**Hypotonic, Isotonic and Hypertonic solutions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Isotonic مساوي التوتر | outflow تدفق خارجي  | Pressure الضغط | Hypotonic نقص الضغط | Expand وسعت |
| Inflow تدفق داخلي  | Semipermeable شبه نفاذا | Shrivel ذبل.  | red blood cell خلية دم حمراء | Hypertonic مفرط التوتر |

We're going to assume that the cellular membrane, this phospholipid bilayer, is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, that it will allow water molecule to go from the inside to the outside, or from the outside to the inside. We're going to assume that it does not allow the passage of the solute particles, that's why it's semipermeable.

The first thing that you might observe is we have a lower concentration of solute on the outside than we have on the inside. The water molecules are less likely to be able to move in the right direction. They're being obstructed by these solute particles. Even though you're going to have water molecules going back and forth, you have a higher probability of more going in, than going out, so you're going to have a net \_\_\_\_\_\_\_\_\_\_\_\_ of H2O, of water molecules. We call this type of situation, this type of solution that the cell is immersed in, we call this a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution. The word hypo is a prefix that means less of something, so in this case, we have a lower concentration of solute in the solution than we have inside of the cell, you're going to have water molecules going from the outside to the inside. That's actually going to put \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the cell. The cell itself might \_\_\_\_\_\_\_\_\_, or it could even, if there's enough pressure, it might even explode.

Now, let's go to the next scenario. We have roughly equal concentrations of solute on the outside and on the inside. In this situation, the probability of a water molecule going from the outside to the inside, or from the inside to the outside, is going to be the same, so you're not going to have any net inflow or net \_\_\_\_\_\_\_\_\_\_\_\_\_. In this type of solution, where you have the same concentration of solute in the solution, as you do inside the cell, we would call this an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution. The prefix, iso, refers to things that are the same. It has the same concentration of solute, and so you have no net inflow.

In this last scenario, I have a higher concentration of solute on the outside than I have on the inside. I have more of something in the solution, so I would use the prefix hyper. I have more of it, more, hypertonic. This is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solution. Once again, the solute can't go across the membrane, but the water molecules can, and you're going to have water molecules going from the outside to the inside, and from the inside to the outside, but in this situation, you're going to have the water escape the cell, and the cell actually might shrivel up. Since it's going to lose that pressure from the water, the cell itself might \_\_\_\_\_\_\_\_\_\_\_\_ up in some way.

If you were to put a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into a hypotonic solution, the water's going to rush into it, and it's going to blow up. an isotonic solution is going to look the way that we're used to seeing a red blood cell, Then, in the hypertonic solution, the water's going to escape the red blood cell, then you would actually see it kind of shrivel up, this because we have a net outflow of water molecules.