

Lab #5: The Case of the Shipwrecked Sailor



The story...

A shipwrecked sailor is stranded on a small desert island with no fresh water to drink.

He knows he could last without food for up to a month, but if he didn't have water to drink he would be dead within a week.

Hoping to postpone the inevitable, his thirst drove him to drink the salty seawater.

He was dead in **two days**.



What happened?

Why do you think drinking seawater killed the sailor faster than not drinking any water at all?



Objective:

To determine the cause of the sailor's death, we will **determine the effects of salt water on slices of potato.**

- measure changes in mass

Our assumption is that potato cells will behave like the sailor's cells in his body.

How does salt water concentration change the mass of potato slices?

Hypothesis:

“The higher the salt concentration, _____”

Materials:

Pre-lab questions:

1. What is diffusion?
2. What is osmosis?
3. Define hypotonic, isotonic and hypertonic solutions with regard to cells. Give an example of each type of solution.

Pre-lab: Make sea water solutions

Percent sea water	Vol. of 20% salt water (mL)	Vol. of distilled water (mL)	Total Vol. (mL)
Distilled water	0.0	40.0	40.0
0.5% sea water			40.0
1% sea water			40.0
5% sea water			40.0
10% sea water			40.0
20% sea water	40.0	0.0	40.0

Record Data

Sample	Initial mass	Final mass	Change in mass	Change in Length	Turgidity (crisp/flaccid)
20% salt					
10% salt					
5% salt					
1% salt					
0.5% salt					
Fresh water					

Prepare a graph of your data

Conclusion:

Address the following in your conclusion:

- What happened to the potato slices over 1 hour?
- Is diffusion or osmosis responsible for the changes?
- Which of the solutions is isotonic to potato cells?
How do you know this?
- Which solution is hypertonic? Which solution is hypotonic?
- **Sea water is 35% salt.** Why did the sailor die more quickly drinking sea water than fresh water? What do you think killed him?