

## Solutions

## JEE Main 2020 Chapterwise

### Questions with Answer Keys

### Chemistry

#### Q1 JEE Main 2020 - 2 September (Morning)

An open beaker of water in equilibrium with water vapour is in a sealed container. When a few grams of glucose are added to the beaker of water, the rate at which water molecules

- (A) leaves the solution increases
- (B) leaves the vapour increases
- (C) leaves the vapour decreases
- (D) leaves the solution decreases

#### Q2 JEE Main 2020 - 2 September (Evening)

The size of a raw mango shrinks to a much smaller size when kept in a concentrated salt solution.

Which one of the following processes can explain this?

- (A) Osmosis
- (B) Reverse osmosis
- (C) Diffusion
- (D) Dialysis

#### Q3 JEE Main 2020 - 3 September (Evening)

If  $250\text{cm}^3$  of an aqueous solution containing  $0.73\text{g}$  of a protein A is isotonic with one litre of another aqueous solution containing  $1.65\text{g}$  of a protein B, at  $298\text{K}$ , the ratio of the molecular masses of A and B is  $\times 10^{-2}$  (to the nearest integer).

#### Q4 JEE Main 2020 - 4 September (Morning)

At  $300\text{K}$ , the vapour pressure of a solution containing 1 mole of n-hexane and 3 moles of n-heptane is  $550\text{mm}$  of Hg. At the same temperature, if one more mole of n-heptane is added to this solution, the vapour pressure of the solution increases by  $10\text{mm}$  of Hg. What is the vapour pressure in mm Hg of n-heptane in its pure state

#### Q5 JEE Main 2020 - 4 September (Evening)

The osmotic pressure of a solution of NaCl is  $0.10\text{ atm}$  and that of a glucose solution is  $0.20\text{ atm}$ . The osmotic pressure of a solution formed by mixing  $1\text{ L}$  of the sodium chloride solution with  $2\text{ L}$  of the glucose solution is  $x \times 10^{-3}\text{ atm}$ .  $x$  is . (nearest integer)

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#### Q6 JEE Main 2020 - 5 September (Morning)

A soft drink was bottled with a partial pressure of  $\text{CO}_2$  of 3 bar over the liquid at room temperature. The partial pressure of  $\text{CO}_2$  over the solution approaches a value of 30 bar when 44g of  $\text{CO}_2$  is dissolved in 1kg of water at room temperature. The approximate pH of the soft drink is  $\times 10^{-1}$  (First dissociation constant of  $\text{H}_2\text{CO}_3 = 4.0 \times 10^{-7}$ ;  $\log 2 = 0.3$ ; density of the soft drink =  $1\text{g mL}^{-1}$ )

#### Q7 JEE Main 2020 - 6 September (Morning)

The elevation of boiling point of 0.10m aqueous  $\text{CrCl}_3 \cdot x\text{NH}_3$  solution is two times that of 0.05m aqueous  $\text{CaCl}_2$  solution. The value of  $x$  is [Assume 100% ionisation of the complex and  $\text{CaCl}_2$ , coordination number of Cr as 6, and that all  $\text{NH}_3$  molecules are present inside the coordination sphere]

#### Q8 JEE Main 2020 - 6 September (Evening)

A set of solutions is prepared using 180g of water as a solvent and 10g of different nonvolatile solutes A, B and C. The relative lowering of vapour pressure in the presence of these solutes are in the order [Given, molar mass of  $A = 100\text{g mol}^{-1}$ ;  $B = 200\text{g mol}^{-1}$ ;  $C = 10,000\text{g mol}^{-1}$ ]

- (A)  $A > C > B$
- (B)  $C > B > A$
- (C)  $A > B > C$
- (D)  $B > C > A$

#### Q9 JEE Main 2020 - 7 January (Morning)

At  $35^\circ\text{C}$ , the vapour pressure of  $\text{CS}_2$  is 512 mm Hg and that of acetone is 344 mm Hg. A solution of  $\text{CS}_2$  in acetone has a total vapour pressure of 600 mm Hg. The false statement amongst the following is:

- (A) heat must be absorbed in order to produce the solution at  $35^\circ\text{C}$
- (B) Does not obey Raoult's law
- (C) a mixture of 100 mL  $\text{CS}_2$  and 100 mL acetone has a volume  $< 200\text{ mL}$
- (D)  $\text{CS}_2$  and acetone are less attracted to each other than to themselves

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#### Q10 JEE Main 2020 - 7 January (Evening)

There are two beakers (I) having pure volatile solvent and (II) having volatile solvent and non-volatile solute. If both beakers are placed together in a closed container then:

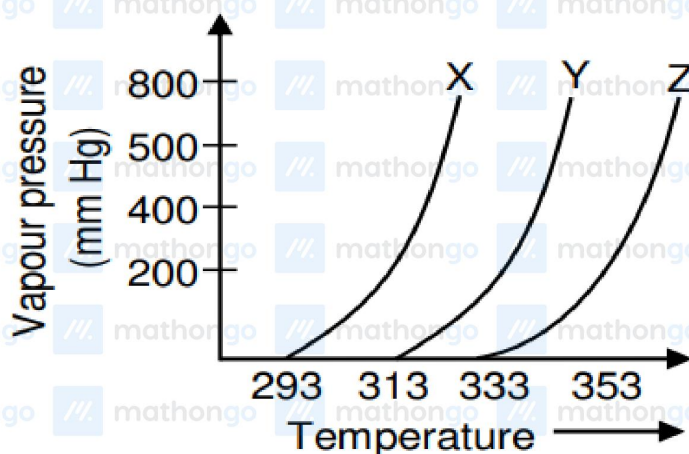
- (A) Volume of solvent beaker will decrease and solution beaker will increase
- (B) Volume of solvent beaker will increase and solution beaker will also increase
- (C) Volume of solvent beaker will decrease and solution beaker will also decrease
- (D) Volume of solvent beaker will increase and solution beaker will decrease

#### Q11 JEE Main 2020 - 8 January (Morning)

A graph of vapour pressure and temperature for three different liquids  $X$ ,  $Y$  and  $Z$  is shown below :

The following inferences are made :

- (A) Intermolecular force of attraction of  $X > Y$ .
- (B) Intermolecular force of attraction of  $X < Y$ .
- (C) Intermolecular force of attraction of  $Z < X$ .



Select the correct option(s).

- (A)  $A$  and  $C$
- (B)  $A$  and  $B$
- (C)  $B$  only

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(D) *B* and *C*

#### Q12 JEE Main 2020 - 8 January (Morning)

A flask contains a mixture of isohexane and 3-methylpentane. One of the liquids boils at  $63^{\circ}\text{C}$  while the other boils at  $60^{\circ}\text{C}$ . What is the best way to separate the two liquids and which one will be distilled out first?

- (A) Simple distillation and isohexane.
- (B) Fractional distillation and isohexane.
- (C) Simple distillation and 3-Methylpentane.
- (D) Fractional distillation and 3-Methylpentane.

#### Q13 JEE Main 2020 - 9 January (Morning)

How much amount of *NaCl* should be added to 600 g of water ( $\rho = 1.00 \text{ g/mL}$ ) to decrease the freezing point of water to  $-0.2^{\circ}\text{C}$ ?

(The freezing point depression constant of water =  $2 \text{ K kg mol}^{-1}$ ,

#### Q14 JEE Main 2020 - 9 January (Evening)

The solubility product of  $\text{Cr}(\text{OH})_3$  at 298 K is  $6.0 \times 10^{-31}$ . The concentration of hydroxide ions in a saturated solution of  $\text{Cr}(\text{OH})_3$  will be:

- (A)  $(2.22 \times 10^{-31})^{1/4}$
- (B)  $(18 \times 10^{-31})^{1/2}$
- (C)  $(4.86 \times 10^{-29})^{1/4}$
- (D)  $(18 \times 10^{-31})^{1/4}$

## Solutions

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Chemistry

### Answer Key

Q1 (D)

Q2 (D)

Q3 (177)

Q4 (600)

Q5 (167)

Q6 (37)

Q7 (5)

Q8 (C)

Q9 (C)

Q10 (A)

Q11 (C)

Q12 (B)

Q13 (1.76)

Q14 (D)

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