Title: Osmosis

Topics: Osmosis, molarities, data gathering and graphical representation.	**Time**: 120minutes	**Age**: 14 - 16

Differentiation:	**Guidelines, ICT support etc.:**
Differing levels of assistance are available as are different tasks.	There are no specific IT or software requirements for this activity.

Equipment needed for this activity:	**Learning outcomes for this activity:**
Stock 2 M Sucrose solution Burette Distilled water Digital Balance Potato with corer and sharp knife Absorbent tissue Stop Clock <u>Health and Safety:</u> Goggles and care must be taken with the knife.	Students will create different molarities of a sucrose solution from a stock 2 molar solution supplied. Pupils can unaided, record the start and final weight of their potato core for each of the solutions supplied. Pupils will also discuss the difficulties of achieving accurate measurements. Pupils may unaided be able to construct an appropriate graph to allow them to establish the molarities for which there is no net movement of water into or out of the potato.

Lesson description

Starter Activity (30 minutes)

Pupils should be familiar with the concept of a Mole and Molarity and also the definition of Osmosis.

Pupils begin by taking the stock solution and diluting it to produce the different molarities of sucrose solution needed.

To use the burette with precision the meniscus should be discussed and pupils should be required to describe what they will do before they start to produce the different molarities.

Pupils should also discuss the necessity of ensuring the potato discs produced are as uniform as possible this is important in respect of mass and surface area.

Main Activity (70 minutes)

At the start of this section, a piece of potato should be massed and then placed within a bath a distilled water, after the various explanations below are discussed the potato is taken out and massed again showing a rise in mass.

1: Work sheets are provided

2: Pupils begin by noting the action of water in a semi permeable membrane and the effects of Osmosis.

3: Asking them to consider what happens if we stay in the bath too long or the possible effects of staying too long in the sea.

4: The pupils should also be given the opportunity to explain what would lie behind no gain or loss in mass during this experiment.

5: Pupils then plan and carry out the experiment with the different molarities of sucrose solution they have produced, a stock of pre prepared solutions should be kept on hand as a control.

6: Pupils record their results as they proceed. The teacher should circulate throughout this element of the lesson checking on the pupil's activities and their understanding of what they are observing.

7: Results should be plotted on a large sheet of graph paper.

8: More able pupils should be able to design a graph themselves the majority of pupils may need help with this.

Plenary Activity (20 minutes)

Pupils are asked to report on their experiment and the class results are analysed. Any anomalous results should be examined and if possible explained.

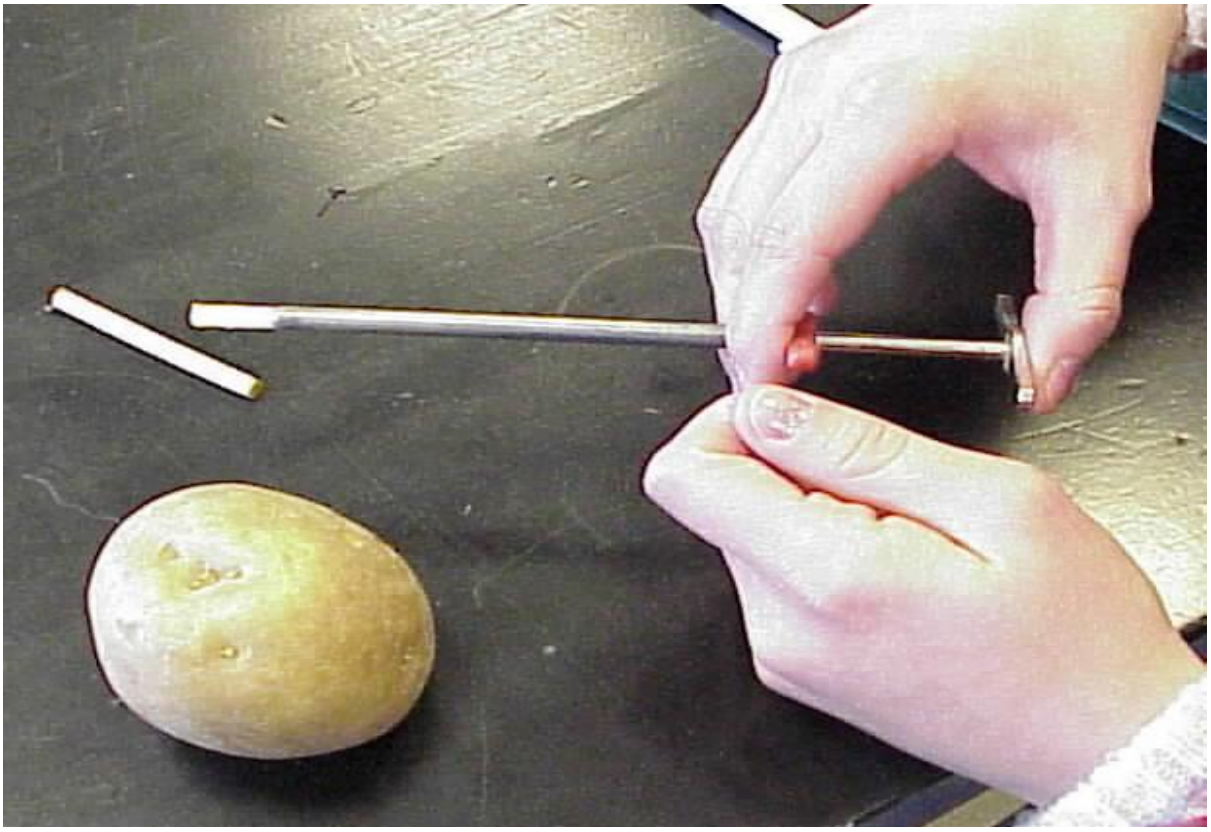
Questions about the relative shapes of the graphs should be explored. The abstract concept of Osmosis is again revisited and pupils should be encouraged to use this concept when explaining their results.

Finally pupils should be asked to consider the possible effects of changing the age of the potato or breed. What would the possible results indicate?

Osmosis

Step 1

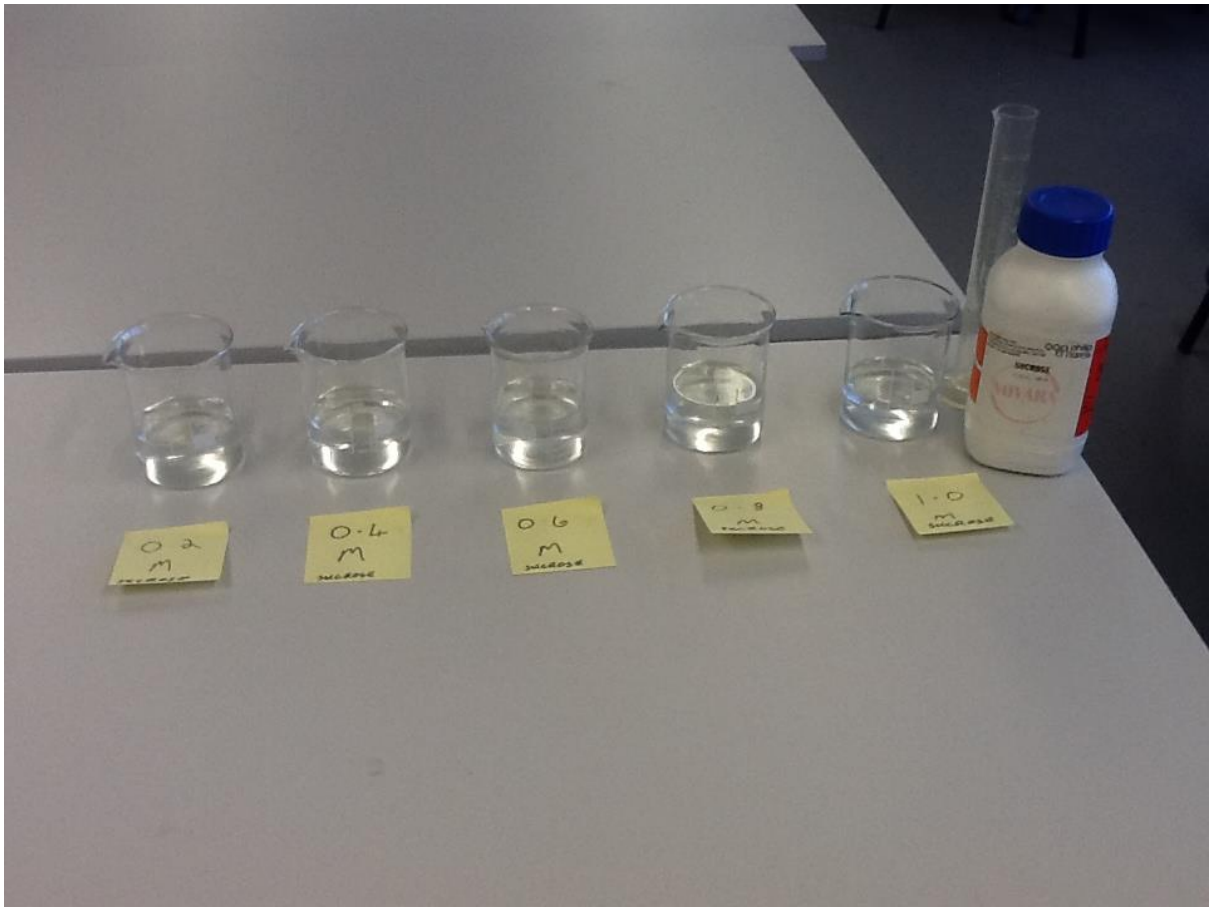
Take your potato and use the corer to take samples.



Take the core produced and cut it into tubes of potato of uniform lengths.

Step 2

Follow your standard procedures to make sucrose solutions of different concentrations.



When you have all your concentrations prepared it's time for step 3.

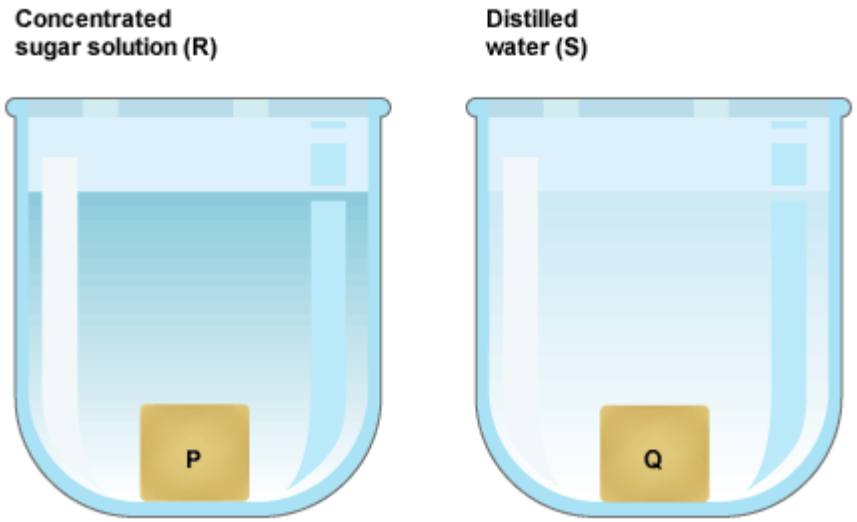
Step 3

You need to know the mass of your potato cores. Use the digital balance to take their mass.

Record the results in your table. Remember you will need both their start and end masses

Step 4

Now place each potato tube into a solution for 10 minutes.



After 10 minutes you must remove them and dry them carefully.

Then you need to mass them again using the digital scales.

You have now finished gathering evidence it's time to start analysing the results.

Osmosis help sheet

Preparing your potato

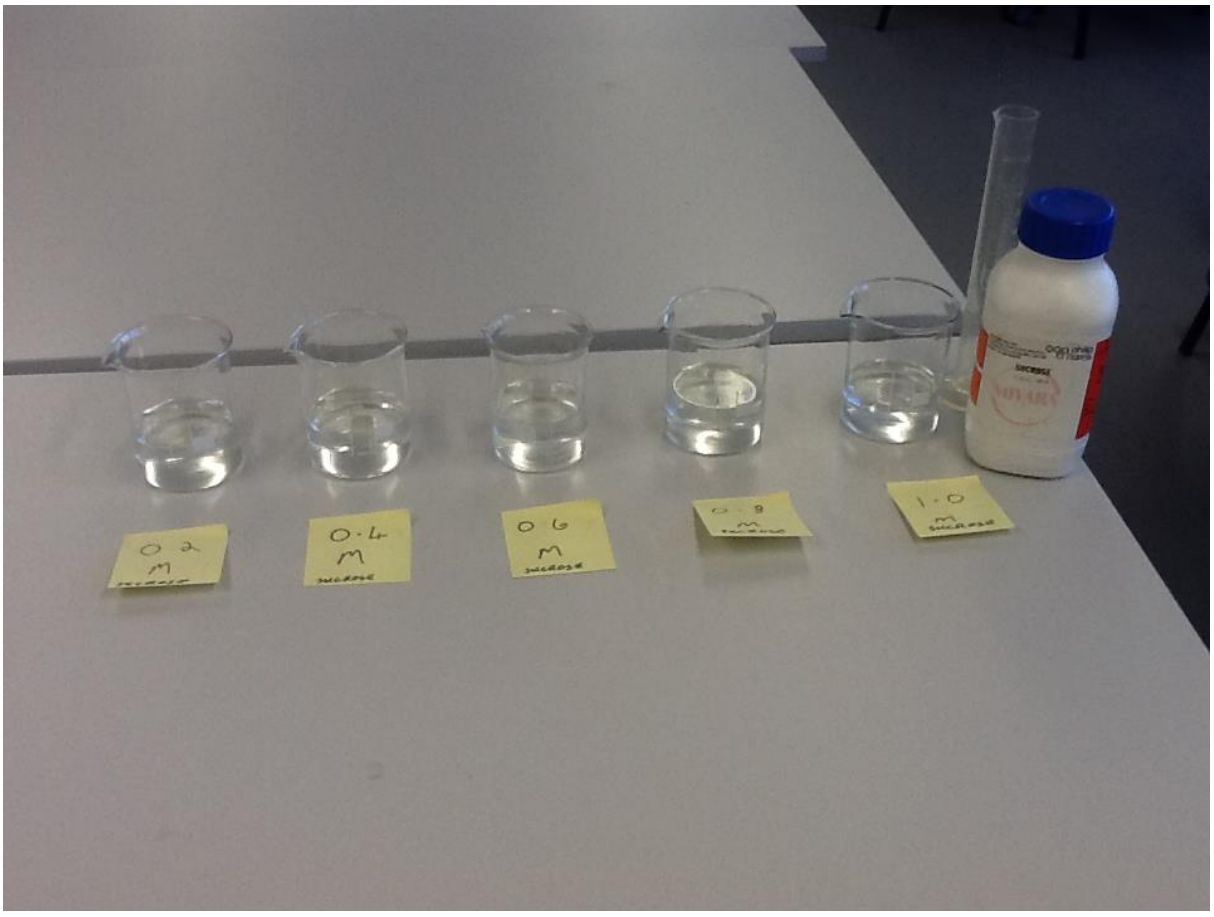
Using your corer, carefully remove a series of potato tubes.

Use a ruler to produce discs of potato which are a uniform circumference and depth.

Preparing your solutions

	50 ml of 2 M Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution	xxxxx of xxxxx Sucrose solution
Plus Distilled water	50 ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water	ml of distilled water
Gives	100 ml of 1 M of Sucrose Solution	100 ml of 1.7 M of Sucrose Solution	100 ml of 1.5 M of Sucrose Solution	100 ml of 1.2 M of Sucrose Solution	100 ml of 0.9 M of Sucrose Solution	100 ml of 0.7 M of Sucrose Solution	100 ml of 0.5 M of Sucrose Solution	100 ml of 0.2 M of Sucrose Solution	100 ml of 0 M of Sucrose Solution

Have your concentrations ready



Osmosis

What are you investigating? (Give a description in your own words)

List your equipment here

1	
2	

3	
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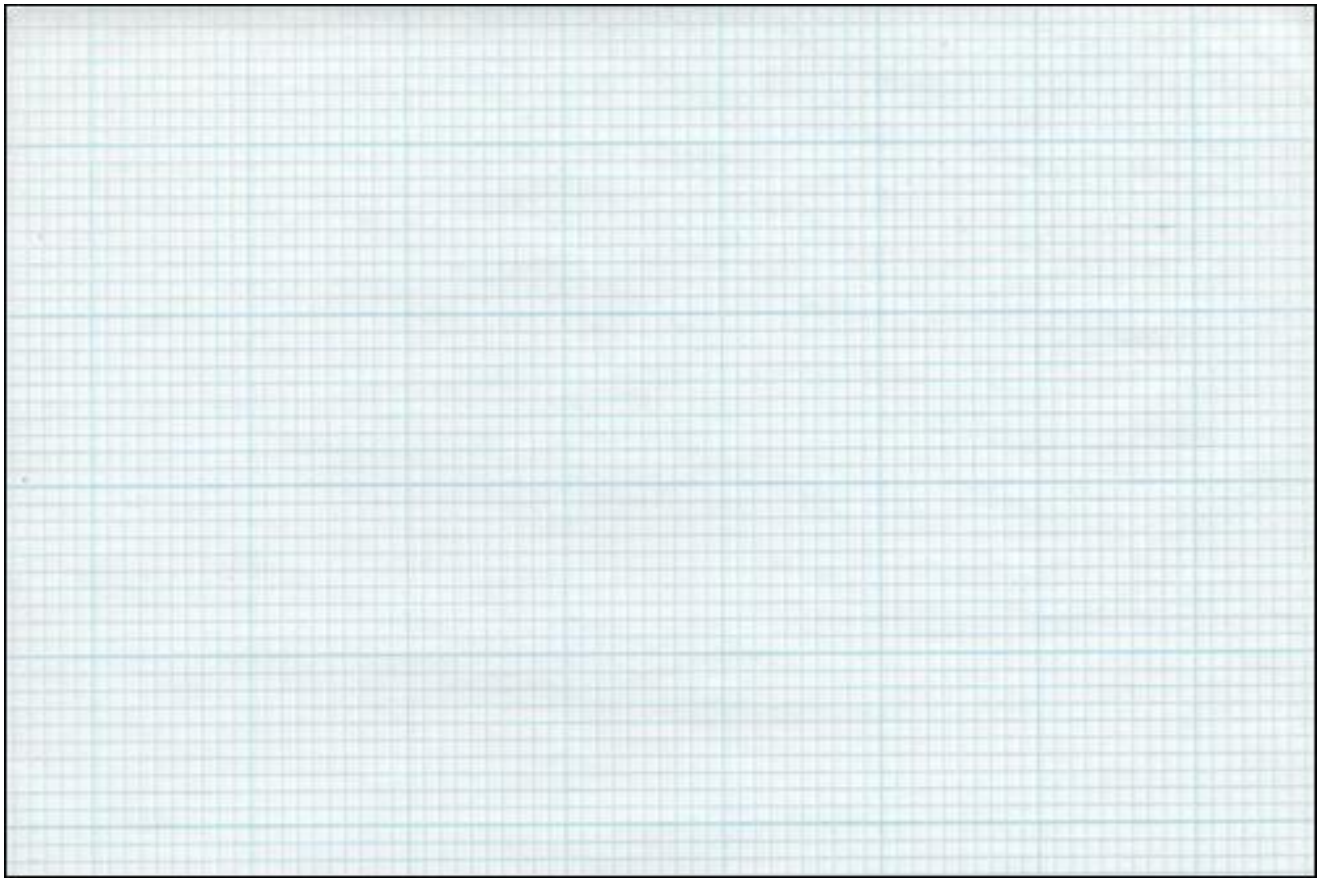
12	

Plan (use bullet points to explain what you are going to do during this experiment)

Results

Molarity	0.0 M	0.2 M	0.5 M	0.7 M	0.9 M	1.0 M	1.2 M	1.5 M	1.7 M	2.0 M
Start Mass										
End Mass										
Change in Mass										
% change in mass										

Graph



Conclusion (What have you found out, refer to your results here)

Evaluation (What could be improved in this experiment, make sure you explain how it would improve the results)