

Reading Toolkit: Grade 6 Objective 2.A.4.g

Standard 2.0 Comprehension of Informational Text

Topic A. Comprehension of Informational Text

Indicator 4. Determine and analyze important ideas and messages in informational texts

Objective g. Synthesize ideas from text

Assessment Limits:

From one text or a portion of the text or across multiple texts

Selected Response (SR) Item

Question

Read this article titled ["Why Is It So Hard to Get Ketchup Out of the Bottle?"](#) Then answer the question below.

According to this article, which of these statements about quicksand is true?

- A. Quicksand molecules become thinner over time.
- B. Animals cannot see through quicksand molecules.
- C. Motion causes quicksand molecules to break apart.
- D. Strings of quicksand molecules are usually tightly packed.

Correct Answer

- C. Motion causes quicksand molecules to break apart.

Question

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Handouts

Why Is It So Hard to Get Ketchup Out of the Bottle?

by Shawna Stuart Whyte

¹The Super Double Cheeseburger Deluxe arrives at your table. You stare at the dripping burger and the tantalizingly crisp, golden French fries. The only thing that's missing is the ketchup, so you grab the bottle and prepare to slather your entire plate. You unscrew the cap, but . . . what's this? Nothing is coming out! Why is ketchup so hard to pour out of the bottle?

²Ketchup is a liquid, right? Not really. A solid? Nope. Actually, ketchup is a type of solution that sometimes acts as a liquid and other times acts as a solid. Ketchup and other solutions that have properties of both a solid and a liquid are called thixotropic solutions. Other thixotropic solutions that you may have in the house include yogurt and margarine. When yogurt sits undisturbed, it is a jellylike solid. When you stir it, it becomes more like a liquid. Margarine that has been refrigerated can become quite hard, but once it warms up, it becomes softer and more liquid—and much easier to spread on toast!

So why are thixotropic solutions so weird? Why can't they just make up their minds and be one or the other: solid or liquid? The answer is that molecules of a thixotropic substance tend to form in long chains. When these substances are stirred or shaken, the chains of molecules break apart into smaller segments, allowing the margarine, yogurt, or ketchup to act more like a liquid. Imagine that a bottle of ketchup is like a bottle full of string. You can see that pouring string out of a bottle is not going to be easy! But if you shake the bottle, the "strings" break apart into small pieces, which come out of the neck more easily.

Thixotropic solutions are also found in more exotic locations than the kitchen. Quicksand is a thixotropic mixture of sand and water. It looks like any other patch of sand, but once someone steps in it, the loosely packed molecules give way, causing the unlucky adventurer to sink into the quicksand.

Thixotropic mixtures of soil and water can be useful, however. Oil rigs use a thixotropic mix of clay to make "drilling mud." This mixture is pumped down a drilling hole to keep the drill bit cool and lubricated. Drilling mud remains a liquid when it is being stirred by the drill, but acts as a solid around the sides of the drilling hole, which helps to keep the hole from collapsing.

⁶Believe it or not, we have thixotropic fluid in our own bodies. This fluid is found in our elbows and knees, where two bones move against one another. It is called synovial fluid and it protects our bones and joints from damage. During normal movement, synovial fluid helps lubricate the joint. But if the joint is hit or suddenly twisted, the fluid immediately becomes thicker. In this way, synovial fluid helps protect our joints from injury.

Now you know all about the mysterious, helpful, and sometimes frustrating behavior of thixotropic solutions, which, because of their unique molecular structure, have some properties of both solids and liquids. Sometimes this can be helpful, as in the case of drilling mud and synovial fluid. Thixotropy can also be dangerous and deceiving, as in quicksand. Sometimes thixotropy is just plain curious—or irritating. It depends on how badly you want that ketchup out of the bottle.

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