



Experiment: Thermal Expansion

Objective:

Investigate the relationship between temperature and volume change in a liquid. This will help you understand the sea level rise component due to increasing ocean temperatures.

Background:

Heat transferred to an object increases the kinetic energy of its molecules.

Imagine to be water molecules and stand next to each other. If you suddenly all start moving, will you occupy more or less space than before?

Before starting, formulate your hypothesis on water behaviour when it gets warmer: with higher temperatures will it expand or contract?

Write your idea below.

Materials:

- Glass bottle;
- Cap with straw;
- Thermometer;
- Heater;
- Ruler.

Group structure

Not more than 4 persons

- 1-2p experiment
- 1p documentation
- 1p presentation

1) Procedure:

Fill your bottle with water to the very top and close with the cap (put some paper under the bottle to absorb water!). Push the cap so that some water is visible in the straw and wait until the level stabilises. Mark the start level of the water in the straw; turn on the thermometer and measure the temperature. Turn on the heater and put the bottle on top. Insert your measurements in the table here on the side!

Draw your instrumental setup below here!

2) Observations:

At regular intervals, measure and transcribe in the table below the water temperature, and mark the level of water on the straw. At the end of the experiment, measure the increase in level at each time step and transcribe it below.

Time	Temperature (°C)	Level (mm)
START:		0
+30 sec:		+
+60 sec:		+
+90 sec:		+
+120 sec:		+
+150 sec:		+
+180 sec:		+
+210 sec:		+
+240 sec:		+

3) Analysis:

Draw in a graph the water level (y axis) as a function of its temperature (x axis). How does the level vary with increasing temperatures?

4) Interpretation

1. What makes the “sea level” rise in this experiment? Mass or volume? Compare this result with the result from the ice melt!
2. Our oceans are warming. Do you think that water expansion affects all the Earth equally?