 2390 kJ mol^{-1}

4. A & C

Sol. Both ions O^{2-} and S^{2-} are diamagnetic. The electron configuration of O^{2-} is $1s^2 2s^2 2p^6$ and that of S^{2-} is $2s^2 2s^2 2p^6 3s^2 3p^6$

5. A

Sol. $K_{sp} = s^2 = 1.8 \times 10^{-10}$

or, $s = \sqrt{1.8 \times 10^{-10}} = 1.34 \times 10^{-5}$ mol L^{-1}

Mass of AgCl dissolved in one litre waer = 1.34 $\times 10^{-5} \times 143.5$

= 192.29×10^{-5} g

= $192.29 \times 10^{-5} \times 10^{3}$ mg

= 192.29×10^{-2} mg

$\therefore$ One litre can dissolve = 1.92 mg

1 mg will be dissolved = $\frac{1}{1.92} = \frac{1}{2} = 0.5\,L$

6. D

Sol. The optical isomer are the non super imposable mirro images of each other.

7. D

Sol. $Mg^{2+} + 2HCl \longrightarrow MgCl_2 + H_2$

$Mg^{2+} + Na_2CO_3 \longrightarrow MgCO_3 \downarrow + 2Na^+$

$Mg^{2+} + Na_2SO_4 \longrightarrow MgSO_4 + 2Na^+$

8. C

Sol. $\Delta H_{sol} = \Delta H_{Hyd} + \Delta H_{lattice} = 0$

$5 = 753 + \Delta H_{lattice}$

$\Delta H_{lattice} = -748$

H.E = $-748 \times \frac{6}{11} = -408$ kJ mol^{-1}

9. C

Sol. $2BF_3 + 6LiH \longrightarrow 6LiF + B_2H_6$

10. A

Sol. $K = \frac{K_f}{K_b}$

or $2\times10^{-3} = \dfrac{4\times10^{-6}}{K_b}$

$\therefore K_b = \dfrac{4\times10^{-6}}{2\times10^{-3}} = 2\times10^{-3}\,s^{-1}$

11. C

Sol. No. of geometrical isomers = $2^n = 2^4 = 16$

12. B

Sol. $V = \dfrac{V_0 bP}{(1+bP)}$

or $\dfrac{1}{V} = \dfrac{1+bP}{V_0 bP} = \dfrac{1}{V_0 bP} + \dfrac{bP}{V_0 bP}$

$= \dfrac{1}{V_0 b}\times\dfrac{1}{P} + \dfrac{1}{V_0}$

y = mx + C

positive slope and intercept

13. A

Sol. ΔH = - 112 kJ whenN_2O_5 is a gas

$\Delta H = -112 - 2\times54 = -220$ kJ mol^{-1}

14. B

Sol. Equal fraction of reactants consumes in equal interval of time. Hence it is a first order reaction.

15. B

Sol. $pH = pK_a + \log\dfrac{[Salt]}{[Acid]}$

$\log\dfrac{[Salt]}{[Acid]} = \dfrac{2}{1}$

i.e. $\dfrac{[Acid]}{[Salt]} = \dfrac{1}{100}$

i.e. $\dfrac{1}{101}\times100 = 0.99\%$

16. C

Sol. $W = -P_{ext}(V_2 - V_1)$

W = -1(10 – 20) L atm

W=-8L –atm

W= -8$\times$101.3

W=810.4 J(approx)

17. D

Sol. It forms the most stable carbonium ion(benzyl) among the given compounds.

18. B

Sol. $C_6H_{12}O_6 + 9O_2 \longrightarrow 6CO_2 + 6H_2O$

$\Delta_r H$ = -2807 kJ mol

Total energy needed = 7800 kJ

Energy released by 1 mole = $\frac{7800}{2807} = 2.778$

$\therefore$ Mass of glucose = 2.778 $\times$ 180 = 500.178

19. C

Sol. $P = \frac{P_1V_1 + P_2V_2}{V_1 + V_2} = \frac{(25\times10)+(50\times20)}{50+25} = 16.66\ kP_a$

20. A

Sol. Graphite is used as anode in the electrometallurgy of Al.

21. D

Sol. Product of $[H_3O^+][OH^-]$ is constant.

22. A

Sol. $Sn^{4+} + 2e^- \longrightarrow Sn^{2+}\ E^0 = 0.15\ V.....\Delta G_1^0 = -2F(0.15)$

$Br_2 + 2e^- \longrightarrow 2Br^-\quad E^0 = 1.07\ V.....\Delta G_2^0 = -2F(1.07)$

$\Delta G_3^0 = \Delta G_1^0 - \Delta G_2^0$

$\Delta G_3^0 = -2F(0.15) - (-2F\times1.07)$

$\Delta G_3^0 = +177.6\,kJ$

23. C

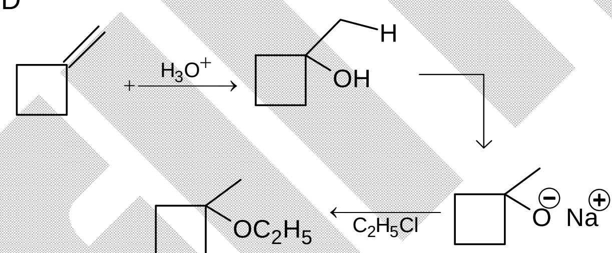
Sol. $2KClO_3 \longrightarrow 2KCl + 3O_2$

3 $\times$ 22.4 L O_2 given by 2 moles

1 L of O_2 gives = $\frac{2\times1}{3\times22.4}$ mole

24. D

Sol.



25. B

Sol. $\frac{N_A}{4} = 0$ atom

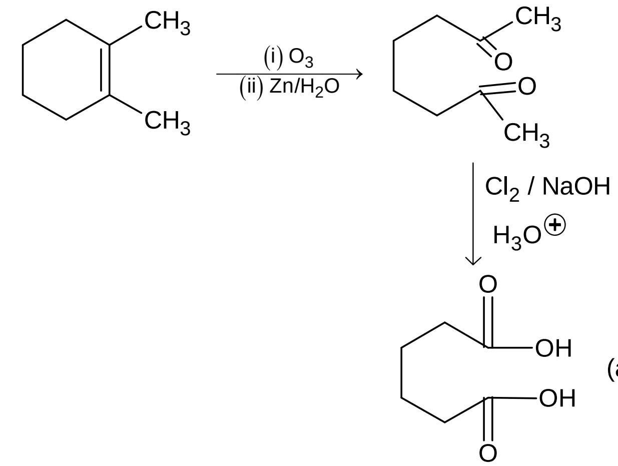
26. B

Sol. $E = \frac{hc}{\lambda(\text{longer})}$

Energy lesser required for rubidium

27. C

Sol.



(adipic acid)

28.

Sol. $\Delta G = \Delta H - T\Delta S$

At equilibrium $\Delta G = 0$

So, $\Delta H = T\Delta S$

$$T = \frac{\Delta H}{\Delta S}$$

$$\Delta S = 193 - \frac{1}{2}(190) - \frac{3}{2}(130)$$

$$= -97$$

$$T = \frac{-45 \times 1000}{-97} \simeq 464K$$

29.

Sol. $d = \frac{PM}{RT}$

$$d = \frac{2 \times 44}{0.0821 \times 273} = 4\ gm/L \text{ (not in the option) or } 4\ Kg/m^3$$

30. D

Sol. Nucleophilic substitution reaction.

31. C

Sol. Applying Nernst Equation

$$E = E^o - \frac{2.303RT}{1F}\log_{10}\left[K^+\right]$$

$$E^1 = E^o - \frac{2.303RT}{1F}\log_{10}\left[25\,K^+\right]$$

Since they have asked magnitude of potential difference

$$\left|E - E^1\right| = \frac{2.303\,RT}{F}\log\frac{25\left[K^+\right]}{\left[K^+\right]}$$

= 82 mV

32. A

Sol. $2H_2O \longrightarrow O_2 + 4H^+ + 4e^- \qquad -1.23V$

Apply Nernst Equation

$$E = -1.23 - \frac{0.0591}{4}\log_{10}\left[H^{+}\right]^{4}$$
$$E = -1.23 - 0.0591 \times \log_{10} 10^{-7}$$
$$E = -0.8163 \simeq -0.82V$$

33. D
Sol. Explained on basis of Ortho Effect.

34. D
Sol. Use $r = 53\frac{n^2}{Z}$ pm 1 pm = 10^{-12}m

35. B
Sol. Phase change occurs at constant temperature.

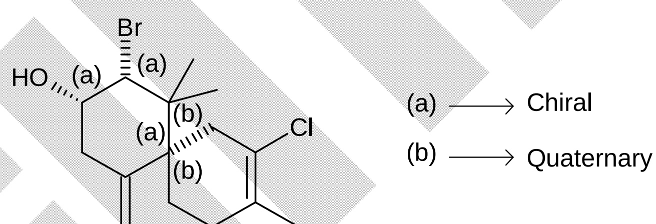
36. A
Sol. Use electrophilic aromatic substitution.

37. C
Sol. As hybridization is sp^3d, so we have two different type of bonds (axial and equatorial).

38. C
Sol. Change in oxidation number occurs.

39. B
Sol. $2BrF_3 \rightleftharpoons BrF_2^{+} + BrF_4^{-}$

$2ICl_3 \rightleftharpoons ICl_2^{+} + ICl_4^{-}$

40. A
Sol.


41. D
Sol. Use EAS, also Na reacts with hydrogen attached to electronegative atom to release H_2(g).

42. C
Sol. Each Ca^{2+} will replace two K^{+}.
Ca has mass no. as 40 whereas K has 39.

43. D
Sol. Follow either Ion electron/oxidation no. method to balance.

44. A
Sol. Use Haworth Projection rules.

45. D
Sol. Use IUPAC Nomenclature rules.

46. B

Sol. Stronger the acid weaker is it's conjugate base.

47. D
Sol. $BrCl_2^+$ is bent shape due to sp^3 hybridisation.

48. A
Sol. As after losing water, compound becomes Quasi aromatic species.

49. C
Sol. Use rules for conversion of flying Wedge representation to Newman.

50. D
Sol. Silicones have in general the chemical formula as $[R_2SiO]_n$ where 'R' is alkyl or aryl group.

51. D
Sol. $yBa_2Cu_3O_{6.5}$
Use summation of oxidation no. = 0

52. AB
Sol. Find molecular formula by percentage composition given.
The formula is $C_4H_8O_2$ and option (A) & (B) both give positive Fehlings Test.

53. C
Sol. Use IUPAC rules

54. B
Sol. Explained on basis of Intermolecular Hydrogen Bonding.

55. B
Sol. Tl prefers +1 oxidation state.

56. C
Sol. Cumulated alkene with even number of double bond is non planar.

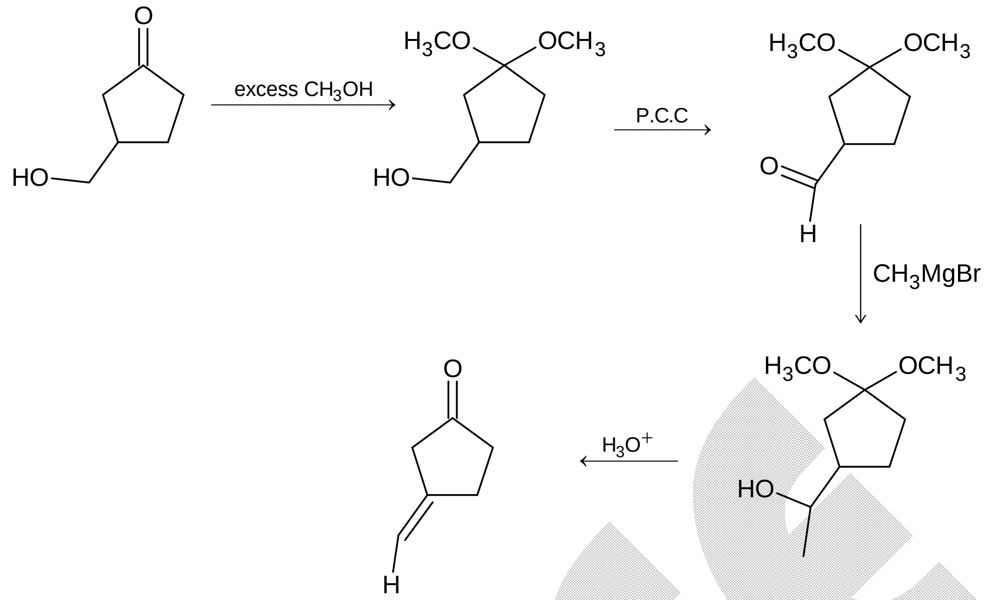
57. D
Sol. More resonance stabilized and more hyper conjugation.

58. C
Sol. Due to TIN pest (Autocatalytic, allotropic transformation)

59. C
Sol. Acidic hydrogen in conjugation with electron withdrawing group.

60. B
Sol. As Boron is an electron deficit when compare with carbon.

61. B
Sol. P is

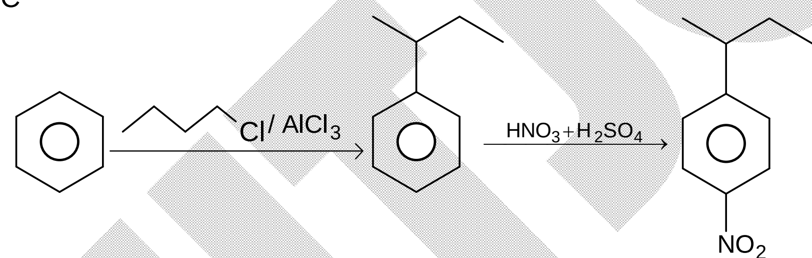


62. D

Sol. $N \equiv \overset{+}{N} - \overset{-}{O}$ is the most stable Lewis structure because octet of all the elements is complete and the +ve charge is present on less e.n and –ve charge on more e.n atom.

63. C

Sol.

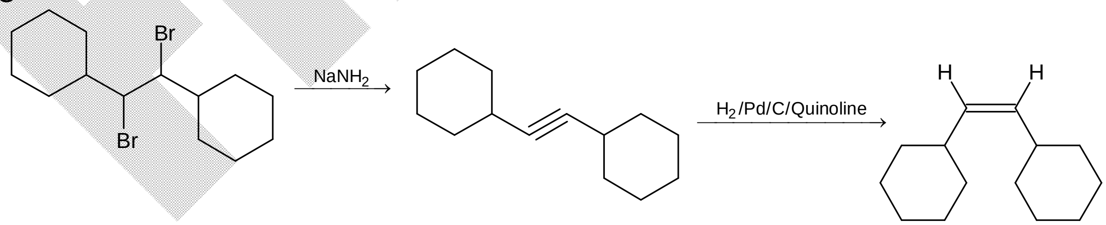


64. B

Sol. Since both are isoelectronic species, but F^- has higher nuclear charge hence it is smaller than O^{2-}.

65. C

Sol.



66. D

Sol. Radial nodes = z = n – l – 1

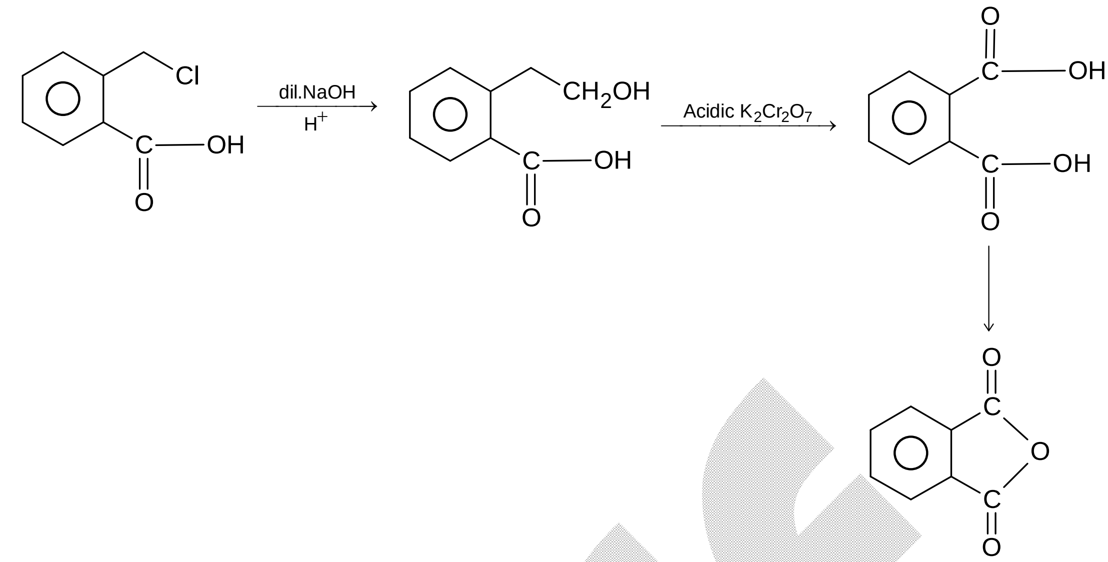
Angular nodes = z = l = d-orbital

Hence n = 5

Therefore 5d orbital

67. C

Sol.



$C_4H_8O_3$

68. C

Sol. I, II and III are correct statements.

69. C

Sol. i & iii involve carbocation intermediate.

70. C

Sol. due to positive charge on Mn, back bonding is not so effective(dπ - pπ)

71. C

Sol. $R_1 = K[X_0][Y_0]$

$$0.5\ R_1 = k\left[\frac{1}{2}X_0\right]^2[Y]$$

Hence $Y = 2[Y_0]$

72. B

Sol. $H_3C-\overset{O}{\overset{||}{C}}-NH_2$ has highest dipole moment because of stable resonating structure

$$H_3C-\overset{O}{\overset{||}{C}}-NH_2 \rightleftharpoons CH_3-\overset{\bar{O}}{\overset{|}{C}}=\overset{+}{N}(H)-H$$

73. C

Sol. milli eq of HCl = 50 $\times$ 0.75 = 37.5 mili eq

$$\frac{W_{Na_2CO_3}}{53}\times 1000 = 37.5$$

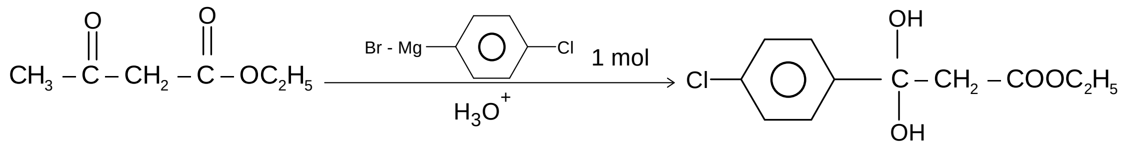
$$W_{Na_2CO_3} = 2 \text{ gram}$$

74. C

Sol. $[Fe(NH_3)_6]^{3+}$ has 1 unpaired and $[FeF_6]^{3-}$ has 5 unpaired electron

75. A

Sol.



76. C

Sol. Zn^{2+} $conc^{n}$ will be less than 1 M hence Zn^{2+} will more spontaneously oxidized at anode

$$E = 1.1 - \frac{0.59}{2}\log\frac{.1}{1}$$

77. D

Sol. $M \times \frac{21.49}{100} = 32$

$$M = \frac{3200}{21.49} = 149.2$$

78. D

Sol. pH = 2

$[H^{+}] = 10^{-2}$ M

1 L = 10^{3} g of water has 10^{-2} mole of H^{+}

1 ppm = 10^{6} g of water has 10 mole of H^{+} = 5 mole of Ca^{2+}

Hence weight of Ca = 5 × 40 = 200 ppm

79. D

Sol. For compound Y

.303 g of O combine with 1 gm of Br

$.303 \times 60 \longleftarrow 160\text{g of Br}$

= 48 g = 3 'O' atm

Hence Y is Br_2O_3

For Z

$.503\text{g of 'O'} \longrightarrow 1\text{g of Br}$

.503 × 160 = 80 g _________ 160 g of Br

Hence no. of O atoms = $\frac{80}{16} = 5$

Z is Br_2O_5

80. B