

Brian Chen

Experiment 3

Title: Transport Mechanisms and Cell Permeability

Objective: To investigate diffusion and osmosis through a non-living membrane

#### Material/Method

- four dialysis sacs
  - a small funnel
  - a 25-ml graduated cylinder
  - a wax marking pencil
  - fine twine or dialysis tubing clamps
  - four beakers (250 ml)
  - Benedict's solution
  - Silver Nitrate
- 1) Label the beakers 1-4 and half-fill each 1, 3, and 4 with distilled water. Half-fill beaker 2 with 40% glucose solution
  - 2) Fill sacs 1 and 2 with 20ml of 40% glucose solution, 3 with 10% NaCl solution, and 4 with 40% sucrose solution
  - 3) Weigh each sac and record as initial weight
  - 4) Submerge each solution to their respective beakers and leave it there for 45 minutes
  - 5) After 45 minutes, dry the exterior of the sacs and weigh on a balance. Record as final weight
  - 6) Label 4 test tubes as 1A, 1B, 1C, and 1D. Fill these with 10mL of their respective sac's content
  - 7) Label 4 test tubes as 2A, 2B, 2C, and 2D. Fill these with 10mL of their respective beaker's content
  - 8) Place a few drops of Benedict's solution in tubes 1A, 1B. 2A. 2B. 4A, and 4B
  - 9) Place these in boiling water and observe for color change
  - 10) Add drops of Silver Nitrate to tubes 3A and 3B and observe for milky substance

## Results

Beaker	Content of Sac	Initial weight	Final weight	Weight change	Tests-beaker fluid	Tests-Sac fluid
Beaker 1 filled with ½ distilled with water	Sac 1, 20ml of 20% of glucose solution	7.1g	8.0g	+0.9g	Benedict's test: light brown (positive)	Benedict's test: light brown (positive)
Beaker 2 ½ filled with 40% glucose solution	Sac 2, 20ml of 40% glucose solution	6.9g	6.9g	0.0g	Benedict's test: light brown (positive)	Benedict's test: light brown (positive)
Beaker 3 ½ filled with distilled water	Sac 3 , 20ml of 10% NaCl solution	7.2g	7.8g	+0.6g	Silver Nitrate test: white (positive)	Silver Nitrate test: white (positive)
Beaker 4 ½ filled distilled water	Sac 4 20ml of 40% sucrose solution	7.1g	8.0g	+0.9g	Benedict's test: (negative)	Benedict's test: light brown (positive)

## Conclusion

The data concludes that osmosis always occurs whenever there is a concentration difference as well as a permeable membrane. This makes water move through the membrane down its (water) concentration gradient. This is supported by weight changes of sacs 1,3, and 4. Each of them had an increase in weight, which supports that water has entered the sac from the beaker.

The data also concludes that diffusion usually occurs with a concentration gradient, unless the particle can't pass through the membrane. This is supported by beakers 1,3, and 4 by the Benedict and Silver Nitrate tests. Beaker 1 was brown, meaning glucose diffused through the membrane, and beaker 3 was white, meaning Cl<sup>-</sup> particles were able to diffuse through the membrane. However, even though beaker+sac 4 also had a concentration gradient, Benedict's test tested negative for sugar in beaker 4. This means that the sucrose did not diffuse through the membrane. Sucrose is a polysaccharide, and thus it can be concluded that it physically could not diffuse through the membrane due to its large size.