Diffusion and Osmosis Math Problems (images are NOT to scale)

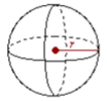**Review Lecture Question #'s 32-34 (especially #32)**

Use AP Biology Equations and Formulas

Show your work and box your answers! Round answers to the nearest tenth.
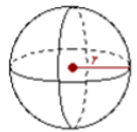
1) Calculate the surface to volume ratio of the sphere to the right (r = 2mm). Show your work!

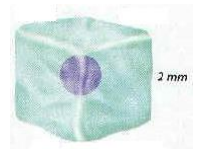2) Calculate the surface to volume ratio of the sphere to the right (r = 3mm). Show your work!

3) Calculate the surface to volume ratio of the sphere to the right (r = 4mm). Show your work!
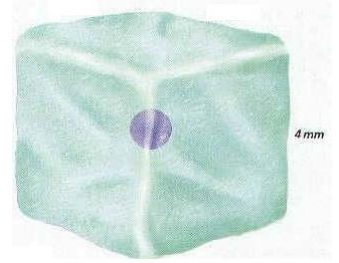
4) Calculate the surface to volume ratio of the cube to the right. Show your work!

1 mm

5) Calculate the surface to volume ratio of the cube to the right. Show your work!

2 mm

6) Calculate the surface to volume ratio of the cube to the right. Show your work!

4 mm

Review *Making Solutions* Assignment

Use units and show unit cancellations! Box answers. Round answers to the nearest tenth.

7) If you had 100mL of a 2.5M solution of sucrose, how many mL of a 1.0M solution of sucrose could you make?

Predicted answer:

Rationale for prediction:

8) If you had 5000mL of a 3.5M solution glucosamine, and you added distilled water until you had 8000mL of a glucosamine solution, what would the molarity of the new solution be?

Predicted answer:

Rationale for prediction:

9) How many mL of a 20% solution of NaCl do you need to make 150mL of a 15% solution of NaCl? Show your work and the equation!

Predicted answer:

Rationale for prediction:

10) If you made 200mL of a 5% solution of maltase from 150mL of maltase stock solution, what is the percent concentration of the stock solution?
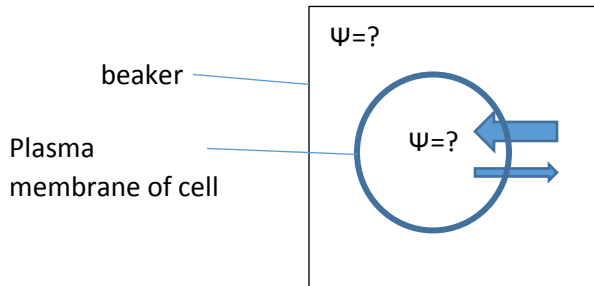
Predicted answer:

Rationale for prediction:

11) If you had 300mL of an 85% solution of phosphofructokinase, how many mL of a 60% solution of phosphofructokinase could you make?
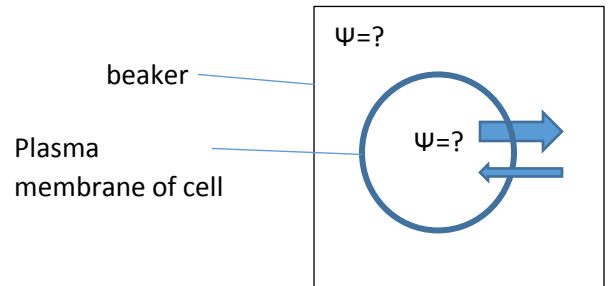
Predicted answer:

Rationale for prediction:

Review Lecture Question #45

Use the following as a guide for illustrating your answers

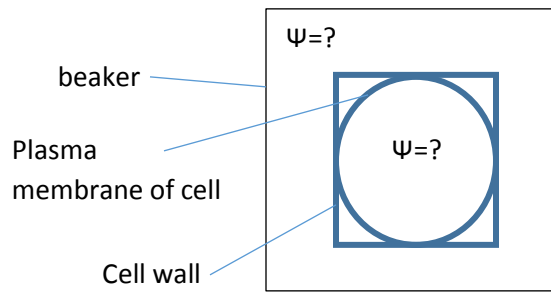Ψ=?

beaker

Plasma
membrane of cell

Ψ=?

Shows net
movement of water
into the cell

Ψ=?

beaker

Plasma
membrane of cell

Ψ=?

Shows net
movement of water
out of the cell

Ψ=?

beaker

Plasma
membrane of cell

Ψ=?
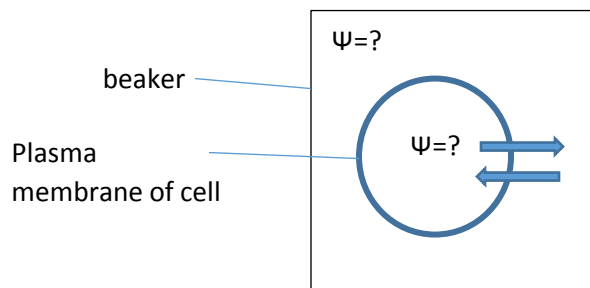
Shows no net
movement of water

Ψ=?

beaker

Plasma
membrane of cell

Ψ=?

Cell wall

Shows the plasma
membrane pressed
up against the cell
wall

Ψ=?

beaker

Plasma
membrane of cell

Ψ=
?
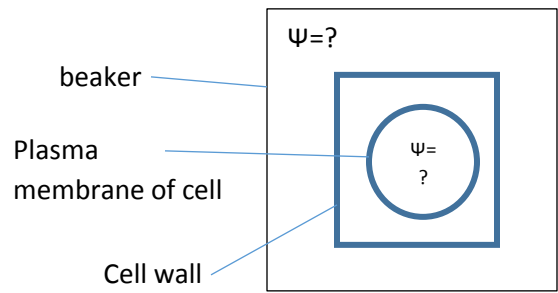
Cell wall

Shows plasmolysis
(the cell membrane
has shrunk away
from the cell wall)

Use units and show unit cancellations! Box answers. Round answers to the nearest tenth.

12) If a cell's Ψ_P = 3 bars and its Ψ_S = -4.5 bars, what is the resulting Ψ?

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

13) The cell from the last question is placed in a beaker of sugar water with Ψ_S = -4.0 bars. In which direction will the net flow of water be? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

14) The cell from the question above is placed in a beaker of sugar water with Ψ_S = -0.15 MPa (megapascals). We know that 1 MPa = 10 bars. In which direction will the net flow of water be? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

15) The value for Ψ in root cells was found to be -3.3 bars. If you take a root cell and place it in a 0.1 M solution of sucrose at 20°C in an open beaker, what is the Ψ of the solution, and in which direction would the net flow of water be? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

16) NaCl dissociates into 2 particles in water: Na⁺ and Cl⁻. If the solution in the question above contained 0.1M NaCl instead of 0.1M sucrose, what is the Ψ of the solution, and in which direction would the net flow of water be? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

17) A plant cell with a Ψ_s of -7.5 bars keeps a constant volume when immersed in an open-beaker solution that has a Ψ_s of -4.0 bars. What is the cell's Ψ_P? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

18) At 20°C, a cell containing 0.6M glucose is in equilibrium with its surrounding solution containing 0.5M glucose in an open container. What is the cell's Ψ_P? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential:

19) At 20°C, a cell with Ψ_P of 3.0 bars is in equilibrium with the surrounding 0.4M solution of sucrose in an open beaker. What is the molarity of the cell? **Illustrate your answer.**

Predicted answer:

Rationale for prediction:

Explain what happened in terms of water potential: