

# Brontosaurus Learning

*Making science fun!*

An Experiment about

## Air Collapsing Bottle



### What you will need:

- A plastic bottle with a lid
- Hot tap water

### What you will do:

- 1 Half fill the bottle with hot tap water. **The hotter the better, but be careful!**
- 2 Now put the lid back on and swirl the water around the bottle while you slowly count to 100.
- 3 Empty the water out and quickly put the lid back on the bottle and screw it down tight. **Remember the water is still hot!**
- 4 Put the bottle on a table, stand back and watch what happens. **You might have to be a little patient.**

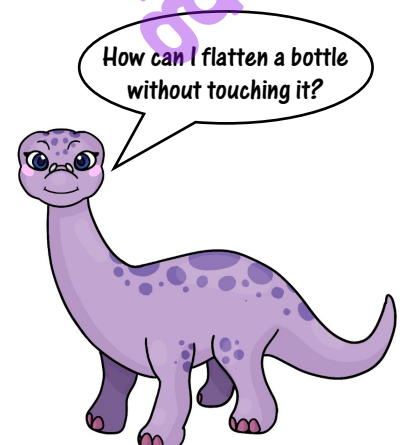
### What is going on?

The hot water is heating up the air molecules in the bottle. When they are hot, they expand.

When the hot water is poured out, the air molecules begin to cool. As they get cooler they get closer together – they make the air pressure inside the bottle go down. The air on the outside has more pressure, so it pushes toward the air inside the bottle, but the bottle is in the way!

### Challenges:

- Compare the size of the bottle before it was crushed to the size of the crushed bottle. How many more bottles could you fit into your recycling bin if you crushed them all?
- Is the air pressure the same everywhere on Earth? Where could it be higher or lower? Do some research to find out if you are right.



# TEACHING NOTES:

Brontosaurus Learning Experiment: Air A04

**Topic:** Air

**Key Concepts:**

- ♦ Air has molecules. Molecules get closer together when they are cool and further apart when they are warm. Air pressure.

**Resources:**

- Investigation Record IR01– one copy per student
- Experiment Description Air A04– one copy per student
- Empty plastic container with lid, hot water

**Lesson Notes:**

This lesson is suitable for younger students as a demonstration – safety with the hot water is the issue.

With older students, group them into small groups with responsible students given the job of filling the bottle. Hot tap water is sufficient for the experiment, but in the interest of safety remind everyone of the dangers – even tap water can burn.

Remind students to listen carefully to instructions, and to OBSERVE their experiment.

As a class discuss the experiment prior to undertaking it, and students should complete the sections of their Investigation Report IR01 from "Title to "Hypothesis".

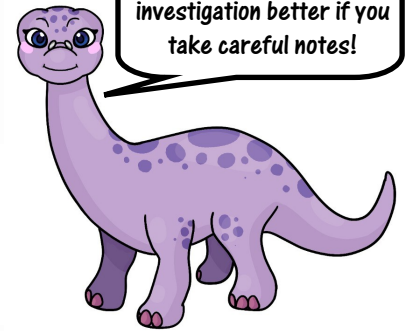
**What should happen in this experiment, and why?**

After the hot water is swirled and poured out and the lid is put on the bottle, the bottle should collapse. This may take a few minutes.

**Follow up discussion questions:**

- What would happen if we didn't put the lid on the bottle tight enough?
- What do you think would happen if we put the lid on the bottle then put the bottle in the freezer?

## Investigation Record



Experiment Title:

Scientist (that's you!):

Materials: What will I need?

Investigation—what am I going to do in this experiment?

Diagrams are a great idea!

Hypothesis: What I think will happen:

Observation: What I SAW happen:

Diagrams are a great idea!

From my investigation I learnt:

**Great work scientist!**