

## Cell Biology – Module 2

### Osmosis – Hypotonic, Isotonic and Hypertonic solutions

Before completing this worksheet, watch the following clips for background information.

<https://www.youtube.com/watch?v=rMa9MzP19zI>

Hypertonic, Hypotonic and Isotonic solutions by BOGOBiology.

<https://www.youtube.com/watch?v=zuNMVzTeCtw>

Diffusion and Osmosis by Science Sauce.

*Activity 1 – Use the word bank to complete the cloze exercise*

Osmosis is defined as the movement of \_\_\_\_\_ across a semi-permeable membrane (like a cell membrane). Like all forms of diffusion, osmosis follows a concentration gradient, where water will move from \_\_\_\_\_ of fairly high water content (eg pure water) to areas of fairly low water content (eg concentrated solutions).

Cells contain solutions of \_\_\_\_\_ substances. If a cell were to be placed into pure water, the water would move across the membrane \_\_\_\_\_ the cell. This influx of water would eventually cause the cell to \_\_\_\_\_ - a process called lysis. In this case: the water is said to be hypotonic.

If a cell was placed in a concentrated solution of salt or sugar, the relative levels of water would be higher inside the cell than out, and water would leave \_\_\_\_\_ cell, causing it to shrivel. Salt and sugar can cross the cell membrane, but they need to do this via specialized channels and therefore their movement is \_\_\_\_\_ than that of water which diffuses quickly across the membrane. In this case: the solution is said to be \_\_\_\_\_.

An isotonic solution ("iso" = the same) is one which has the same levels of solutes as the inside of the cell. Cells placed in isotonic solutions do not lyse or \_\_\_\_\_. For this reason, isotonic solutions are used to manipulate and wash cells.

#### Word Bank

Dissolved, slower, areas, shrivel, the, water, burst, hypertonic, into

*Activity 2*

Construct a labelled diagram to express what happens when a cell undergoes lysis.

The following investigation uses mammalian cells grown in culture. In the previous module, you learnt about the origin of HeLa cells. SPARQ-ed teachers prepare the HeLa cells by growing them in media in a 6 well plate. Each well in the plate can be used as a separate test chamber. HeLa cells stick to the walls of the chamber, allowing the removal of the growth medium. We can then add other solutions and observe how the cells react under the microscope.



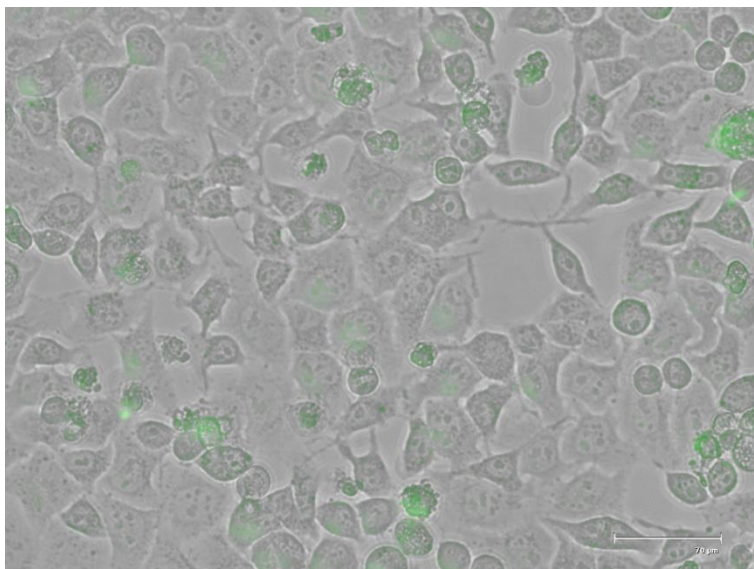
SPARQ-ed teachers prepared a 15g/L stock solution of sodium chloride (salt). The stock solution needs to be diluted to provide a range of solutions to test.

### Activity 3

Calculate the volumes of stock solution and water to make each solution. 0g/L and 15g/L are done as an example for you.

Concentration	0g/L	3g/L	6g/L	9g/L	12g/L	15g/L
Dilution from 15g/L	0 in 15					15 in 15
Volume of stock solution needed	0mL					15mL
Volume of water needed	15mL					0mL
Total Volume	15mL					15mL

Before the experiment took place. The cells, in their pink growing medium, were placed on the Floid Microscope and observed.



### Activity 4

Predict what will happen to the cells at 3 different salt concentrations (eg 0g/L, 9g/L and 15g/L)

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**Cognitive Verbs and Sentence starters**

Cognitive Verb	QCAA Definition	Sentence Starters
<b>Use</b>	operate or put into effect; apply knowledge or rules to put theory into practice	n/a
<b>Construct</b>	create or put together (e.g. an argument) by arranging ideas or items; display information in a diagrammatic or logical form; make; build	n/a
<b>Calculate</b>	determine or find (e.g. a number, answer) by using mathematical processes; obtain a numerical answer showing the relevant stages in the working; ascertain/determine from given facts, figures or information	n/a
<b>Predict</b>	give an expected result of an upcoming action or event; suggest what may happen based on available information	It is expected that.....