# Popcorn Under Pressure

It looks like kitchen magic. You take a handful of dried corn kernels, small and hard as ladybugs. Throw them into a hot pan with a little oil, and soon they're jumping, spinning and exploding into shapes like freeze-dried clouds. That's popcorn. Don't forget to put on the lid. But why does popcorn pop?

Each kernel of popcorn has a hard outer shell around a pocket of starch. This pocket is called an endosperm, which means "inside the seed." If you could take off the shell, the starch in the endosperm would feel and taste a little like a raw potato. There's a lot of water in that starch; in fact, the perfect piece of popcorn is about 14% water.

When the popcorn is heated, the water in the endosperm turns to steam. Steam takes up more space than liquid water: the molecules of water in the steam are farther apart and move faster. It's the expansion of the steam that makes popped popcorn so big. A piece of popped popcorn can be 40 times as big as a kernel of unpopped popcorn.

But the expansion of steam is only half the story. When most things are heated, the water in them just boils away. That's why foods with a lot of water in them, such as mushrooms or tomatoes, usually get smaller when you cook them. Popcorn is different because of the hard shell. The shell keeps the hot steam inside the popcorn like air inside a balloon. The pressure builds up. You can picture the fast-moving molecules of steam pushing and hitting against the hard shell until the shell can't hold them in. Like a balloon, the shell flies apart all at once: it pops.

Popcorn is a tasty example of the science of pressure. It may not be magic, but it is magical.

**9** What is at the centre of the corn kernel?

- **a** oil
- **b** starch *
- **c** steam
- **d** potato

**10** What is the purpose of the colon in line 11?

- **a** to introduce a list
- **b** to connect an idea *
- **c** to indicate a long pause
- **d** to separate contrasting ideas

**11** Read this sentence from line 15.

But the expansion of steam is only half the story.

What is the other half of the story?

- **a** The shell gets harder as it cooks.
- **b** Popcorn gets smaller when it is cooked.
- **c** The shell cracks open from the pressure. *
- **d** The pot lid keeps the popcorn under pressure.

**12** Describe a safety issue related to popping popcorn. Use information from the text and your own ideas to support your answer.

**13** How does this text make a complicated process understandable? Use information from the text and your own ideas to support your answer.

**14** The text as a whole answers which of these questions?

- **a** What is an endosperm?
- **b** Why does steam expand?
- **c** How does pressure make a corn kernel explode? *
- **d** How does popcorn cook differently from tomatoes?

**15** Where would this text most likely be published?

- **a** in a book of poetry
- **b** in a science textbook *
- **c** on the front page of a newspaper
- **d** on the editorial page of a magazine