ACTIVITY: Investigating Osmosis with Potatos

Description:
The Potato Activity is a hands-on and engaging experiment designed to help you understand the fundamental concept of osmosis, using potato cylinders as a model system. In this experiment, you will cut potato cylinders to a uniform length of 6 cm and immerse them in sodium chloride (NaCl) solutions of six different concentrations. This interactive activity allows you to explore how soil moisture dynamics are influenced by osmotic processes.

🎯 Main Objectives:

- Understand the concept of osmotic suction and its role in soil moisture retention.
- Investigate how solute concentration influences water movement in the soil.
- Develop critical thinking skills through the analysis and interpretation of experimental results.

🧪 Materials Needed (per group):

- 2 potatoes
- 1 potato corer (cylindrical cutter)
- 1 cutting board
- 1 knife
- 1 ruler
- 1 cup
- Sodium chloride (NaCl)
- 100 mL of water
- Paper towels
- Graduated cylinder (shared)
- Timer (shared)
- Scale (shared)
- Marker (shared)

📋 Procedure:

1. Each group starts by cutting 3 potato cylinders using the corer, each measuring 6 cm in length, with the help of a knife and ruler. Make sure all cylinders are the same size for consistency. Record the diameter of the cylinders.
2. Each group is assigned a specific NaCl solution concentration. Label a cup with the assigned concentration (0 g, 1 g, 2 g, 3 g, 4 g, or 5 g of NaCl per 100 mL of water).
3. Fill the labelled cup with 100 mL of water.
4. Measure the required amount of NaCl to create the solution for your group's assigned concentration.
5. Pour the NaCl into the cup of water and mix well until fully dissolved into a homogeneous solution.

6. Once all groups complete the preparation, immerse the 3 potato cylinders in their respective solutions, ensuring they are fully submerged.
7. Set a timer for 20 minutes.
8. After this time, carefully remove the potato cylinders from the solutions and gently dry them with paper towels. Record any observable changes in length, diameter, texture, or colour.
9. As a class, compile the results into the following table:

NaCl (g/100mL)	Initial Length (cm)	Initial Diameter (cm)	Initial Volume (cm^3)	Final Length (cm)	Final Diameter (cm)	Final Volume (cm^3)	Volume Change (%) *	Average Volume Change (%)
0	6,0							
	6,0							
	6,0							
1	6,0							
	6,0							
	6,0							
2	6,0							
	6,0							
	6,0							
3	6,0							
	6,0							
	6,0							
4	6,0							
	6,0							
	6,0							
5	6,0							
	6,0							
	6,0							

* Record volume change following this convention: if the final volume is greater than the initial, the change is positive (+); if smaller, it is negative (−).

10. Create a graph with **NaCl Concentration (g/100 mL)** on the **X-axis** and the **Average Volume Change (%)** on the **Y-axis.**

✅ Key Conclusions:

The potato cylinder experiment is an interactive and educational activity that vividly demonstrates the concept of osmosis**.** By observing the effects of different solute concentrations on the potato cylinders, you can gain deeper insights into how concentration influences water movement in soils. This experiment fosters critical thinking and creates a concrete connection between scientific principles and real-world applications.

🧠 **For Reflection:**

1. What do the terms hypotonic, hypertonic, and isotonic mean in the context of osmotic suction?

2. How does variation in solute concentration affect the moisture content of soil?

3. Can you think of a real-world geotechnical engineering scenario where understanding osmotic suction would be relevant?