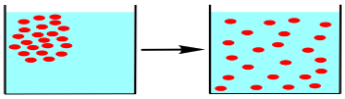
TRANSPORT IN PLANTS & PLANT GROWTH AND DEVELOPMENT

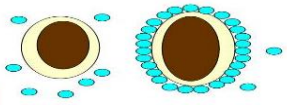
Roopa.S

TRANSPORT IN PLANTS



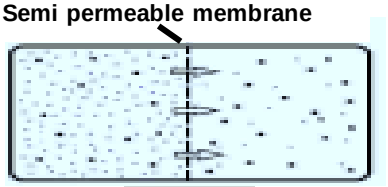
DIFFUSION-

It is the passive movement of **substances** from the **region of thier higher concentration** to a **region of lower concentration**



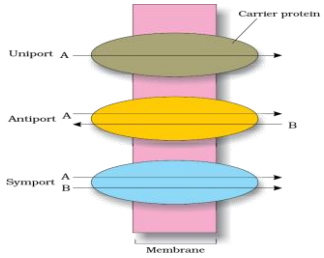
IMBIBITION

It is a special type of diffusion where water is **adsorbed** by **solids – colloids** – causing them to **enormously increase in volume**.



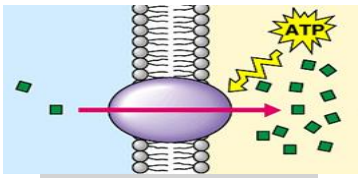
OSMOSIS

It is the **diffusion of water** (solvent molecules) from a region of its **higher concentration to a region of lower concentration**, via a **semipermiable** membrane, until



FACILITATED DIFFUSION–

Is the **passive** movement of substances which are **hydrophilic & insoluble in membrane lipids,** through **special protein channels,** from a region of their **higher**



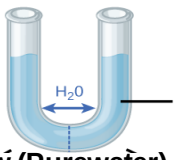
ACTIVE TRANSPORT

It is the movement of molecules **against a concentration gradient** (from a region of lower concentration to a region of higher concentration) by means of **membrane-proteins**, with the **expenditure of energy**.

TRANSLOCATION

It is the **long distance, mass or bulk** transport of **water, minerals, food and plant hormones** through **xylem & phloem,** by **positive or negative hydrostatic pressure gradient**.

WATER POTENTIAL- It is the **potential energy of water,** which helps in the **movement of water**



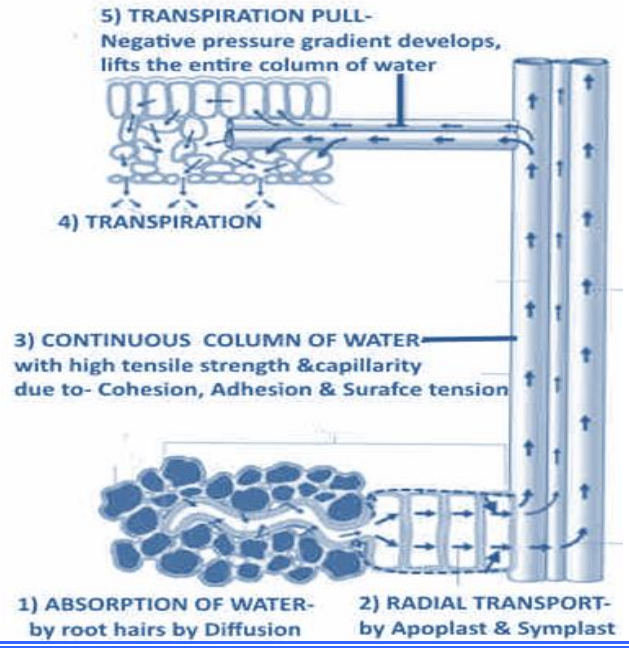
Pure water

Ψ_{w} (Purewater) = Zero

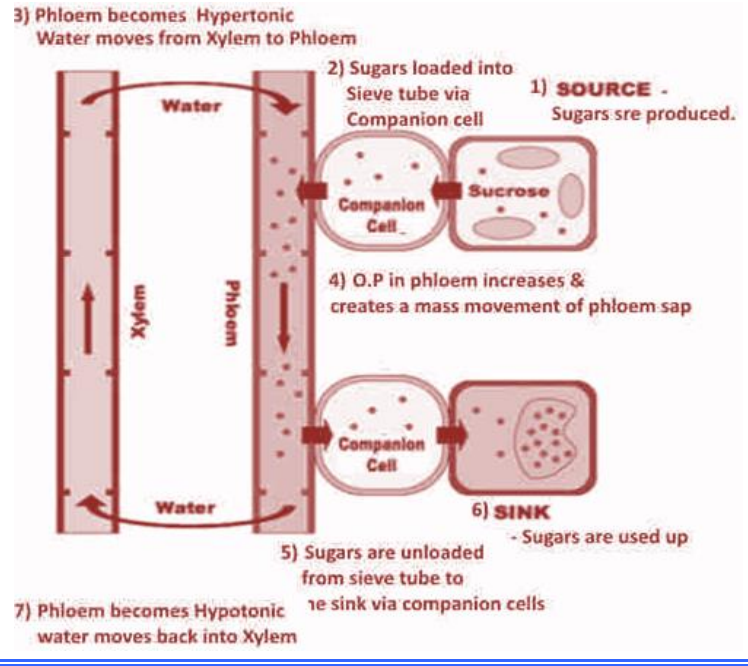
Ψ_w = Ψ_s + Ψ_p

(Water Potential of a solution) = (Solute Potential) + (Pressure Potential)

TRANSLOCATION IN XYLEM

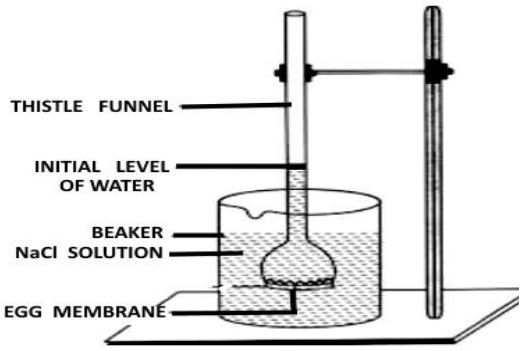


TRANSLOCATION IN PHLOEM



PRACTICE QUESTIONS

1. What could be expected in the following experiment



a) Water from the beaker enters the thistle Funnel

b) Level of salt solution in the beaker increases

c) Sodium chloride in the beaker enters the thistle funnel

d) No change.

2. Select the correct statements amongst the following-

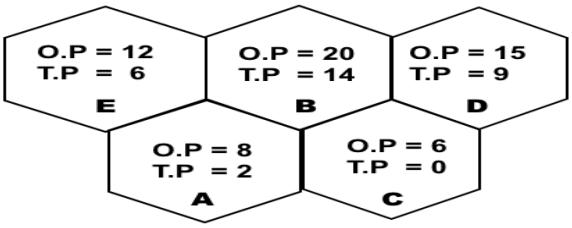
A. Simple diffusion & Facilitated transports require special membrane proteins.
B. Transport saturates in Active transport & Facilitated transport
C. Active transport requires ATP energy & shows downhill transport
D. Simple diffusion & Facilitated transports cannot cater to uphill transport
E. Active transport & Simple diffusion are highly selective.

a) Only E is correct
b) B & C are correct
c) B & D are correct
d) B, D & A are correct

3. When a cell is placed in a sugar solution of concentration 0.14 M, there is no change. What is the concentration of the cell sap?

a) 0.14 M b) 0.014M c) 0.0014 d) 1.4M

4. In the following diagram if T.P of the cell B increases to 18, what will be the change in water movement?



a) A,B, D & E absorb water from C

b) A,C, D & E absorb water from B

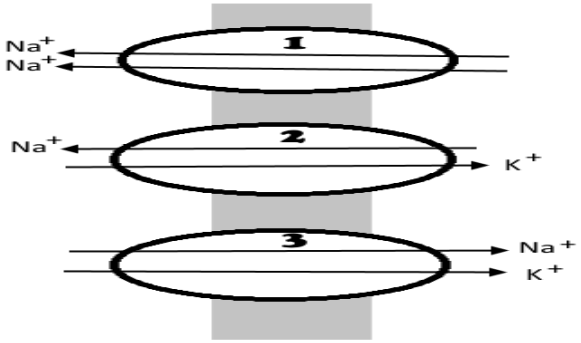
c) B, C & E absorb water from A

d) No change.

5. When water….1…. a plant cell due to diffusion, pressure builds up against the ……2…….. It makes the cell ……3….this increases the ……..4……..,which is usually ……..5……..

a) 1= enters , 2= plasma membrane, 3= turgid, 4= Solute potential, 5= Positive
b) 1= exits , 2= cell wall, 3= flaccid, 4= Solute potential, 5= Negative
c) 1= exits , 2= plasma membrane, 3= flaccid, 4= Pressure potential , 5= Negative
d) 1= enters , 2= cell wall, 3= turgid, 4= Pressure potential, 5= Positive

6. Which one of the following is the correct illustration of the diagram ?



a) 1 represents symport
b) 2 represents symport
c) 3 represents symport
d) Both 1 & 3 represents symport

7. Read the following & select the correct option-
A (Assertion) - Gluten of wheat adsorbs water & swells .
R (Reasoning) - Water acts as a imbibant.

a) both A & B are true & R is the correct explanation of A
b) both A & B are true & R is not the correct explanation of A
c) A is true but R is false
d) both A & B are false

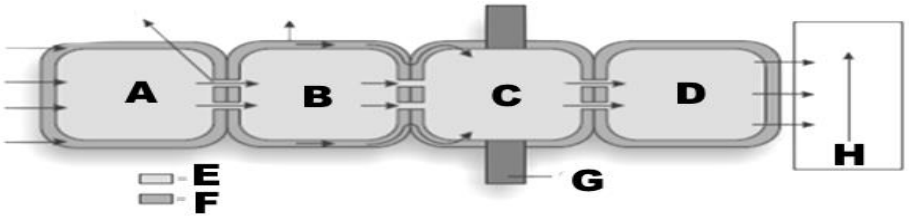
8. A plant cell began to show plasmolysis when it was placed in 5% NaCl solution. To deplasmolyse the cell, it should be placed in-

a) 5% NaCl solution b) 10% NaCl solution c) 15% NaCl solution d) 2% NaCl solution

9. Maximum absorption of water in roots occurs in

a) Zone of elongation b) Zone of maturation c) Root cap d) Zone of cell division

10. The following diagram depicts the pathway of water movement in root. Select the correct option ,



a) A= Epidermis, B=Endodermis, C= Cortex, D= Pericycle, E=Apoplast, F= Symplast, G= Casparian strip, H= Xylem
b) A= Epidermis, B= Cortex, C= Endodermis, D= Pericycle, E=Apoplast, F= Symplast, G= Xylem, H= Phloem
c) A= Epidermis, B=Endodermis, C= Cortex, D= Pericycle, E= Symplast, F= Apoplast, G= Xylem, H= Casparian strip
d) A= Epidermis, B= Cortex, C= Endodermis, D= Pericycle, E= Symplast, F= Apoplast, G= Casparian strip, H= Xylem

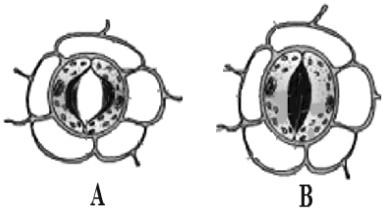
11. In which of the following plants would metabolism be hindered if the leaves are coated with wax on their upper surface

a) Hydrilla b) Lotus c) Pistia d) Vallisneria

12. Exudation & Guttation occur due to,

a) Root pressure, a +ve pressure b) Root pressure, a -ve pressure
c) Transpiration, a +ve pressure d) Transpiration, a -ve pressure

13. Observe the 2 states of Stomata- A& B. Which one of the statements hold good for A.



a) The guard cells are turgid & Elastic inner walls of guard cells stretch inwards
b) The guard cells are turgid & Elastic inner walls of guard cells stretch outwards
c) The guard cells are flaccid &Elastic inner walls of guard cells stretch outwards
d) The guard cells are flaccid &Elastic inner walls of guard cells stretch inwards

14. The physical properties of water Cohesion, adhesion & surface tension, gives water an ability to resist a pulling force, which is called-

a) Capillarity b) Liquidity c) Tensile strength d) Viscosity

15. Which one of the following is the right sequence for the "pull" exerted during transpiration ?

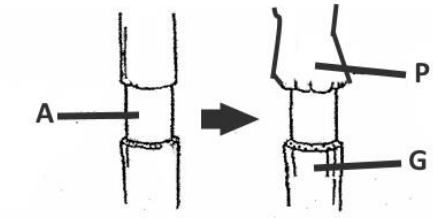
a) substomatal cavity→ stomata → leaf vein→ intercellular spaces of mesophyll→ xylem of stem → vessels from the root

b) leaf vein→xylem of stem → substomatal cavity→ stomata → intercellular spaces of mesophyll→ vessels from the root

c) vessels from the root xylem of stem → intercellular spaces of mesophyll→ leaf vein→stomata → substomatal cavity→

d) stomata → substomatal cavity→ intercellular spaces of mesophyll→ leaf vein→xylem of stem → vessels from the root

16. Study the following girdling experiment & choose the correct statement-



a) 'A' shows the Bark upto Xylem is removed

b) 'P' swollen due to accumulation of sugars in xylem

c) ' G' receives supply of sugars from leaves.

d) 'G' receives supply of minerals & water from roots.

17. Starch is stored in potato tubers, the proper explanation of how starch gets there would be,

a) Starch passes from the leaves through phloem to the tubers

b) Starch passes from the leaves through companion cells to the tubers

c) Starch passes from the leaves through xylem to the tubers

d) sugars passes through phloem to the tubers & gets converted there into starch

18. Select the correct sequential changes that occur at the source, during Phloem translocation.

A= Creates hydrostatic pressure **E= Sucrose enters the sieve tube**
C=Glucose is prepared in leaf **D= Creates hypertonic condition**
G= Glucose is converted to sucrose **F= Water from xylem enters the Phloem**
H= Pressure flow of solutes towards sink **B=Phloem loading**

a) F→B→H→A→C→E→G→D b) B→D→F→A→G→C→E→H

c) H→E→A→D→F→H→C→B d) C→G→B→E→D→F→H→A

19. Which of them cannot act as a source during translocation ?

a) Leaves b) Fruit c) Tubers d) none

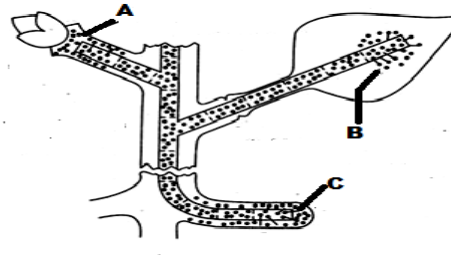
20. Match the following-

1. Shrinkage of fruits in sugary syrup	**A. Imbibition**
2. Swelling of wooden frames of windows in rainy season	**B. Guttation**
3. Movement of O_2 within the tissues	**C. Plasmolysis**
4. Transport of sugars from leaves to roots	**D. PhloemTranslocation**
5. Loss of water in liquid phase from leaf margin	**E. Diffusion**

a) 1=D, 2=C, 3=E, 4=B, 5=A b) 1=B, 2=E, 3=C, 4=A, 5=D

c) 1=A, 2=E, 3=B, 4=C, 5=D d) 1=C, 2=A, 3=E, 4=D, 5=B

21. Study the following figure & choose the correct statement.



a) A= region of lower turgor pressure, where phloem unloading occurs
b) B= region of lower turgor pressure, which acts as a sink
c) C= region of higher turgor pressure, where phloem loading occurs
d) B= sugars leaves the sieve tubes & phloem unloading occurs

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ALL THE BEST !!!!!