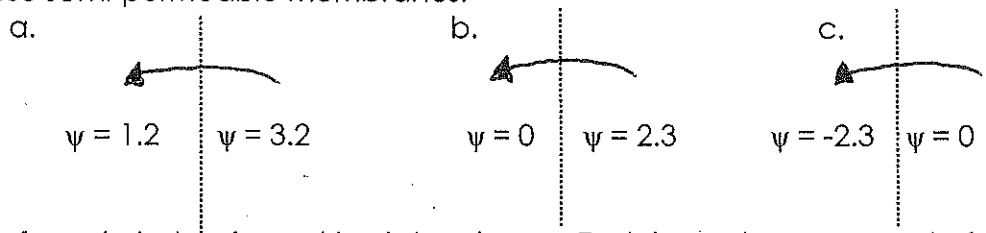
AP Biology Cell Function Water Potential WS

Name Answer Key Date

# Water Potential Worksheet

***Directions: Water potential is the potential of water to leave an area. It is water's ability to 'get up and go'. High water potential represents a high potential to leave. Low water potential represents a low potential to leave. Therefore, water moves from an area with a high water potential to an area with low water potential.***

1. Given the following scenarios draw an arrow representing the movement of water across these semi-permeable membranes.




2. The formula below is used to determine Ψs. Explain each component of the formula.

$$\Psi s = -i \times C \times R \times T$$

i = ionization constant. Does the solute split/ionize in water?
C = the molar concentration of the solute.
R = pressure constant (0.0831)
T = the temperature in Kelvin! (°C + 273)

3. For the following molarities of sucrose, calculate the water potential of each. $\psi s = -i\,C\,R\,T$. Sucrose's ionization constant is 1. The pressure constant (R) is 0.0831 liter bars/mole °K. And the experiment was run at 23 °C. (Convert to Kelvin by adding Celsius to 273). ***SHOW WORK BELOW***
   a. 1.1 Mol/Liter = − 27 bars
   b. 0.3 Mol/liter = − 7.4 bars
   c. 0.0 Mol/Liter = 0 bars
   d. 7.0 Mol/Liter = − 172 bars

4. For the following molarities of sodium chloride (NaCl), calculate the water potential of each. $\psi s = -i\,C\,R\,T$. Sodium chloride's ionization constant is 2. The pressure constant (R) is 0.0831 liter bars/mole °K. And the experiment was run at 23 °C. (Convert to Kelvin by adding Celsius to 273). ***SHOW WORK BELOW***
   a. 0.8 Mol/Liter = − 39 bars
   b. 1.4 Mol/liter = − 69 bars
   c. 0.0 Mol/Liter = 0 bars
   d. 4.2 Mol/Liter = − 207 bars

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5. **Fill in the blanks below.**

$\Psi = \Psi_p + \Psi_s$ (water potential = pressure potential + solute potential)

a. Pure water has a $\Psi$ = 0

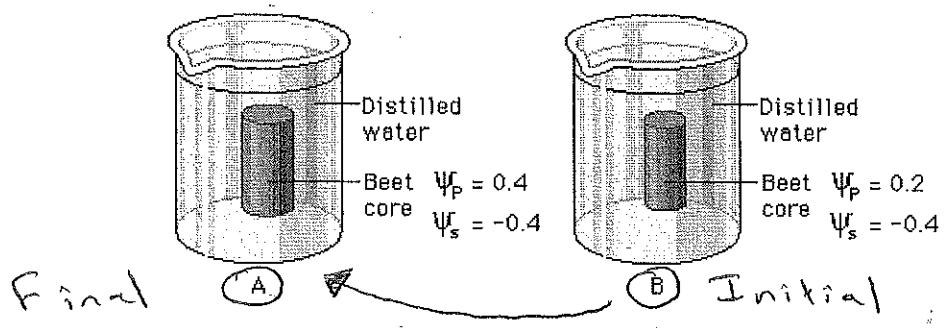
b. If $\Psi$ = -2 bars and $\Psi s$ = -2 bars, then $\Psi p$ = 0.

c. If $\Psi$ = -3 bars and $\Psi s$ = 0 bars and, then $\Psi p$ = -3.

d. If $\Psi$ = 0 bars and $\Psi p$ = +4 bars, then $\Psi s$ = -4.

6. In beaker B, what is the water potential of the distilled water in the beaker, and of the beet core?

Beaker $\Psi$ = 0 Beet Core $\Psi$ = -0.2




7. Which of the following statements is true for the diagrams above?

a. The beet core in beaker B will lose water to the surrounding environment.

→ (b) The beet core in beaker B will gain water from the surrounding environment.

c. The beet core in beaker A is likely to gain so much water that its cells will rupture.

d. The cells in beet core B are likely to undergo plasmolysis.

means plant cells losing water / wilting.