

JEE EXPERT

ANSWER KEY

REGULAR TEST SERIES - (RTS-01)

Batch : 12TH Pass (Desire A01)

Date 30.06.2019

PHYSICS

1	(D)	2	(B)	3	(D)	4	(A)	5	(B)
6	(B)	7	(C)	8	(D)	9	(B)	10	(A)
11	(D)	12	(C)	13	(B)	14	(C)	15	(C)
16	(C)	17	(C)	18	(B)	19	(D)	20	(A)
21	(B)	22	(B)	23	(A)	24	(D)	25	(A)
26	(B)	27	(B)	28	(C)	29	(B)	30	(B)

CHEMISTRY

31	(B)	32	(B)	33	(A)	34	(A)	35	(B)
36	(D)	37	(A)	38	(A)	39	(A)	40	(B)
41	(C)	42	(D)	43	(B)	44	(B)	45	(A)
46	(D)	47	(C)	48	(D)	49	(C)	50	(B)
51	(B)	52	(B)	53	(D)	54	(B)	55	(A)
56	(C)	57	(D)	58	(D)	59	(A)	60	(A)

MATHEMATICS

61	(D)	62	(B)	63	(C)	64	(D)	65	(C)
66	(B)	67	(A)	68	(B)	69	(B)	70	(B)
71	(B)	72	(A)	73	(D)	74	(B)	75	(D)
76	(D)	77	(C)	78	(B)	79	(B)	80	(B)
81	(D)	82	(C)	83	(A)	84	(B)	85	(D)
86	(A)	87	(B)	88	(C)	89	(D)	90	(A)

JEE EXPERT

SOLUTIONS

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CHEMISTRY

31. (B) Lowering, $\Delta P \propto$ 'a' number of solute particles.

Hence, HA_1 is stronger acid than HA_2 (Given $\Delta P_1 > \Delta P_2$) and $pK_{a_1} < pK_{a_2}$.

32. (B)

33. (A) $m = \frac{(639.7 - 631.9)}{639.7} \times \frac{1000}{78} = 0.156$.

34. (A)

35. (B) $\Delta T_b = k_b \times \frac{m/M}{w/1000}$ $\frac{m}{w} = \frac{2 \text{ gm.}}{50 \text{ gm.}}$ k_b is constant as same solvent is used.

Hence, $\Delta T_b \propto \frac{1}{M}$ As $M_A > M_B$, $(\Delta T_b)_B > (\Delta T_b)_A$

36. (D) Higher the value of i , lower will be the freezing point of the solution.

37. (A) Let vapour pressure of pure A = 2 P.

$$Y_A = \frac{P_A^0 X_A}{P_A^0 X_A + P_B^0 (1 - X_A)}$$

$$\frac{1}{4} = \frac{2P X_A}{2P X_A + 3P(1 - X_A)} ; X_A = \frac{1}{3}$$

38. (A) $K_4[Fe(CN)_6] \longrightarrow 4K^+ + [Fe(CN)_6]^{4-}$

1	0	0
0	4	1
\therefore	$i = 5$	

39. (A) On converting 0.6% (w/v) into molarity we will get, 0.1M, which is same as that of glucose solution.

40. (B) $\Delta t_f = K_f \times m$, $\Delta t_b = K_b \times m$

$$\Rightarrow m = \frac{\Delta t_f}{K_f} \text{ and } m = \frac{\Delta t_b}{K_b}$$

i.e. $\frac{\Delta t_f}{K_f} = \frac{\Delta t_b}{K_b}$

i.e. $\frac{0.186}{1.86} = \frac{\Delta t_b}{0.512}$

i.e. $\Delta t_b = 0.0512^\circ\text{C}$

41. (C) $P = 440 \times \frac{1}{5} + 120 \times \frac{4}{5} = 184 \text{ mm Hg}$

$$(X_{\text{pentane}})_{\text{vapour phase}} = \frac{440 \times \frac{1}{5}}{184} = \mathbf{0.478 \text{ mm Hg.}}$$

42. (D) According to Raoult's law, $\frac{P_o - P_s}{P_o} = \frac{N_1}{N_1 + N_2}$

$$1 - \frac{P_s}{P_o} = \frac{N_1}{N_1 + N_2}$$

or $\frac{P_s}{P_o} = 1 - \frac{N_1}{N_1 + N_2} = \frac{N_2}{N_1 + N_2}$ or $P_s = P_o / (N_1 + N_2)$

Also, $\frac{P_o - P_s}{P_o} = \frac{N_1}{N_1 + N_2} \therefore = \frac{N_1 + N_2}{N_1} = 1 + \frac{N_2}{N_1}$

or $\frac{P_s}{P_o - P_s} = \frac{N_2}{N_1}$ or $\frac{P_o - P_s}{P_s} = \frac{N_1}{N_2}$

43. (B)

44. (B) Total pressure of a mixture of 2 volatile liquids is given by

$$P_{\text{Total}} = P_A^\circ X_A + P_B^\circ X_B = \left(100 \times \frac{1}{4}\right) + \left(80 \times \frac{3}{4}\right) = (25 + 60) = 85 \text{ mm Hg}$$

Mole fraction of A in the vapour phase (X'_A) is given by

$$X'_A = \frac{P_A}{P_T} = \frac{\left(100 \times \frac{1}{4}\right)}{85} = \frac{25}{85} = 0.294$$

$$\therefore X'_B = 0.706$$

These mole fractions will go into the distillate. The total vapour pressure of the distillate would be

$$P'_{\text{Total}} = P_A^\circ X'_A + P_B^\circ X'_B = (100 \times 0.294) + (80 \times 0.706) \\ = (29.4 + 56.48) = \mathbf{85.88 \text{ mm Hg.}}$$

45. (A) $\Delta T_f = T_{\text{solvent}} - T_{\text{solution}} = K_f \times m_{\text{observed}}$.
 Greater the value of m_{observed} , lower is the T_{solution} .
 In option (a), the correct order would have been (assuming 100% dissociation for each salt) **0.05 M KNO_3 > 0.04 M CaCl_2 > 0.14 M glucose > 0.075 M CuSO_4 .**
46. (D) There are in total 8 tetrahedral voids. A will form ccp and B are present in all tetrahedral voids. When half of the B atoms are ejected from the solid, half remains filled i.e. equal to A atoms.
47. (C) $Z_A = \frac{1}{8} \times 8 = 1$; $Z_B = \frac{1}{2} \times 5 = \frac{5}{2}$ A $\text{B}_{5/2}$ i.e. A_2B_5
48. (D) The given planes will form an fcc lattice where coordination number of a lattice point = **12**.
49. (C) Number of A atoms = 7
 Contribution of each = $\frac{1}{8}$
 \therefore Net contribution of A atoms = $\frac{7}{8}$
 B atoms at the face centres
 \therefore Net contribution = $\frac{6}{2} = 3$
 Formula = $\text{A}_{7/8}\text{B}_3 = \text{A}_7\text{B}_{24}$.
50. (B) Mass of one fcc unit cell = $\frac{4 \times M}{N_A}$.
 $\rho = \frac{4 \times M}{N_A a^3} \therefore \frac{4M}{N_A} = \rho a^3$.
 Total number of fcc unit cells = $\frac{100}{\rho a^3} = \frac{100}{10 \times (10^{-8})^3} = 10^{25}$
 Each fcc unit cell contains 4 atoms. So number of atom is 100 g of fcc unit cell
 = **4×10^{25}** .
51. (B) If 'Z' is the number of Al atoms per unit cell then its density is given by
 $d = \frac{Z \times 27}{N (400 \times 10^{-10})^3}$
 $\therefore Z = \frac{2.8 \times 6.023 \times 10^{23} (400 \times 10^{-10})^3}{27} = 3.997 \approx 4$.
 Unit cell of aluminium is face centred.

52. (B) The density of crystals having Frenkel defect is unaltered as the defect involves displacement of an atom or ion from its lattice position to an interstitial position. So the mass and volume remain unaffected.

53. (D) Volume of atoms in a unit cell = $\frac{4}{3}\pi r^3 \times 4 = \frac{16}{3}\pi r^3$
(In FCC unit cell, the effective number of atoms present = 4)

54. (B) One Fe^{3+} ion replaces three Na^+ ions. As Na^+ ions occupy all octahedral voids of NaCl crystal, due to replacement few octahedral voids fall vacant. So, one Fe^{3+} ion creates two vacant octahedral voids. 10^{-3} mole FeCl_3 creates unoccupied octahedral voids = $2 \times 6.02 \times 10^{23} \times 10^{-3} = 12.04 \times 10^{20}$

Hence, 100 mole of doped NaCl crystals create 12.04×10^{20} vacant octahedral voids. Hence, 1 mole of doped NaCl crystals create 12.04×10^{18} vacant octahedral voids.

55. (A) In primitive cubic, $2r = a$

$$\text{In BCC, } 2r = \frac{\sqrt{3}}{2} a$$

$$\text{In FCC, } 2r = \frac{\sqrt{2}}{2} a$$

$$\text{In diamond, } 2r = \frac{\sqrt{3}}{4} a.$$

56. (C) Effective number of carbon atoms present at corners = $\frac{1}{8} \times 8 = 1$

$$\text{Effective number of carbon atoms present at face centers} = \frac{1}{2} \times 6 = 3$$

$$\text{Effective number of carbon atoms present in tetrahedral holes} = 8 \times \frac{1}{2} = 4.$$

\therefore Total number of effective carbon atoms present in a unit cell of diamond is 8.

57. (D) In ZnS structure, $r_{\text{Zn}^{2+}} + r_{\text{S}^{2-}} = \frac{\sqrt{3}}{4} a$
 $\therefore a = \frac{(0.83 + 1.74) \times 4}{\sqrt{3}} = 5.93 \text{ \AA}.$

58. (D) Each sphere corresponds to one octahedral hole and two tetrahedral holes.

59. (A) The bcc structure has co-ordination number of eight.

60. (A)