Post-Lab Questions:

Using the formula below, calculate the solute potential and water potential for each of the lab set ups.
*Remember **ESA**!*

Water Potential: $\Psi = \Psi_P + \Psi_S$
Solute Potential : $\psi s = -iCRT$

i = Ionization constant
C = Molar concentration
R = Pressure Constant (R = 0.0831 liter bars/mole °K)
T = Temperature (°K) (273 + °C of solution)

1. Calculate the solute potential **and** water potential of a 0.0 M sugar solution at 22 °C.

$\psi_s = -iCRT$

$\psi_s = -1(0.0 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(273K + 22)$
$\psi_s = -1(0.0 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -1(0.0 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = 0$
$\psi_s = 0 \text{ bars}$

$\Psi = \Psi_p + \Psi_s$
$\psi = 0 + (0)$
$\psi = 0 \text{ bars}$

The water potential will be equal to the solute potential of a solution in an open container because the pressure potentila of the solution in an open container in ZERO.

3. Calculate the solute potential **and** water potential of a 0.6 M sugar solution at 22 °C.

$\psi_s = -iCRT$

$\psi_s = -1(0.6 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(273K + 22)$
$\psi_s = -1(0.6 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -1(0.6 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -14.7$
$\psi_s = -15 \text{ bars}$

$\Psi = \Psi_p + \Psi_s$
$\psi = 0 + (-15)$
$\psi = -15 \text{ bars}$

2. Calculate the solute potential **and** water potential of a 0.2 M sugar solution at 22 °C.

$\psi_s = -iCRT$

$\psi_s = -1(0.2 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(273K + 22)$
$\psi_s = -1(0.2 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -1(0.2 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -4.9029$
$\psi_s = -5 \text{ bars}$

$\Psi = \Psi_p + \Psi_s$
$\psi = 0 + (-5)$
$\psi = -5 \text{ bars}$

The water potential will be equal to the solute potential of a solution in an open container because the pressure potentila of the solution in an open container in ZERO.

4. Calculate the solute potential **and** water potential of a 0.8 M sugar solution at 22 °C.

$\psi_s = -iCRT$

$\psi_s = -1(0.8 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(273K + 22)$
$\psi_s = -1(0.8 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -1(0.8 \text{ mole/liter})(0.0831 \text{ liter bars / mole K})(295K)$
$\psi_s = -19.6116$
$\psi_s = -20 \text{ bars}$

$\Psi = \Psi_p + \Psi_s$
$\psi = 0 + (-20)$
$\psi = -20 \text{ bars}$