Investigating osmosis in chickens’ eggs

The purpose of this activity is:

* to observe the effect of different concentrations of sodium chloride on a de-shelled chicken’s egg
* to explain the effects in terms of osmosis.

### Procedure

SAFETY:

Wear eye protection in case any of the sodium chloride solution gets in your eyes.

### Investigation

1. Ensure the egg is dry by gently patting it with a paper towel.
2. Place the egg on a balance and record the mass in a suitable table.
3. Put the egg in a 200 cm3 beaker.
4. Pour in enough sodium chloride solution to cover the egg. Record the concentration of sodium chloride you have used.
5. Leave the egg until next lesson – at least 24 hours.
6. Pour the sodium chloride solution off the egg.
7. Dry the egg carefully using a paper towel.
8. Place the egg on the balance and record the mass in the table.
9. Calculate change in mass and percentage change in mass.
10. Compare the results for the different concentrations of sodium chloride.

**QUESTIONS**

1. Why was the shell of the egg removed?
2. Why did you dry the eggs with a paper towel before weighing them?
3. Why is it a good idea to compare the percentage change in the mass of each egg, rather than the simple change in mass?
4. What happened to the egg placed in the 20% sodium chloride solution?
5. Explain why the mass of the egg changed in this way.
6. What happened to the egg in distilled water or 0% salt solution?
7. Explain why the mass of the egg changed in this way.
8. What do you think about eggs like this as a model for showing osmosis in animal cells?
9. Are there any problems with this as a model for animal cells?

**ANSWERS**

1. The shell of the egg is removed to reveal the egg membrane. The shell is rigid and will not change in shape or size. Without the shell the membrane can expand or contract.
2. You dry the eggs with a paper towel to make sure that the change in mass is due to the fluid inside the egg membrane, not to drops of water on the outside.
3. Comparing the percentage change in mass takes account of differences in the size of the eggs. A small egg could increase by a smaller amount than a large egg, but it could be a larger percentage increase.
4. The egg in 20% sodium chloride has lost mass.
5. This is because the concentration of solutes inside the egg membrane is less than 20% sodium chloride, so water has diffused out through the selectively permeable egg membrane. This is osmosis.
6. The egg in 0% sodium chloride has gained mass.
7. This is because the concentration of solutes inside the egg membrane is more than that of 0% sodium chloride, so water has diffused in through the selectively permeable egg membrane. This is osmosis.
8. These eggs are a nice big, easy to handle example of animal tissue which makes it easy to see what is going on.
9. A chicken’s egg is not a single cell, and the egg membrane is a different structure from a cell membrane although it shares some of its properties.