PART (B) : CHEMISTRY

Answer Key & Solution

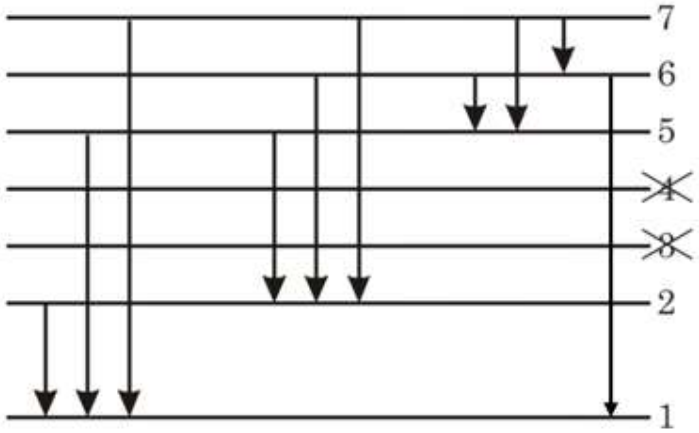
31. (C)
Lanthanum is d block element.

32. (C)
C is antibonding overlap.

33. (A)
$2 \times 500 + 5 \times V_1 = 2.5 \times (500 + V_1)$
$1000 + 5V_1 = 1250 + 2.5V_1$
$2.5V_1 = 250$
$V_1 = 100\,\text{ml}$

34. (C)
1 of 1st orbit, 4 of 2nd orbit, 9 of 3rd orbit and 16 of 4th orbit.

35. (C)



36. (C)
(A) θ incorrect less than 109°28'
(B) incorrect position of lone pair
(C) correct square planar structure with θ = 90°
(D) θ incorrect because it is square planar with two lone pair at Xe and θ = 90°

37. (B)
$$m = \frac{\text{No. moles of solute}}{\text{mass of solvent}} \times 1000$$

$$m = \frac{\omega_2}{M_2} \times \frac{1000}{\frac{\omega_1}{M_1} \times M_1}$$

$$m = \frac{n_2 \times 1000}{n_2 \times M_1}$$

$\chi_{solvent} = 0.7, \chi_{solute} = 0.3$

$(n_1) \qquad (n_2)$

$$m = \frac{0.3 \times 1000}{0.7 \times 18} = 23.80 \text{ mol kg}^{-1}$$

38. (C)

De-Broglie wavelength $(\lambda) = \frac{h}{p}$

K.E. of $e^{=} = eV$

K.E. = $P^2/2m$

$eV = P^2/2m$

$P = \sqrt{2meV}$

$\frac{h}{\lambda} = P = \sqrt{2meV}$

39. (D)

I.E. : 4d series < 5d series

40. (B)

IE of Pd > IE of Ag

41. (B)

Neutral atom configuration is $3d^4\ 4s^2$ or $3d^5\ 4s^1$

42. (B)

Higher n+l

43. (B)

$Co^{3+} \Rightarrow d^6 \rightarrow 4$ unpaired electron

Magnetic moment $= \sqrt{n(n+2)}$

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

$= 4.90$ BM

44. (C)

SF_4 is sp^3d hybridization with 1 lone pair (see saw).

BrF_3 is sp^3d hybridization with 2 lone pair (T shape).

45. (D)
1 g atom of Fe (56 g Fe) is present in 1 mole of the compound
As 4.6 g Fe will be present in
$= \frac{100}{4.6} \times 56\,g$
$= 1217\ g$ of the compound.
So, approximate molecular mass = 1200.

46. (D)

Element	Carbon	Hydrogen
% Composition	92.3	7.7
Atomic ratio	92.3/12 = 7.69	7.7/1 = 7.7
Simple ratio	7.69/7.69 = 1	7.7/7.69 = 1

So, empirical formula is 'CH'.

47. (C)
$BaCO_3 \rightarrow BaO + CO_2$
197 gm
197 gm of $BaCO_3$ released CO_2 = 22.4 litre
1 gm of $BaCO_3$ released $CO_2 = \frac{22.4}{197}$ litre
9.85 gm of $BaCO_3$ released $CO_2 = \frac{22.4}{197} \times 9.85 = 1.12$ litre

48. (A)
p-orbital has single dumb bell and d orbital has double dumb bell.

49. (B)
2s should be filled before 2p.

50. (A)
$_{28}Ni = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$
$Ni^{2+} = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8$
Hence, d-electrons in Ni and Ni^{2+} are same.

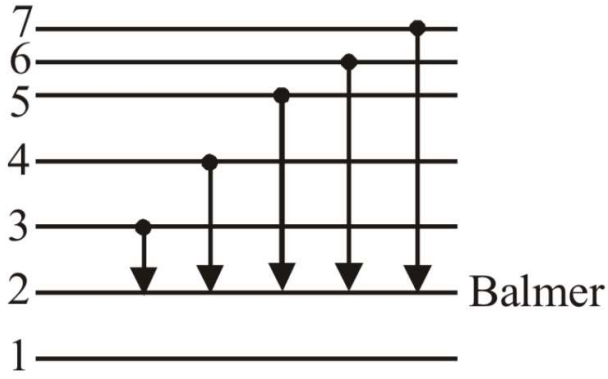
51. (8)
Bond angle is 134 degree.

52. (3)
SF_4 and SF_6 are non planar.

53. (3)

54. (2)
CO_2 and XeO_2F_4

55. (5)



56. (191.66 to 191.67)
sp^3d^2, sp^2 and sp^3 respectively.

57. (0.07)
Let molarity of $Ba(OH)_2 = M_1$
$2M_1 \times 25 = 0.1 \times 35$
$M_1 = 0.07$ M

58. (5)
Total values of $m = (2\ell + 1)$ = no. of orbitals in subshell.
As $\ell = 2$ represents 'd' subshell and d subshell has five orbitals. ($d_{xy}, d_{yz}, d_{zx}, d_{x^2-y^2}, d_{z^2}$).

59. (25)
M^{2+} has 5 unpaired electrons.
Atomic number is 25.
$M \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^5$
$M^{2+} \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^0\ 3d^5$

60. (4)
Orbit number is 4.