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הפיקוח על הוראת מדע וטכנולוגיה

# The effect of pH level on shells

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## Introduction

Seas and other bodies of water, such as oceans, serve as habitats for a wide range of living organisms. Among them, oysters are mollusks with shells primarily composed of calcium carbonate ($CaCO_3$). These oysters are exposed to chemical changes in the water, particularly fluctuations in pH levels, which can affect the rate at which their shells dissolve. In recent years, due to human activities such as carbon dioxide ($CO_2$) emissions, the concentration of carbonic acid in the water has increased. This process leads to a decrease in pH values and ocean acidification. This phenomenon raises concerns about the stability of marine ecosystems and its impact on sensitive species such as oysters. Electrical conductivity is a measure of the concentration of free ions in a solution. The lower the pH (higher acidity), the more ions are expected to be released into the water due to the breakdown of the calcitic material in the oysters' shells.

## Research Question

What is the effect of water pH levels on shells dissolution?

## Hypothesis

The lower the pH level (higher acidity), the more the oyster will dissolve, and the conductivity will be higher.

## Research Methodology

Materials and Equipment:

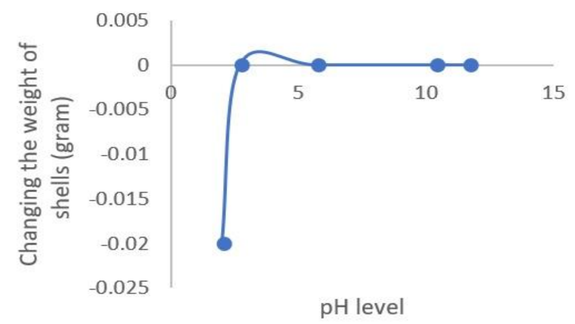
5 chemical beakers, 5 oysters, Distilled water, HCl drops, NaOH drops, pH sensor, Conductivity sensor, Tweezers, Gloves, Stirrer/stick for mixing, Marker for labeling.

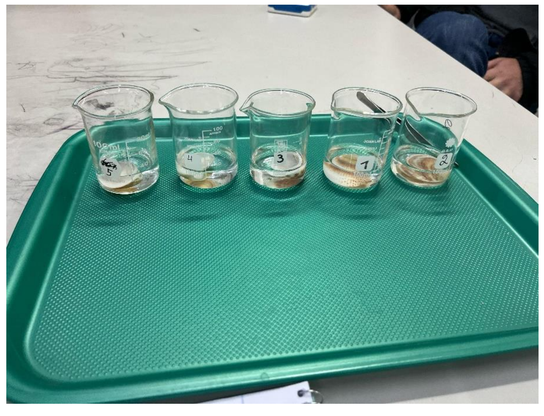
Experiment Procedure:

1. Pour 40 mL of distilled water into each beaker.
2. Add one drop of HCl to the first beaker, several drops of HCl to the second, and leave the third beaker unchanged (control).
3. Add one drop of NaOH to the fourth beaker and nine drops of NaOH to the fifth beaker.
4. Stir the solutions with the stirrer.
5. Label the beakers with numbers using a marker.
6. Measure and record the pH and conductivity levels of each beaker using the sensors.
7. Place an oyster in each beaker.
8. Wait for one week.
9. After one week, remove the oysters using tweezers, weigh them again, and record the data in a table.
10. Re-measure the pH and conductivity levels of the water in each beaker and update the table.

## Results

| Tube | pH level | weight at day 0 | weight at day 7 | weight difference |
|---|---|---|---|---|
| 1 | 2 | 7.24 | 7.22 | -0.02 |
| 2 | 2.7 | 5.37 | 5.37 | 0 |
| 3 | 5.7 | 5.27 | 5.27 | 0 |
| 4 | 10.4 | 3.66 | 3.66 | 0 |
| 5 | 11.7 | 4.19 | 4.19 | 0 |



## Conclusions and Discussion

In our research, we examined the effect of different pH levels in distilled water on oysters. No significant change in oyster weight was observed. This finding suggests that under the tested conditions, the oysters did not absorb or lose significant amounts of fluids. It is possible that their shells serve as an effective barrier against external changes, or that they were not affected by the pH levels tested. Additionally, the fact that the water's pH level remained nearly unchanged indicates that the oysters did not significantly alter their surrounding environment. Other possible explanations include: The oysters might not be active under these conditions or may not release substances that affect pH. The experiment duration might have been too short to observe noticeable changes. Other factors, such as temperature, oxygen concentration, or the presence of other substances in the water, may have influenced the results. These findings may suggest that oysters have the ability to maintain internal stability even under varying pH conditions. They may have evolved to withstand changes in the marine environment.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