

JEE MAIN SOLUTIONS — OSMOSIS AND OSMOTIC PRESSURE — PYQS

Max. Marks: 32

Questions: 8

Section A (MCQ) — 6 questions

Q.1 Given below are two statements :

Chamber 1		Chamber 2
18 g glucose in 100 mL aqueous solution	Semi-permeable membrane	30 g glucose in 250 mL aqueous solution

Statement-I: H_2O molecules move from the chamber 1 to chamber 2.

Statement-II: The osmotic pressure of a solution prepared by dissolving 50 mg of potassium sulphate (molar mass = 174 g/mol) in 2 L of water (at 27°C) is 0.0107 bar. (Given: $R = 0.083 \text{ dm}^3 \text{ bar K}^{-1} \text{ mol}^{-1}$ and assume complete dissociation of electrolyte)

In the light of the above statements, choose the correct answer from the options given below :

[JEE Main 2026 (Online) 6th April Evening Shift]

- (1) Both Statement-I and Statement-II are true
- (2) Both Statement-I and Statement-II are false
- (3) Statement-I is true but Statement-II is false
- (4) Statement-I is false but Statement-II is true

Scan or tap for the full solution



Q.2 At 27°C , 0.1 M, 1 L $\text{K}_4[\text{Fe}(\text{CN})_6]$ aqueous solution and 0.1 M, 1 L FeCl_3 aqueous solution are placed in a container separated by a semi permeable membrane AB. Assume complete dissociation of both the solutes. Which of the following statement is correct?

[JEE Main 2026 (Online) 4th April Evening Shift]

A	
0.1 M, 1 L $\text{K}_4[\text{Fe}(\text{CN})_6]$ side 'x'	0.1 M, 1 L FeCl_3 side 'y'
B	

- (1) Blue color is formed on both sides.
- (2) Ionic solutes in aqueous solution can pass through semi-permeable membrane.
- (3) Solution on side 'y' is hypotonic.
- (4) To cause the reverse flow of solvent during osmosis, external pressure (any value) should be applied to side 'x'.

Scan or tap for the full solution



Q.3 Solution A is prepared by dissolving 1 g of a protein (molar mass = $50,000 \text{ g mol}^{-1}$) in 0.5 L of water at 300 K. Its osmotic pressure is x bar. Solution B is made by dissolving 2 g of the same protein in 1 L of water at 300 K. Osmotic pressure of solution B is y bar. Entire solution of A is mixed with entire solution of B at the same temperature. The osmotic pressure of resultant solution is z bar. x, y and z respectively are:

($R = 0.083 \text{ L bar mol}^{-1} \text{ K}^{-1}$)

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 9.96×10^{-4} ; 9.96×10^{-4} ; 9.96×10^{-4}
- (2) 9.96×10^{-4} ; 9.96×10^{-4} ; 19.92×10^{-4}
- (3) 4.98×10^{-4} ; 4.98×10^{-4} ; 9.96×10^{-4}
- (4) 4.98×10^{-4} ; 4.98×10^{-4} ; 4.98×10^{-4}

Scan or tap for the full solution



Q.4 A solution is prepared by dissolving 0.3 g of a non-volatile non-electrolyte solute 'A' of molar mass 60 g mol^{-1} and 0.9 g of a non-volatile non-electrolyte solute 'B' of molar mass 180 g mol^{-1} in 100 mL H_2O at 27°C . Osmotic pressure of the solution will be

[Given: $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$]

[JEE Main 2026 (Online) 24th January Morning Shift]

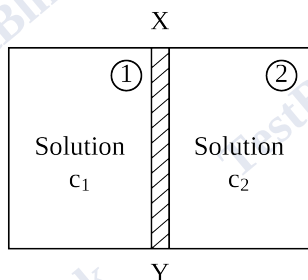
- (1) 2.46 atm
- (2) 0.82 atm
- (3) 1.47 atm
- (4) 1.23 atm

Scan or tap for the full solution



Q.5 XY is the membrane/partition between two chambers 1 and 2 containing sugar solutions of concentration c_1 and c_2 ($c_1 > c_2$) mol L^{-1} . For the reverse osmosis to take place identify the correct condition.

(Here p_1 and p_2 are pressures applied on chamber 1 and 2.)



- A. Membrane/Partition : Cellophane, $p_1 > \pi$
 B. Membrane/Partition : Porous, $p_2 > \pi$
 C. Membrane/Partition : Parchment paper, $p_1 > \pi$
 D. Membrane/Partition : Cellophane, $p_2 > \pi$
 Choose the correct answer from the options given below: [JEE Main 2025 (Online) 4th April Morning Shift]
- (1) A and C Only (2) A and D Only
 (3) B and D Only (4) C Only

Scan or tap for the full solution



- Q.6** Assume a living cell with 0.9% (w/w) of glucose solution (aqueous). This cell is immersed in another solution having equal mole fraction of glucose and water.

(Consider the data upto first decimal place only)
 The cell will :

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) shrink since solution is 0.45% (w/w) as a result of association of glucose molecules (due to hydrogen bonding)
 (2) shrink since solution is 0.5% (w/w)
 (3) show no change in volume since solution is 0.9% (w/w)
 (4) swell up since solution is 1% (w/w)

Scan or tap for the full solution



Section B (Numerical) — 2 questions

- Q.7** 20 g hemoglobin in a 1 L aqueous solution (A) at 300 K is separated from pure water by semi permeable membrane. At equilibrium the height of solution in a tube dipped in a solution (A) is found to be 80.0 mm higher than the tube dipped in water. The molar mass of hemoglobin is _____ kg mol^{-1} . (Nearest integer)
 (Given : $g = 10 \text{ m s}^{-2}$, $R = 8.3 \text{ kPa dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$, density of solution = 1000 kg m^{-3})

[JEE Main 2026 (Online) 5th April Evening Shift]

Scan or tap for the full solution



- Q.8** The osmotic pressure of a living cell is 12 atm at 300 K. The strength of sodium chloride solution that is isotonic with the living cell at this temperature is _____ g L^{-1} . (Nearest integer)

Given : $R = 0.08 \text{ L atm K}^{-1} \text{ mol}^{-1}$

Assume complete dissociation of NaCl

(Given: Molar mass of Na and Cl are 23 and 35.5 g mol^{-1} respectively.)

[JEE Main 2026 (Online) 21st January Evening Shift]

Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 6 questions

Ques.	1	2	3	4	5	6					
Ans.	4	3	1	1	1	—					

Section B (Numerical) — 2 questions

Ques.	7	8									
Ans.	62	15									