

AP Biology Lab 1c: Calculation of Water Potential from Experimental Data

$i =$	The number of particles the molecule will make in water; for NaCl this would be 2; for sucrose or glucose, this number is 1
$C =$	Molar concentration (from your experimental data)
$R =$	Pressure constant = 0.0831 liter bar/mole K
$T =$	Temperature in degrees Kelvin = 273 + °C of solution

1. The solute potential of this sucrose solution can be calculated using the following formula:

$$\text{Solute potential } (\Psi_s) = -iCRT$$

The units of measure will cancel as in the following example:

- A 1.0 M sugar solution at 22 °C under standard atmospheric conditions
 $\Psi_s = -i (C) (R) (T)$

$$\Psi_s = -(1) \left(1.0 \frac{\text{mole}}{\text{liter}} \right) \left(0.0831 \frac{\text{liter bar}}{\text{mole K}} \right) (295 \text{ K})$$

$$\Psi_s = -24.51 \text{ bars}$$

- In an open system with only atmospheric pressure, the same amount of force is acting on both the beaker and the cells in it. That allows us to assume that the **pressure potential (Ψ_p) of any open system is Zero**. Knowing the solute potential of the solution (Ψ_s) and knowing the pressure potential of the solution is zero ($\Psi_p = 0$) allows you to calculate the water potential of the solution. The water potential will be equal to the solute potential of the solution.

$$\Psi = \Psi_p + \Psi_s$$

$$\Psi = 0 + \Psi_s$$

$$\Psi = \Psi_s$$

The water potential of the solution at equilibrium will be equal to the water potential of the potato cells. What is the water potential of the potato cells? Show your calculations here.

- Water potential values are useful because they allow us to predict the direction of the flow of water. Suppose that a student calculates the water potential of a solution inside a bag is -6.25 bar and the water potential of a solution surround the bag is -3.25 bar. In which direction will the water flow?.....Water will flow into the bag. This occurs because there are more solute molecules inside the bag (therefore a value further away from zero) than outside the solution.

Ap Biology Lab Answers

Tao Wei



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America's Lab Report National Research Council, Division of Behavioral and Social Sciences and Education, Center for Education, Board on Science Education, Committee on High School Laboratories: Role and Vision, 2006-01-20 Laboratory experiences as a part of most U S high school science curricula have been taken for granted for decades but they have rarely been carefully examined What do they contribute to science learning What can they contribute to science learning What is the current status of labs in our nation s high schools as a context for learning science This book looks at a range of questions about how laboratory experiences fit into U S high schools What is effective laboratory teaching What does research tell us about learning in high school science labs How should student learning in laboratory experiences be assessed Do all student have access to laboratory experiences What changes need to be made to improve laboratory experiences for high school students How can school organization contribute to effective laboratory teaching With increased attention to the U S education system and student outcomes no part of the high school curriculum should escape scrutiny This timely book investigates factors that influence a high school laboratory experience looking closely at what currently takes place and what the goals of those experiences are and should be Science educators school administrators policy makers and parents will all benefit from a better understanding of the need for laboratory experiences to be an integral part of the science curriculum and how that can be accomplished

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