Science 14

## Unit B: Energy transfer technologies

# Why water changes temperature slowly

# Water and oil heating rates

- Equal masses of water and cooking oil receive the same heating time.
- The oil’s temperature climbs faster than the water’s.

# Specific heat capacity

- Water takes in a lot of heat for each degree its temperature rises.
- Cooking oil changes temperature faster under the same heat.

# Key terms

### specific heat capacity

The heat a stated mass of a substance absorbs or releases for each degree of temperature change.

### controlled variable

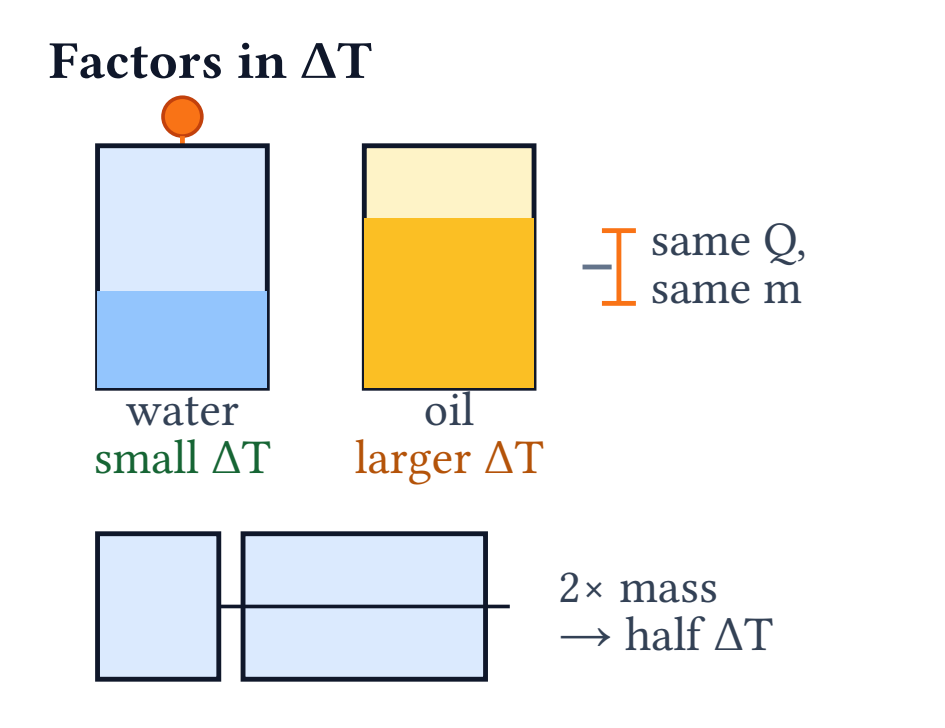
A factor you keep the same so the comparison is fair, such as starting temperature or heater setting.

### manipulated variable

The factor you deliberately change, such as the type of liquid or the mass.

# Factors in temperature change

- A high specific heat capacity means a smaller temperature change for the same heat and mass.
- Doubling the mass, with the same heat, cuts the temperature change for that material.



# Oil and water, same heat

- The oil rises about 12 degrees and the water rises about 5.
- Water has the higher specific heat capacity in that test.

## Same heat, different climb

- The heater setting and the time stay the same.
- The larger temperature climb belongs to the lower specific heat capacity.

# A heavier pot of water

- The same heat spread through more mass gives a smaller temperature change.
- Material and mass both belong in the comparison.

## The manipulated variable

- Material in one trial, mass in the next, and the heater stays the controlled variable.
- The lake and the kettle are the same specific-heat story at two sizes.