

Lab 1 - Model Cell 1



(adapted with permission from R. Griffin, City College of San Francisco)

A. Objectives

Become familiar with

1. Certain properties of non-living membranes which are shared with the membranes of living organisms;
2. The actual practice in strong inference and in deductive reasoning.

B. Before coming to lab

1. Read this exercise;
2. Draw a protocol for the initial experiment with the model cell (including how to make the model cell). Refer to Appendix B, Figure 2 for a sample protocol.

C. Procedure during lab

3. Work in groups of two. Construct the model cell (see Note 1) and place it in a clean beaker. Add just enough water to cover the cell completely. Then add 10 drops of Lugol's iodine solution and swirl gently to mix. Observe for 20 minutes, recording all visible changes.
4. Formulate multiple working hypotheses for the possible cause or causes of the color change observed (we do not have time to investigate other changes you might have observed). Number your hypotheses and write them in your notebook. Be exhaustive in formulating hypotheses so that you identify every possible cause. Remember, though, that a hypothesis is worthless if it can't be tested by experiment.
5. For each hypothesis, design a simple experiment that will test it, using the strong inference criterion (the hypothesis must provide the possibility of disproving it). Construct a table in your laboratory notebook like the one in Note 2 to record your tests, predictions, and results.
6. Perform your experiments, record the observed results and conclusions.
7. **Clean-up and waste disposal.** Clean up your glassware; that means that you need to remove all labels, rinse out all solutions, remove all solid materials, brush out all residues stuck to the glass. Empty the cell's content in the container provided. Throw membrane and strings in the wastebasket.

D. Materials available for testing

Material	
Dialysis tubing, string 0.3% starch suspension 10% glucose solution	To build the model cell.
Lugol's Iodine a solution of 5% I ₂ in 20% KI. Corrosive. Remove stains with paste available.	Elemental I is only very slightly soluble in water, but it dissolves readily in KI by formation of the tri-iodide ion, I ₃ ⁻¹ . Your initial observations of this experiment should lead you to a hypothesis of what Lugol's reacts with.
Sodium tri-iodide, Sodium iodide, I ₂ Potassium iodide, Sodium chloride, Potassium chloride	To isolate components of Lugol's iodine solution
Funnels, 70 mL, Test tubes w/ racks Graduate cylinders, 10 mL	

Note 1: Constructing the model cell

Obtain a piece of cellophane dialysis tubing about 12 cm long and tie one end. Fill it with 5 mL of 0.3% (w:v) starch suspension and 2 mL of 10% (w:v) glucose solution. The measurements don't need to be precise - one good dropperful approximates 0.5 mL. Now tie the second end of the tube securely shut, and rinse your model cell before placing it in the beaker.

Note 2: Constructing your hypotheses table

Use the following format for your tests of hypotheses for the causes of the color change

Hypothesis #	Test	Prediction	Result	Conclusion
1				
2				

Note that the conclusions will consist of a single word: either "supported", "rejected" or "inconclusive". If the conclusion for any test is inconclusive, then you must devise a new test. Also note that the prediction has to be congruous with the hypothesis.

E. After lab

After class discussion, discuss your experimental design with your team mates. How could you have streamlined your experiments? Saved time or materials? Which controls would have been useful – what would they have told you? Which variables had you overlooked?

Submit a one-page assessment of your experimental design and data collection at the beginning of the next lab period. Read Appendix C, Lab Reports, and write a title for a report on today's lab (just a title, not a report). Submit that too.

