

## How Fast Does Water Evaporate from a Cup of Hot Tea?

How much water evaporates from a cup of hot tea in 100 seconds? How much can we slow down the cooling, when we prevent the evaporation?

### What you need:

- sensitive balance connectable to a PC via USB or LabQuest
- a thermo cup (or a common cup)
- a plastic bag
- USB Go!Temp thermometer
- a kettle
- a stand



### Tasks:

#### Preparation for measurement

1. Before the measurement, it is necessary to unlock the balance. Remove the metal plate off the balance, turn the red knob to the "unlocked" position and return the metal plate back in its original place.



2. Connect the balance to an electrical grid (so that the battery is not being “wasted”) and switch the balance on.
3. Connect the balance and a thermometer via USB ports to your computer, open the Logger Lite software.
4. Set Duration to 600 s and Sampling Rate to 1 Hz.
5. Fill the cup with tap water so that the water level is 1 - 2 cm below the edge and put it on the balance. If the mass of the cup with water exceeds the measuring range of the balance (600 g), pour some water out.
6. Use the stand to place the thermometer so that its tip is immersed 2 cm below the water level.
7. Boil the water in the kettle. Meanwhile, prepare the plastic bag. In the first phase of the experiment it will serve as a pot lid to prevent the evaporation – pierce a hole in the bag with the tip of the thermometer. After pouring hot water into the cup and starting the experiment, it will look something like the image above.

#### Performing measurements

1. Start the measurement. After 300 seconds, lift the bag gently and fasten it on the stand so that it does not prevent the evaporation of water from the cup any more. Do not stop the measurement. This manipulation with the bag will be shown on the graph of mass vs. time as an irregularity (“spike”).



2. The measurement stops after 600 seconds (10 minutes). Store the measurement and look at the graphs.

### Evaluation

1. How much water has evaporated in the first and in the second case?
2. How has the removal of the “lid” affected the cooling rate?