✦ IDEA · CHEAT CARD · PHYSICS

Mpemba effect

The claim that water starting hotter can, under the same conditions, freeze sooner than water starting colder.

How it works

1. To freeze, hot water must first pass the cold water's starting temperature.
2. If both samples were identical at that moment, the hot one would still be behind.
3. So hot water can freeze first only if it changed while cooling.
4. Steam, lost air, different flow and supercooling can make the two samples differ.

Example

Mpemba's ice-cream mix at a Tanzanian school

- Erasto Mpemba put his milk-and-sugar mix into the freezer while it was boiling.
- A classmate's mix went into the same freezer cold.

→ An hour and a half later, Mpemba's mix had frozen and the cold one had not.

Use it for

- ✓ Asking what was measured when a headline reports a surprising effect
- ✓ Agreeing at work on the measure of success before looking at results
- ✓ Deciding not to fill ice-cube trays with hot water to save time

Watch out

- ✗ Careful tests in 2016 found that cold water reaches 0 °C first, as expected.
- ✗ Moving the thermometer by just 1 cm could make data look like the Mpemba effect.

Remember When a surprising effect is reported, first ask exactly what was measured.