TEMPERATURE

Community Science Institute
Partnering with Communities to Protect Water

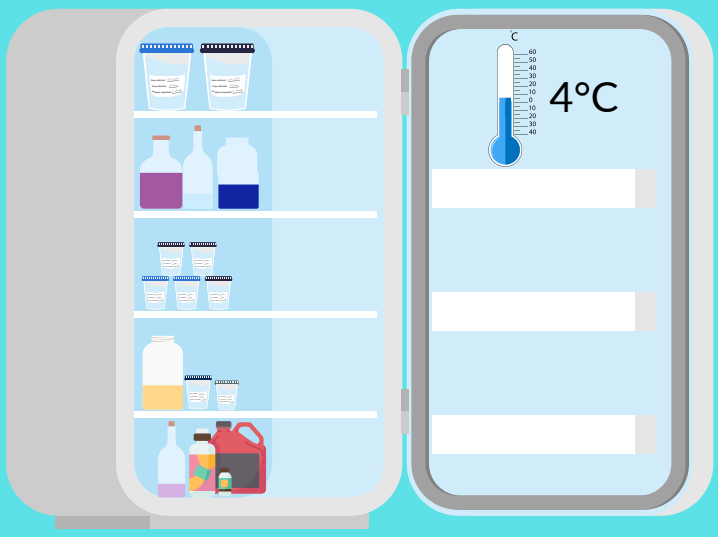
WHAT IS TEMPERATURE?

Temperature refers to how warm or cold a water sample is. Though temperature is a simple concept, it is an extremely important component of water testing. Whether water samples are from non-potable sources, like streams and lakes, or from potable sources, such as private wells, they should be transported on ice to ensure their chemical characteristics remain consistent during transportation.

WHY DO WE MEASURE TEMPERATURE?

Water temperature influences water chemistry, making it a critical piece of water quality monitoring. For instance, colder water can hold more dissolved oxygen, an important water quality indicator for fish and other organisms, than warm water can. Potential changes in water chemistry make maintaining a cool sample temperature important to test accuracy. Once water samples reach CSI's lab, they are stored in a fridge kept at 4°C until they can be tested.

Beyond temperature's impacts on other water quality indicators, many organisms are sensitive to water temperatures. For trout, the optimum temperature is between 6 and 20°C. As our climate changes, water temperatures are likely to change, too. The temperature data our volunteers collect directly from streams help us to track these changes in water temperature over time.



February 2024

HOW DO WE MEASURE TEMPERATURE?

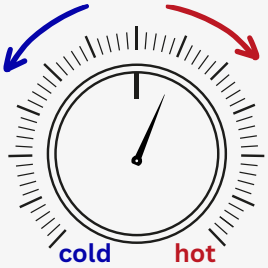
Temperature is measured using a thermometer. Field measurements are taken with a dial thermometer. Once water samples reach CSI's laboratory, their temperatures are measured once again using a laser thermometer.

Dial Thermometer

CSI volunteers take temperature readings in the field with bimetal dial thermometers. These thermometers have two different kinds of metals connected in a coil.

One metal is very sensitive to heat, while the other is not sensitive to heat at all. When exposed to heat, metals expand, but they do this at different rates that depend on their sensitivity.

When the thermometer probe is in contact with something **cold**, the more sensitive metal contracts, making it shorter than the other metal. This pulls the strip on the dial toward the left, indicating a lower temperature.

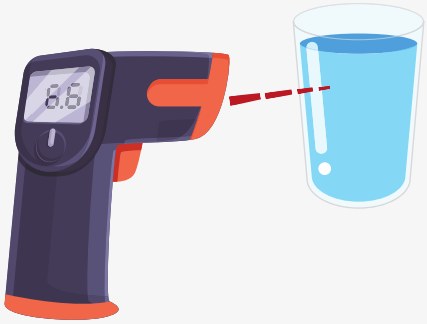


When the thermometer probe is in contact with something **hot**, the more sensitive metal expands, making it longer than the other metal. This pulls the strip on the dial toward the right, indicating a higher temperature.

Thermometers must be calibrated regularly using substances of known temperatures, such as ice water (0°C) or boiling water (100°C).

Laser Thermometer

When water samples reach CSI's laboratory, their temperatures are measured with a laser thermometer. The laser merely helps the user point the thermometer; it has nothing to do with the temperature measurement.



Instead, a "laser thermometer" measures using the infrared light emitted by the object being measured. The infrared wavelength an object emits corresponds to its temperature. The thermometer calculates and displays the temperature of the object.