Worksheet - Osmosis & Tonicity

READ ME! In each diagram below, a “cell” with a semipermeable membrane has been placed in a beaker containing substances that are dissolved in water. The membrane is permeable to water & iodine. It is not permeable to glucose, sodium (Na$^+$), or starch. Please remember that iodine (Lugol’s solution) is an indicator for starch! Therefore, it will turn from yellow-brown to blue-black in the presence of starch. If not otherwise indicated, you may assume for each problem that the remainder of the solution is water.

**Beaker 1**
A. What is the % of water inside the cell? ________
B. What is the % of water outside the cell? ________
C. Will osmosis occur? ________
D. If so, in what direction will osmosis occur? ______________
E. Will glucose diffuse? ________
F. Will the cell shrink or swell? __________
G. How do you know? ________________________________________
H. This diagram shows the cell in a(n) (circle one) hypotonic / hypertonic / isotonic solution.

**Beaker 2**
A. What is the % of water inside the cell? ________
B. What is the % of water outside the cell? ________
C. Will osmosis occur? ________
D. If so, in what direction will osmosis occur? ______________
E. Will glucose diffuse? ________
F. Will the cell shrink or swell? __________
G. How do you know? ________________________________________
H. This diagram shows the cell in a(n) (circle one) hypotonic / hypertonic / isotonic solution.

**Beaker 3**
A. What is the % of water inside the cell? ________
B. What is the % of water outside the cell? ________
C. Will there be a net change in these concentrations? ________
D. Will osmosis occur? ______ Why?
E. Will starch diffuse? ________ Will glucose diffuse? ________
F. If iodine were placed in the beaker, what would you see immediately?
G. What would you see after several hours? Why?
H. This diagram shows the cell in a(n) (circle one) hypotonic / hypertonic / isotonic solution.
In the next beaker the cell is permeable to everything, except it is *impermeable* to starch.

**Beaker 4**

A. What substance(s) show *net* movement into the cell?

B. What substance(s) show *net* movement out of the cell?

C. Does the cell shrink or swell?

D. Benedict’s reagent tests for the presence of glucose. If this reagent was added to the water *in the beaker* after 2 hours, what would the result be? Why?

E. This diagram shows the cell in a(n) (circle one) hypotonic / hypertonic / isotonic solution.

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**Create your own Tonicity Problem!**

For your last problem, try writing your own! Set up a beaker labeled with what is both inside and outside of the cell. Specify (as I did in the directions) what is permeable and impermeable to the membrane. Then write three questions that someone in class can try tomorrow! (Be sure *you* know the answers!)

1. ___________________________________________________

2. ___________________________________________________

3. ___________________________________________________