Does tapping a can of fizzy drink really stop it foaming over?

June 14 2016, by Christopher Arthur Edward Hamlett, Nottingham Trent University

Credit: AI-generated image (disclaimer)

It is one of the distinct sounds of summer: the noise of people tapping the tops of their cans of fizzy drink before opening them. But does this widespread ritual really stop a can of beer or pop from gushing over?

When you open a can of fizzy drink, the refreshing "hiss" is the result of gas bubbles escaping from the liquid as a result of a change in the solubility of the carbon dioxide (CO2) in it. This change occurs due to the pressure inside the can decreasing from ~3 bar (can closed) to 1 bar at atmospheric pressure (can open). The solubility of CO2 in water reduces from ~4.5g in one litre of water at ~3 bar, to ~1.5g at atmospheric pressure, something that is described by Henry's Law.

Before the can is opened, microscopic gas bubbles attach to the inside of it (nucleation). When the can is opened, these bubbles increase in size, due to the decrease in the solubility of CO2. When these bubbles reach a certain size they detach from the inside of the can and rise up to the top of the can due to buoyancy and displace liquid in their path (as shown in Figure 1).

So what part could tapping the top of the can play in this process? Whether or not this technique actually works is the subject of some debate but there is a theory explaining why it may work. As described earlier, the bubbles in an unopened can nucleate at the walls (Figure 2a) so tapping the can before opening could dislodge some of the bubbles, enabling them to float to the top of the liquid.

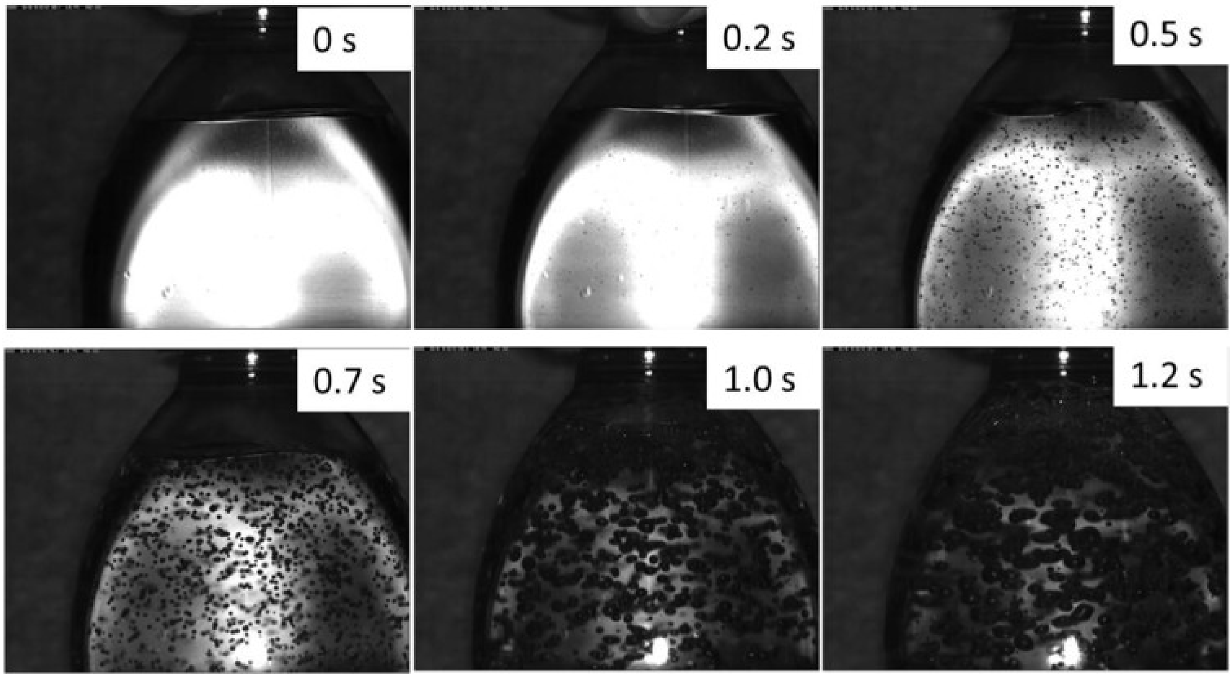

Figure 1: the bubble formation upon opening a bottle of sparkling water. Credit: captured specifically for this article

When a can is opened, the bubbles expand (Figure 2b) with those deeper within the liquid travelling further than those near the surface, displacing more of the drink and possibly resulting in greater amounts of ejected liquid. A "tapped" can will have fewer of these "deep" bubbles and so less liquid will be dislodged – and possibly sprayed out – than an "untapped" can (Figure 2c).

Bubbles also can be dislodged from the side of the can with violent shaking, of course – but this method introduces more turbulence which increases the energy of the system, resulting in more bubbles in the drink and more spraying when opened. Sharply tapping the top of an open beer bottle with another has a similar effect, commonly resulting in a colossal gush of beer foam. This is because pressure waves caused by the impact create tiny "mushroom clouds" inside the bottle that eject huge quantities of liquid as they escape.

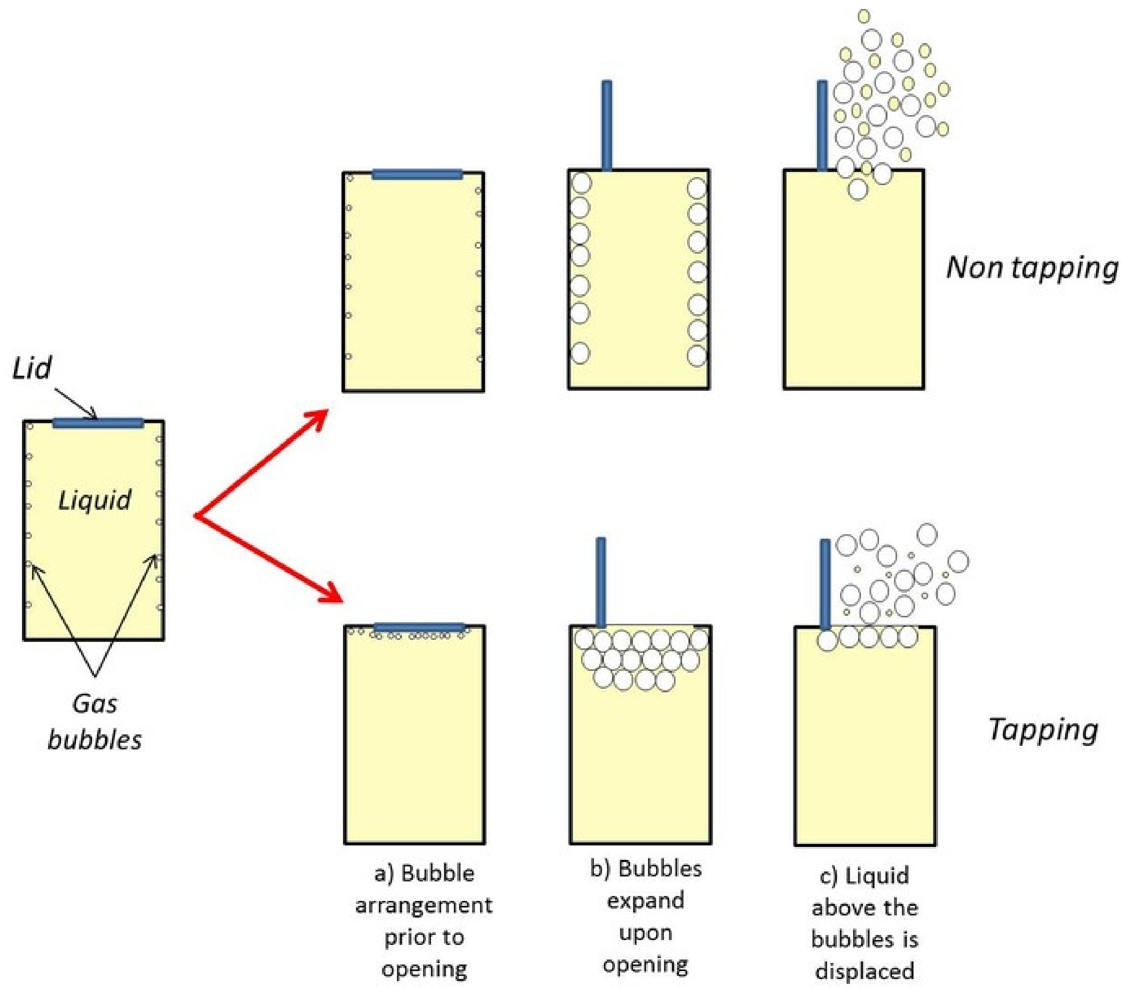

Figure 2: a possible mechanism for why tapping a can before opening may reduce gushing.

Glass and gushing

The debate of tapping aside, the actual material that the container is made from may also reduce gushing. It has been shown that the amount of foam formed when pouring beer into glasses of different "wettabilities" – the extent to which water wets a material – can affect not only the amount of beer head formed but also the size of the bubbles on the inside of the glass. This information is relevant when such bubbles are thought to be the cause of gushing.

Another important factor when it comes to the level of gushing is the stabilisation of the bubbles caused by the presence of large molecules in the drink. This is why some beers have long-lived foam heads compared to the short-lived bubbles at the surface of, say, sparkling water. But such foam stabilising agents are a conversation for another day.

So this summer why not try different ways of opening your fizzy drink – and see how much of it you end up wearing.

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