Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gummy Bears, Raisins and Osmosis**

**1. Background:** Yesterday, we set up our gummy bear lab. One gummy was kept dry. A second was placed in water. We did the same with raisins.

**2. Collecting Data**

**A. Visual Observations**: (Note: you’ll have to observe another group’s bear to see all three treatments). How do the gummy bears and raisins look different?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**B. Numerical Data. Carefully pour off all water before weighing. Zero the scale each time.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** |
| **Note: you’ll have to work with another group to get one data point below** | **Individual data** **(mass in grams)** | **Total class data for gummies** **(mass in grams)** | **# of gummies** | **Average class data** **(Total mass/# gummies )** |
| **Dry Gummy Bear** |  |  |  |  |
| **Gummy Bear in tap water** |  |  |  |  |
| **DRY RAISIN** |  |  |  |  |
| **RAISIN IN TAP WATER** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Graph: Class data for our gummy bear lab***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MASS (grams)** |  | **Gummy Bear** |  | **RAISIN** |
|  |  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  | **DRY** | **Tap****water** | **DRY** | **TAP** |

 |

|  |
| --- |
| **C. Using the concept of *diffusion*, can you explain what happened?**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

 |

**3. Osmosis**

|  |  |
| --- | --- |
| **A. What is osmosis?** | The diffusion of water. |
| **B. How does water diffuse?** | * Water diffuses just like everything else, from more concentrated (more H2O molecules) to less concentrated (fewer H2O molecules).
 |
| **C. Review: Solutions, solvents, and solutes** | * In a solution, the liquid that does the dissolving is the *solvent*.
* The most common solvent on earth is water
* The thing that gets dissolved is the *solute*.
 |

**4. Checking Understanding**: a) If you mix up some powdered lemonade, the water is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the lemonade mix is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. In a cola drink, the sugar is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the water is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

b) All molecules diffuse from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ concentration to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ concentration.

***KEY POINT:* Understanding osmosis is always about *comparing* two solutions separated by a membrane.**

**5. Important terms: Hypertonic & Hypotonic**

|  |  |
| --- | --- |
| **A. What is a hypertonic solution?** | * A solution that has a **higher** concentration of solute than the solution on the other side of the membrane.
* Think: *less water, more solute.*
 |
| **B. What is a hypotonic solution?** | * A solution that has a **lower** concentration of solute than the solution on the other side of the membrane.
* Think: *more water, less solute.*
 |

**6. Practice. In all problems, *the two solutions have the same volume.*** Use *hypertonic* or *hypotonic* as your answers.

1. Solution A has 10 drops of food coloring. Solution B is pure water. Solution A is \_\_\_\_\_\_\_\_\_\_\_\_ to solution B. Solution B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to solution A.
2. Solution X has 3 drops of ink. Solution Y has 8 drops of ink. Solution X is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to solution Y. Solution Y is \_\_\_\_\_\_\_\_\_\_\_\_ to solution X.
3. I’ve made a solution with sugar dissolved in water. If I want to make the solution more hypotonic, I add more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If I want to make the solution more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, I add more sugar.
4. Solution K is 90% water, 10% solute. Solution L is 100% water. Solution K is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to solution L. Solution L is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to solution K.

**7. Back to our gummy bears**

1. When we put our gummy bears into water, the gummy bear was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the water outside of it.
2. You can also say, the water was *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* to the gummy bear.
3. Because of that, the water flowed from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, causing it to expand and gain mass.
4. A raisin placed in a cup of water will…. Because

**8.** Use the terms **hypotonic** and **hypertonic** to describe what’s happening in side A and side B. The dots represent SOLUTE.

|  |  |
| --- | --- |
| **hypo-hypertonic**CELL BCELL A | 1. Cell A is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the surrounding solution.
2. The solution outside CELL A is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the solution inside the cell.
3. As a result, water will flow.\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CELL A.
4. Cell B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the surrounding solution.
5. The solution outside CELL B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the solution inside the cell.
6. As a result, water will flow \_\_\_\_\_\_\_\_\_\_\_ CELL B.
 |

9. The most important idea: Water always flows from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**10. More Checking understanding:**

1. The diffusion of water is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The side of a membrane where the solution is more concentrated is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side.
3. The side of a membrane where the solution is less concentrated is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side.

**11. Reinforcement: In terms of osmosis, how does water flow across membranes? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**12. PULLING IT ALL TOGETHER:** What happened in our gummy bear lab? Explain a) how we set up the lab, b) the change in mass in the gummy bears, and 3) why this occurred. Use the terms *hypotonic* and/or *hypertonic* in your response.

|  |  |
| --- | --- |
| **Language frames.** | **Your response** |
| * We set up the lab as follows:
* we observed that
* This occurred because…
* Consequently
* As a result…
 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**13. Isotonic Solutions**

|  |  |
| --- | --- |
| **What is an isotonic solution?** | * A solution that has the same concentration of solute as the solution on the other side of the membrane.
* Think: equal concentration of water on both sides
* Result: no *overall* movement of solute or solvent (though molecules are moving back and forth)
 |

**14. More Checking Understanding**

1. Osmosis is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of water.

2. Two solutions are separated by a membrane. The side that has more solute dissolved in it is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side.

3. Solution A is 94 % water, 6% solutes. Solution B is 80% water, 20% solutions. Solution A is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to solution B.

4. If two solutions are both 45% water, we’d say that they were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to one another.

15. ***Use arrows*** to show the direction of water movement into or out of each cell (which is 98% water). The % of water outside the cell is listed below the cell. Examine each diagram, and then complete the table.

|  |  |  |
| --- | --- | --- |
| cell8 | cell9 | cell10 |
| The cell is \_\_\_\_\_\_\_\_\_\_\_\_\_ to its environment. | The cell is \_\_\_\_\_\_\_\_\_\_\_\_\_ to its environment. | The cell is \_\_\_\_\_\_\_\_\_\_\_\_\_ to its environment. |
| The outside solution is \_\_\_\_\_\_\_\_\_\_\_\_\_ to the cell. | The outside solution is \_\_\_\_\_\_\_\_\_\_\_\_\_ to the cell. | The outside solution is \_\_\_\_\_\_\_\_\_\_\_\_\_ to the cell. |
| Water will flow \_\_\_\_\_\_\_\_\_\_\_ the cell. | Water will flow \_\_\_\_\_\_ and \_\_\_\_\_\_ the cell and its environment at the \_\_\_\_\_\_\_\_\_\_ rate.  | Water will flow \_\_\_\_\_\_\_\_\_ the cell. |

**16. More applications**

A. A red blood cell is placed in a solution. The first picture shows the cell expanding. The second shows it remaining the same. The third shows it shriveling up. Was the solution isotonic, hypotonic, or hypertonic?

|  |  |  |
| --- | --- | --- |
|  |  |  |
| ***\_\_\_\_\_\_\_\_\_\_\_solution*** | ***\_\_\_\_\_\_\_\_\_\_\_solution*** | ***\_\_\_\_\_\_\_\_\_\_\_solution*** |
| *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water is flowing…*  | *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water water is flowing…*  | *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water water is flowing…*  |

B. A plant cell, with a cell wall, is placed in a solution. The first picture shows the cell expanding. The second shows it remaining the same. The third shows it shriveling up. Was the solution isotonic, hypotonic, or hypertonic?

|  |  |  |
| --- | --- | --- |
|  |  |  |
| ***\_\_\_\_\_\_\_\_\_\_\_solution*** | ***\_\_\_\_\_\_\_\_\_\_\_solution*** | ***\_\_\_\_\_\_\_\_\_\_\_solution*** |
| *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water water is flowing…*  | *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water water is flowing…*  | *The cell must have been \_\_\_\_\_\_\_\_\_\_\_\_ to its environment because water is flowing…*  |

C. Think about it: Why didn’t the plant cell burst?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**17. Yet more checking for understanding**

**a. isotonic b. hypertonic c. hypotonic**

|  |
| --- |
| 1. \_\_\_\_\_ Solution with a lower solute concentration than the one on the other side of the membrane.
 |
| 1. \_\_\_\_\_ Solution in which the solute concentration is the same as the other side of the membrane
 |
| 1. \_\_\_\_\_ Condition plant cells require so that they don’t wilt.
 |
| 1. \_\_\_\_\_ Condition that animal cells require so that they don’t shrink or burst.
 |
| 1. \_\_\_\_\_ This solution will cause red blood cells to burst
 |
| 1. \_\_\_\_\_ In this solution, a plant cell wilts as it loses water..
 |
| 1. \_\_\_\_\_ A solution with a higher solute concentration than the one on the other side of the membrane.
 |
| 1. \_\_\_\_\_ A solution with a higher concentration of water than the one on the other side of the membrane.
 |
| 1. \_\_\_\_\_ A solution with a higher concentration of dissolved materials than the one on the other side of the membrane.
 |

**Osmosis! (Music Video)**

View it at www.sciencemusicvideos.com

Glenn Wolkenfeld © 2012

I put this yummy gummy through a science experiment,

That models what happens to a cell in an environment

That’s more watery than the cell is inside,

And what I saw came as no surprise,

My gummy expanded -- quintupled in weight,

My gummy expanded, an increase so great,

So listen up as Mr. W explains this!

It’s all about osmosis!

Osmosis is the diffusion of water,

Across a membrane or a water-permeable border.

Diffusing like all molecules in fluid situations,

From higher to lower concentration.

**CHORUS**

OSMOSIS!

H20 diffusing

OSMOSIS!

See that water oozing

Hypotonic to hypertonic flow

OSMOSIS!

Let’s go!

Let’s talk about our gummy, in osmotic terms,

Hypotonic, hypertonic, isotonic are the words

You can use to discuss water’s watery diffusion,

Learn ‘em well, to avoid confusion.

*Hypotonic* means higher water concentration

And relatively lower solute concentration,

*Hypertonic* is the opposite --percent of water’s less,

With more solute dissolved inside, as you might guess

So let’s take these terms and apply them to our gummy bear,

I’m looking at the package, and seeing what it says here,

Each bear is mostly sugar with some other stuff mixed in,

And holding it together is the protein gelatin

So when you put a gummy in a cup of H2O

It’s readily apparent that the gummy is so

Hypertonic to the water that it’s in,

and the water’s hypotonic to our little gummy friend,

And so through osmosis the water will diffuse,

Into the gummy which soon will look so huge,

The mass it gains is water which will infiltrate the gummy,

Which one day later, is looking pretty funny

**CHORUS**

Next I took this freshwater plant, name is elodea

It lives in lake and ponds never in the salty sea,

In fresh water elodea cells are full and firm,

It’s all about osmosis as we’re gonna confirm.

See the cells are hypertonic to their watery exterior,

So water will diffuse into the cell’s interior,

Expanding the membrane, pushing it against the wall,

In fact you can’t see the membrane at all,

But add some salty water so the outside’s hypertonic,

And water leaves the hypotonic cells, it’s so osmotic!

Membrane leaves the wall, the cells’ insides are scrunched.

With the chloroplasts all stuck together in a bunch

That’s why at the grocery they always have that mister

The water on the veggies helps to keep them crisper,

Those droplets on the veggies are a hypotonic brew,

osmosis moves the water in, the veggies look brand new.

Dried fruit and beef jerky preservation is osmotic

Their low water content makes the dry food hypertonic

So any germs or molds that fall upon them lose their water

And die and don’t contaminate the dried food in the larder

**CHORUS**

Animal cells, in situation hypertonic

Lose their water, shrink and shrivel look so sick

But an animal cell in hypotonic abode

Gains water and expands, eventually explodes

‘Cause animals cells lack a wall, of course

So nothing pushes back at the osmotic force,

Water flows from hypotonic to the hypertonic cell,

Which bursts cause the membrane can’t stop the swell,

If you want to keep a frog heart outside a body beating,

An isotonic fluid, is what you’ll be needing,

Water concentration’s same on each side of the cell,

No gain or loss of water, the cell’s feel so swell

And this paramecium which lives in ponds and lakes

Constantly fights osmotic water uptake,

The contractile vacuole’s a pumping adaptation

To deal with this osmotic situation

TEACHER’S GUIDE

1) Set up

a) Get a class set of beakers or cups.

b) Make a solution of 10% sucrose

c) Have water available.

2) The day before the analysis, each lab group does the following

a) In the first cup, one gummy bear gets taped to the outside the cup. The cup is filled with water. The second gummy bear gets placed in the water.

b) In the second cup, A gummy bear gets taped to the outside of the cup. The cup is filled with 10% sucrose solution. Another gummy bear is placed inside the 10% sucrose.

c) Let these sit overnight.

3) The gummy bear in water will gain a huge amount of mass and volume. I have the students weigh individually, and then we record the total mass of all the gummies (dry, in water, in 10% sucrose) and average them. That’s what we graph.

4) For the underlying science, it’s all explained in my Osmosis Music Video: [www.sciencemusicvideos.com/osmosis](http://www.sciencemusicvideos.com/osmosis).

4)Target language performance for 1# 10

What happened in our gummy bear lab? Explain a) how we set up the lab, b) the change in mass in the gummy bears, and 3) explain why this occurred. Use the terms *hypotonic* and/or *hypertonic* in your response.

In our gummy bear lab, we placed gummy bears in two solutions. One was pure water, and one was 10% sucrose. After 24 hours, **we observed that** the gummy bear in pure water gained the most mass. The gummy bear in 10% sucrose gained less mass, and the dry gummy bear stayed the same.

Why did this happen? The gummy bear in pure water was in an extremely hypotonic environment. **Consequently**, water flowed from the hypotonic water to the hypertonic gummy bear, **causing it to** gain mass as it took up water. The 10% sucrose solution was also hypotonic to the gummy bear, but less so. **As a result**, less water flowed into the gummy bear, and it gained less mass.