1. Two main components that determine water potential are
(a) pressure gradient minus water potential
(b) solute potential and pressure potential
(c) evaporation of water from stem and leaves
(d) the overall movement of solutes

2. The water potential of pure water is ***NEET 2017***
(a) zero
(b) less than zero
(c) more than zero, but less than one
(d) more than one

3. The water potential of pure water decreases on addition of
(a) solute (b) solvent
(c) Both (a) and (b) (d) None of these

4. Solute particles tend to …… the diffusion pressure of water.
(a) increase (b) decrease
(c) remain constant (d) become less than zero

5. Water tends to move into a cell that has
(a) high turgor pressure (b) high positive y_w
(c) more negative y_w (d) low turgor pressure

6. Water potential increases due to
(a) addition of solute
(b) evaporation
(c) addition of inorganic substances
(d) increase in pressure

7. Solute potential $(y)_s$ is always
(a) positive (b) equal
(c) negative (d) None of these

8. The pressure exerted by the protoplast due to the entry of water against the rigid cell wall is termed as
(a) pressure potential (b) osmotic potential
(c) solute potential (d) water potential

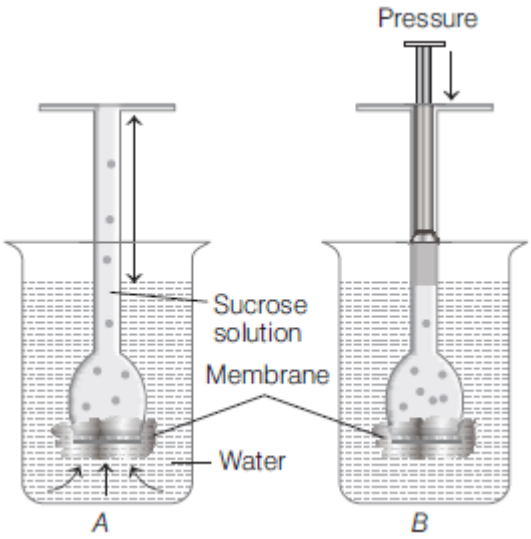
9. The relationship between water potential, solute potential and pressure potential is
(a) $y\ y\ y_{wsp} = -$ (b) $y\ y\ y_{wsp} + =$
(c) $y\ y\ y_{wsp} = +$ (d) $y\ y\ y_{wps} + =$

10. Cell *A* has $y_w - 3$ bars and cell *B* has $y_w - 8$ bars. The movement of water will be from
(a) cell *A* to cell *B*
(b) cell *B* to cell *A*
(c) data insufficient
(d) water cannot move in negative value of y_w

11. The process of osmosis depends upon
(a) concentration gradient (b) pressure gradient
(c) Both (a) and (b) (d) None of these

12. The osmotic expansion of a cell kept in water is chiefly regulated by
(a) mitochondria (b) vacuoles
(c) plastids (d) ribosomes

13. Identify the process taking place in the given experimental setup and choose the correct option.



(a) Osmosis (b) Plasmolysis
(c) Imbibition (d) Diffusion

14. In the thistle funnel experiment, what will happen if sugar solution is added to a beaker after the rocess of osmosis stops?
(a) The level of solution in thistle funnel will rise up
(b) The level of solution in thistle funnel will lower down
(c) The level of solution in beaker will drop
(d) The level of solution will remain unaffected in beaker

15. Prolonged addition of urea to a flowering plant causes
(a) endosmosis (b) exosmosis
(c) plasmolysis (d) diffusion

16. When a plant cell is placed in pure water, it
(a) expands until the osmotic pressure reaches that of water
(b) becomes less turgid until the osmotic potential reaches that of pure water
(c) becomes more turgid until the pressure potential of cell reaches its osmotic potential
(d) becomes more turgid until the osmotic potential reaches that of pure water

17. Cell *A* has osmotic potential of – 20 bars and pressure potential of 5 bars, whereas cell *B* has osmotic potential of –18 bars and pressure potential of 2 bars. The direction of flow of water will be ***AIIMS 2018***
(a) from cell *B* to cell *A* (b) from cell *A* to *B*
(c) no flow of water (d) in both the directions

18. The values of osmotic potential (π) and pressure potential (ρ) of cells *A*, *B*, *C* and *D* are given below.

Cell	π	ρ
A	– 1.0	0.5
B	– 0.6	0.3
C	– 1.2	0.6
D	– 0.8	0.4

Identify the option, which shows correct sequence of the path of movement of water.
(a) A→ B→ C→ D (b) B→ D→ A→ C
(c) B→ C→ D→ A (d) D→ A→ B→ C

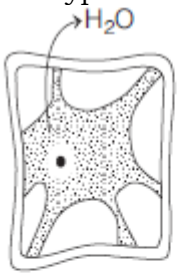
19. Numerically osmotic pressure is equivalent to
(a) osmotic potential (b) pressure gradient
(c) water potential (d) None of these

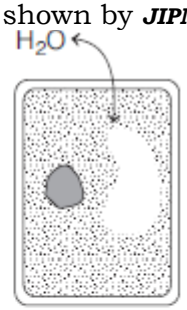
20. If the osmotic pressure of cytoplasm in a cell is balanced by external solution, the solution must be
(a) hypotonic (b) hypertonic
(c) atonic (d) isotonic

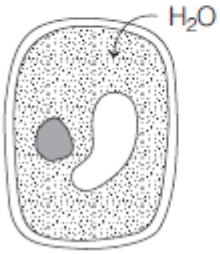
21. When the external solution is more ...*A*..., it is called ...*B*... solution. Fill in the blanks with appropriate pair from the options given below.
(a) A–dilute; B–hypertonic
(b) A–concentrated; B–hypotonic
(c) A–dilute; B–isotonic
(d) A–concentrated; B–hypertonic

22. What will be the direction of flow of water when a plant cell is placed in a hypotonic solution? ***NEET (Odisha) 2019***
(a) Water will flow in both directions
(b) Water will flow out of the cell
(c) Water will flow into the cell
(d) No flow of water in any direction

23. Cell placed in hypertonic solution is shown by ***JIPMER 2019***

(a) 

(b) 

(c) 

(d) Both (a) and (b)

24. RBC and a plant cell are kept in distilled water. The solute concentration is same in both the cells. Observe the change in both the cells.
(a) Both plant cell and RBC would not undergo any change
(b) The RBC would increase in size and burst, while the plant cell would remain about the same size
(c) The plant cell would increase in size and burst, while the RBC would remain about the same size
(d) Both plant cell and RBC would decrease in size and collapse

25. ...*A*... occurs when the water moves out of the cell and the ...*B*... of a plant cell shrinks away from the cell wall. Fill in the blanks by choosing the correct pair of words from the options given below.
(a) A–Reverse osmosis; B–protoplasm
(b) A–Imbibition; B–nucleus
(c) A–Translocation; B–ER
(d) A–Plasmolysis; B–cell membrane

26. Which among the following represents the correct relationship for a plasmolysed cell?
(a) $\psi \psi \psi w s p = +$ (b) $\psi \psi \psi s w p = +$
(c) $\psi \psi w s =$ (d) $\psi \psi w p =$

27. The space between the plasma membrane and the cell wall of plasmolysed cell surrounded by a hypertonic solution is occupied by
(a) hypertonic solution (b) hypotonic solution
(c) isotonic solution (d) water

28. A leaf peeling of *Tradescantia* is kept in a medium having 10% NaCl. After a few minutes, if we observe the leaf peel under the microscope, we are likely to see
(a) entry of water into the cell
(b) the cells bursting out
(c) diffusion of NaCl into the cell
(d) exit of water from the cell

29. What will happen, if a large amount of water enters in a plant cell?
(a) TP of cell gets reduced
(b) TP opposes the entry of water
(c) Water potential of the cell becomes more negative
(d) Water potential of the cell increases simultaneously

30. If sugars are actively moving into a cell, what will happen to the turgor pressure of the cell?
(a) TP increases due to the entry of water
(b) TP decreases because water exits
(c) TP increases as sugar concentration affects it directly
(d) No effect of sugar concentration on turgidity hence, no change

1. (*b*) Water potential is the free energy of one mole of water at NTP. It is the fundamental concept to understand water movement. Solute potential and pressure potential are two main omponents which determine water potential.

2. (*a*) Water potential of pure water at standard temperature, which is not under any pressure is taken to be zero.
3. (a)
4. (*b*) Pure water has maximum diffusion pressure. If solute particles are added in pure water, its diffusion pressure decreases.

5. (*c*) Water tends to move into a cell that has more negative y*w*. Water potential of pure water is zero and it is negative when the concentration of water in a solution is less. Therefore, ovement of water is from an area of its higher water potential (or less negative) to area where there is lower water potential (or more negative).

6. (*d*) Water potential increases due to increase in pressure. If a pressure greater than atmospheric pressure is applied to pure water or a solution, its water potential increases.
7. (*c*) Solute potential is always negative. The more the solute molecules, the lower (more negative) is the solute potential.

8. (a)
9. (*c*) Water potential of a cell is affected by both solute and pressure potential. The relationship between water potential, solute potential and pressure potential is y y y *w s p* = +

10. (*a*) The movement of water will be from cell A to cell B. We know that water moves from the area of its less negative or high water potential to the area of its more negative or less water potential. Therefore water will move from Cell A having a pressure potential of – 3 bars to cell B having a pressure potential of – 8 bars.

11. (c)
12. (*b*) The osmotic expansion of a cell kept in water is chiefly regulated by vacuoles. This is because, vacuoles have single membraned tonoplast and act as a semipermeable membrane, allowing selective entry and exit of water.

13. (*a*) The process taking place in the given experimental setup is osmosis. This is because it depicts the movement of water molecules from the region of its high concentration to lower oncentration through a semipermeable membrane.

14. (*b*) In thistle funnel experiment, when sugar solution is added to a beaker after the process of osmosis stops, the solution of beaker will become hypertonic and as a result exosmosis will occur. Hence, the level of solution in thistle funnel will get lowered.
15. (b)
16. (*c*) When a plant is placed in pure water, the water will move into the cell due to endosmosis until the pressure potential and osmotic potential of the cell become equal. Thus, as a result the cell will become more turgid.

17. (b)
18. (b)
19. (*a*) Numerically osmotic pressure is equivalent to the osmotic potential, but with an opposite sign. Osmotic pressure is positive, while osmotic potential is negative.

20. (*d*) If an external solution balances the osmotic pressure of the cytoplasm, then it is known as isotonic solution. When the cells are placed in isotonic solution, there is no net flow of water.
21. (d)
22. (*c*) The behaviour of plant cells with regards to water movement depends on the surrounding solution. Thus, when a plant cell is placed in hypotonic solution, the water will flow into the cell and the cell will swell.

23. (*a*) Cell placed in hypertonic solution is correctly shown by figure (a). The figure given in option (a) depicts that the movement of water is outside the cell and the cell is plasmolysed, i.e. the cell membrane has got shrinked, these observations signify that the cell is placed in a hypertonic solution.

24. (*b*) When RBC and a plant cell are placed in distilled water, endosmosis takes place. Thus, as a result, RBC would increase in size and burst, while the plant cell would remain about the same size because of the presence of rigid cell wall made of cellulose and hemicellulose.

25. (d)

26. (c)

27. (*a*) When a cell is placed in a hypertonic solution, the protoplasm shrinks and leaves the cell wall due to exosmosis and the cell becomes plasmolysed. The space between the plasma membrane and the cell wall of plasmolysed cell is occupied by a hypertonic solution or water.

28. (*d*) When a leaf peeling of *Tradescantia* is kept in a medium having 10% NaCl solution, the cells shrink in size as water moves out of the cell. This is followed by the separation of protoplast from cell wall due to exosmosis. This phenomenon is called plasmolysis.

29. (*b*) Being a positive force, turgor pressure opposes the entry of water if a large amount of water enters in a plant cell.

30. (*a*)When sugars actively move into a cell, the turgor pressure of the cell increases as the water moves into the cell.