BIOLOGY 1200

VANCOUVER COMMUNITY COLLEGE

Instructor: Maria Morlin

January 2021– hybrid course

Lab: Membranes: diffusion and osmosis lab

Outline

- Objectives
- Summary of demonstrations
- Student submissions of cellfies
- Some terms to review in the manual
- Data analysis: plant osmolarity

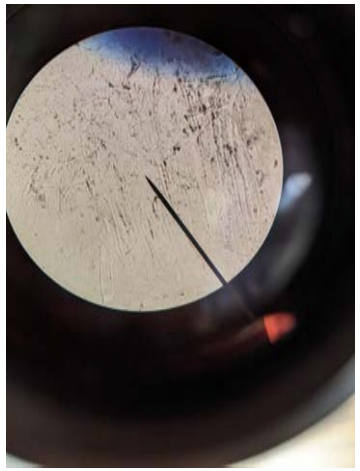
Objectives

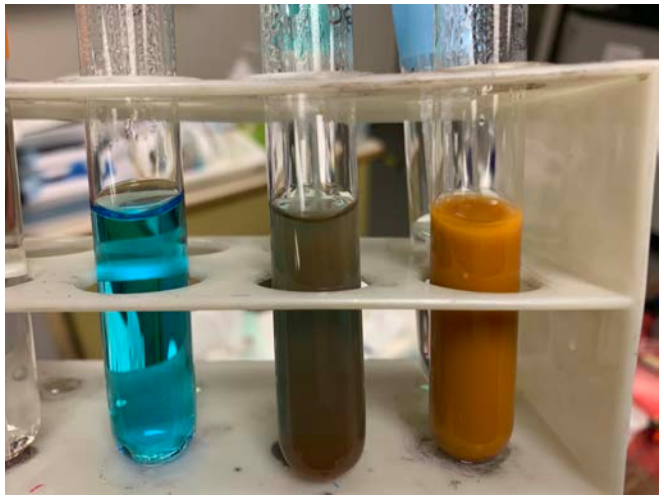
1. Describe diffusion and factors that influence rates of diffusion
2. Define hypotonic, hypertonic and isotonic, and the influence of tonicity on blood cells, and elodea cells.
3. Explain the relationship between molecule size, and permeability of the cell membrane.
4. Perform an experiment to determine the osmolarity of a plant cell.

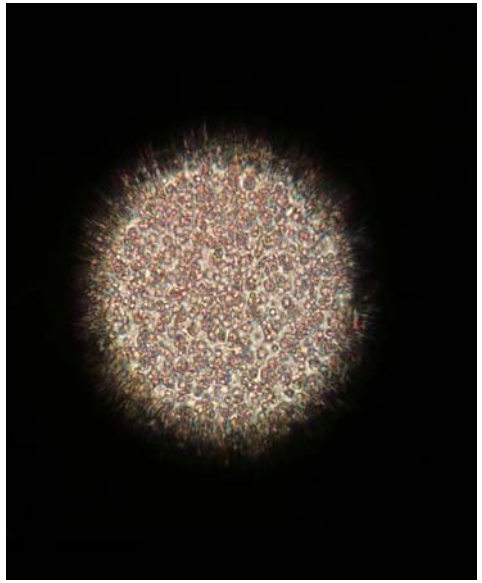
Lab demonstrations

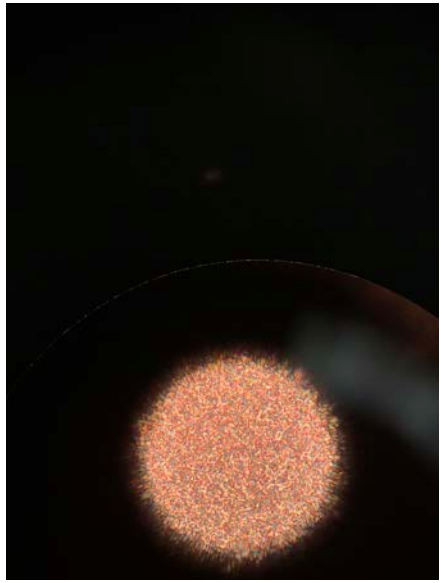
1. Robyn and Maria demonstrated experimental set up of potato cylinders, measuring volume and weight, and placing potato cylinders in solutions of varying glucose osmolarity.
2. Robyn demonstrated how to place carmine on a slide to observe kinetic energy of molecules.
3. Robyn demonstrated the preparation of a dialysis bag with glucose and starch in a beaker with iodine, and placement of solutions from both using benedict's solution to determine the presence/absence of glucose.
4. Each student had a separate station including:
    a) Slides and coverslips
    b) Compound light microscope
    c) Carmine powder
    d) Beakers, test tubes, pipettes
    e) Dialysis tubing, iodine solution

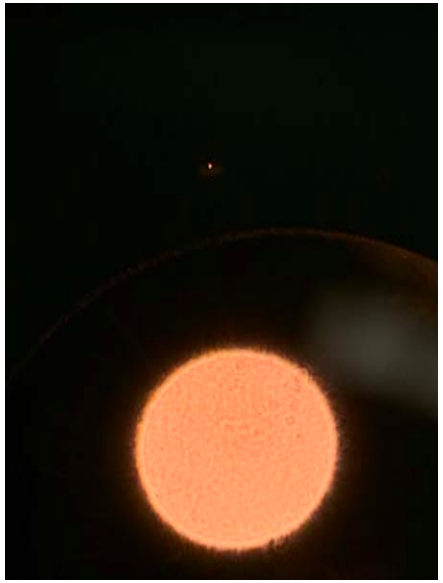
Student submissions of cellfies

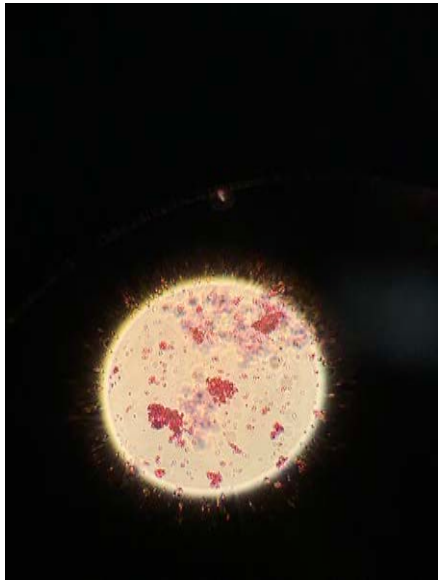












Thank you Andrea and Safaa for the images


water

Questions to review

- Make sure to read the introductions in the manual handout, they are very informative
- Kinetic energy:
  - What is the movement of carmine particles in water like?
  - Is it random or directional?
  - Does the movement ever stop?
  - What does this indicate about diffusion?

- Diffusion through selectively permeable membrane (dialysis tubing)
  - What is the significance of the final colours?
  - From these results, predict the relative sizes of I_2KI molecules, glucose and starch.

Questions continued

- Osmotic behaviour of animal and plant cells due to tonicity.
  - What do you expect would happen to blood cells in:
    - Hypertonic solution
    - Hypotonic solution
    - Isotonic solution
  - What do you expect would happen to plant cells in:
    - Hypertonic solution
    - Hypotonic solution

    (A was 10% NaCl, B was distilled water, C was 0.9% NaCl) – check your results

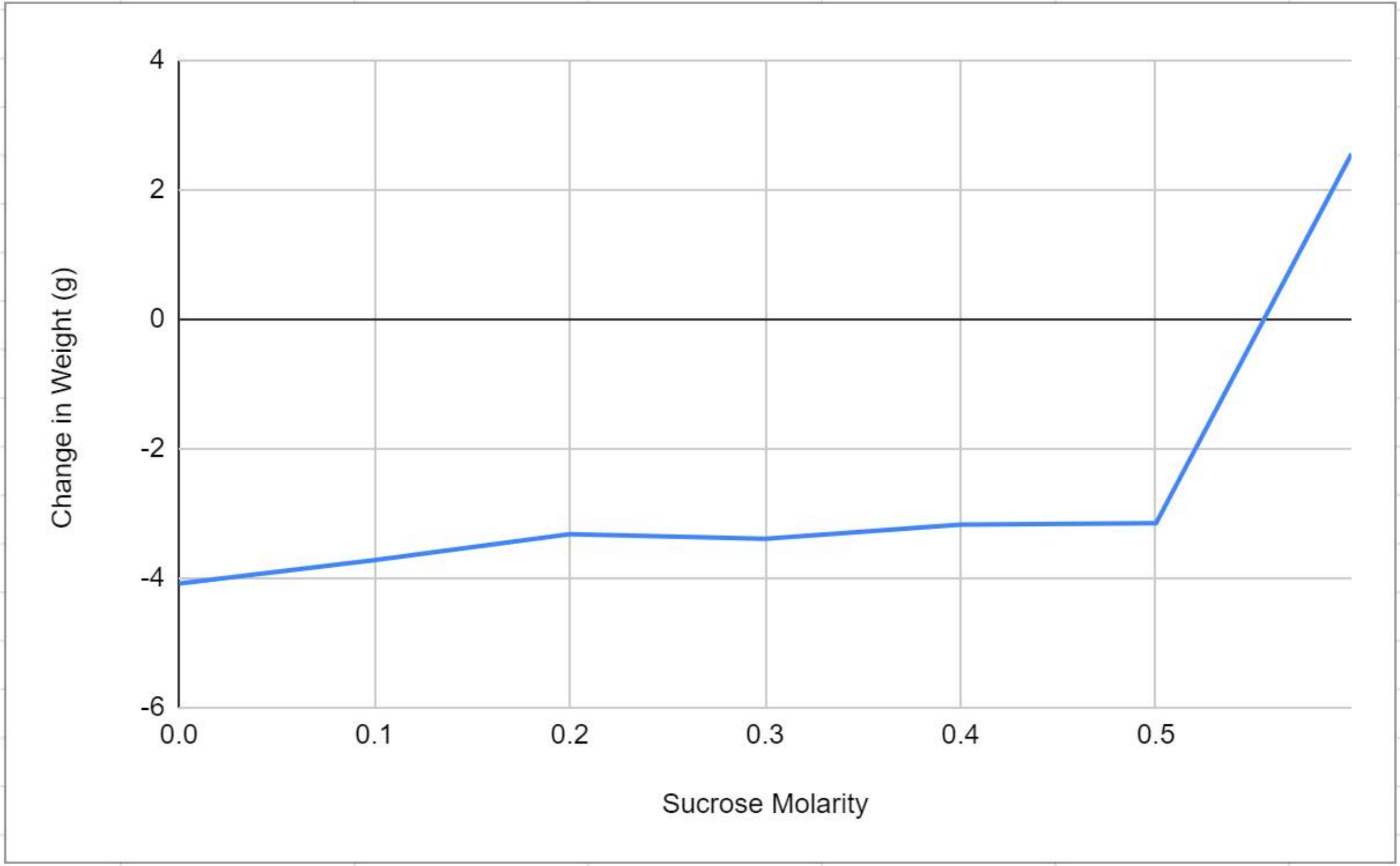
Questions continued

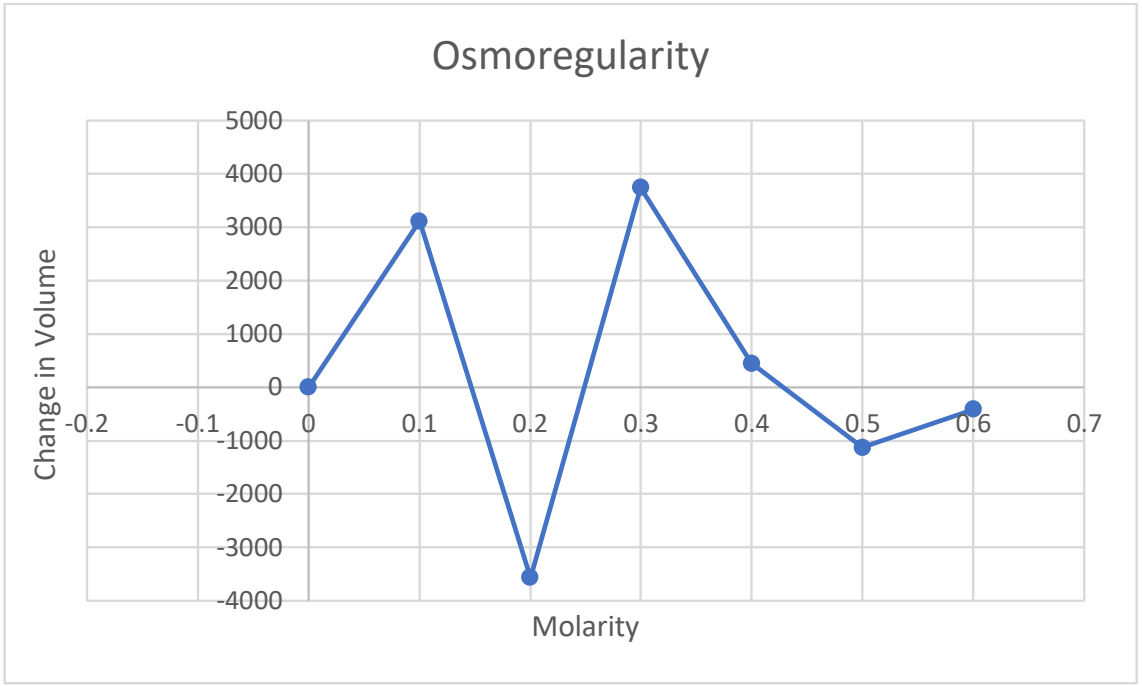
- What do you expect to happen to elodea cells in:
  - Hypertonic solution
  - Distilled water
  - Why?

Check your results

Questions continued

- Osmolarity of plant cells
  - What question is being investigated in this experiment?
  - Check out the graphs of weight change/osmolarity, and volume/osmolarity.
  - Estimate the osmolarity of the potato tuber tissue.
  - What force other than solute concentration will have an impact on water taken up by potato pieces (see figure 3.5 c in the lab handout).


4
2
0
-2
-4
-6
Change in Weight (g)
0.0
0.1
0.2
0.3
0.4
0.5
Sucrose Molarity


Osmoregularity
Change in Volume
Molarity
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

Some terms to review in the manual

- Solvent
- Solute
- Selectively permeable
- ATP
- Diffusion
- Osmosis
- Hypotonic
- Hypertonic
- Isotonic
- Kinetic energy
- Lysis
- Crenate
- Plasmolysis
- Protoplast
- Turgor pressure
- Osmolarity
- Sucrose
- Glucose
- starch