**Why does popcorn pop?**

**Levels:** 4-5  
**NoS achievement aims:** Understanding about science, Investigating in science   
**Contextual strands:** Material world, Physical world   
**Topic:** States of matter

**Rationale**

Water expands when heated.

Students gather evidence to support their explanations of why popcorn pops and critique each others’ explanations. Working together and providing evidence to support ideas are important features of science.

**What you need**

* Unpopped popcorn.
* Butter or vegetable oil (1 tablespoon per 3 tablespoons of unpopped popcorn).
* Apparatus for containing and heating the popcorn (for example, heavy-based saucepan with lid, preferably clear; stove or hotplate).

Note: Supporting activity resources are suggested below.

**Focus**

For information on the properties of popcorn, refer to *Making Better Sense of the Material World*, p. 69.

* Why does popcorn pop?
* Possible student theories - Popcorn pops because:
  + gas expands inside it
  + the white stuff inside expands
  + there’s a build-up of steam inside the seed (This is the accepted theory: Heat vaporises the water inside the seed, the hard seed coat resists the buildup, which increases the pressure inside. When the seed finally explodes, the high-pressure steam escapes from within the starchy tissues, causing them to expand into a very low-density fluffy material – popcorn.)
  + the embryo in the seed makes it swell up
  + there’s a little man inside who does it all.
* What conditions are needed for popcorn to pop? Do all corn types behave the same as popcorn when treated under the same conditions?
* Can you pop popcorn in a microwave using standard equipment?
* How can you test to find out what causes the popping?   
  Suggestions might include:
  + weighing the popcorn before and after popping
  + cutting the unpopped corn in half before popping
  + sandpapering the surface of the unpopped corn before popping
  + trying to collect the water that comes out as the popcorn pops.

**Exploration**

1. Challenge students to experiment with theories that address the question “Why does popcorn pop?” using all the apparatus in the room and a given amount of time.
2. To make popcorn, heat the butter or oil in a pan, add unpopped corn in a single layer, put the lid on the pan, keep the pan on heat and shake the pan from time to time. Keep the lid on until the popping noises stop.
3. Have students write up their preferred proposition and present this, with supporting evidence, to their classmates.
4. Classmates can challenge the presenter with questions about method and evidence, for example:
   * How do you know that?
   * Where does your evidence come from?
   * How did your experiment show that?
   * How many times did you measure it?
   * How did you eliminate other possibilities?

**Reflection**

* Which theory for why popcorn pops is supported or not supported by each of the investigations you did?
* If your investigation observations do not support the view currently accepted by scientists, does that mean that they are wrong? Does that mean you did something wrong? How many times would you need to get the same result before you could suggest that the science explanation could be wrong?
* How difficult is it to pull the results of different investigations together, to arrive at one conclusion?
* Can we really experience the creativity of scientists if we know the answer all along?
* Which theory for why popcorn pops is now thought to be the correct theory, and what evidence do we have for that?

**Activity resources**

Ministry of Education (1998). *Making Better Sense of the Material World*. Wellington: Learning Media.