



national science week 2021

Boozy Bubbles

What are the bubbles in fizzy beverages made from?

The bubbles in most of our fizzy or sparkling drinks are made of carbon dioxide (CO₂) gas.

In closed, sealed carbonated beverage containers (beer cans, beer bottles, champagne bottles, soft drink bottles) the carbon dioxide dissolved in the liquid is in balance, or equilibrium, with gas stored in the space between the lid and the liquid. While in equilibrium the carbon dioxide gas will stay dissolved in the liquid. When that equilibrium is impacted (i.e. when you open the container) the dissolved gas comes out of the solution in the form of bubbles!

How do the bubbles in beer differ from other sparkling drinks?

Beer is much richer in proteins than soda or wine. Beer bubbles tend to be much finer and much more “stable” as they are protected by an invisible protein coating or “armour.” Generally, beer bubbles make it through your mouth and throat intact and don’t burst until they reach your stomach. This may contribute to the feeling of bloating that some people associate with drinking beer (watch a 'beer sommelier' explaining how pouring a beer the wrong way can give you a stomach ache - <https://www.youtube.com/watch?v=StMMa8uR2-0&t=101s>).

The protein in the beer is also responsible for the foam or head on a glass of beer.

Bubbles in Champagne and Prosecco don’t have the benefits of protein protection, but as they effervesce and pop on the surface of your drink they aerate the liquid and release the wine’s aromas adding to the flavour experience.

How do bubbles impact on our senses?

Bubbles can do a few things. Firstly they aerate the drink, enabling aromatic compounds to leave the liquid. These enter our nose (directly or via the back of our mouth) and enhance flavours.

Secondly, sparkling drinks capture light as the bubbles move, making them mesmerising to watch.

Thirdly, and this is really interesting, carbon dioxide in fizzy drinks set off the same pain sensors in our nasal cavities as mustard and horseradish, though thankfully at a lower intensity.

Carbonation can produce two distinct sensations. It makes things like drinks sour and also makes them burn. We have all felt that painful tingling sensation when a fizzy drink goes down your throat too fast!

The burning sensation comes from a system of nerves that respond to sensations of pain, skin pressure and temperature in your nose and mouth. You may not think of the fizz in soda as spicy, but your body definitely does.

This may explain why some people don’t like drinks with fizz. They may be more sensitive to these sensations.



Experiments to try at home

Beer:

Did you know that drinkers consume beer almost twice as quickly if it is served in a curved glass rather than a conventional straight one?

Curved glass



Straight glass



It took on average nearly 12 minutes for those who took part to down 355mL of lager from a straight glass. But from a curved glass it took seven minutes. There was hardly any difference if the alcohol was replaced with a soft drink.

Try different glasses with your friends next time you have a beer and see if you note any differences in drinking rates.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0043007>

Champagne and sparkling wine

There are around one million bubbles in a 100mL glass of champagne!

There are specific things you can do to ensure you maximise the bubbles you experience. Perhaps you've been to the bar and ordered a prosecco only to notice it looks flat?

Take two, matching champagne flutes and mark them "A" and "B". Wash both with detergent and water. Let "A" air dry in a clean environment (such as a dust free cupboard). Dry "B" using paper towel.

Once both are fill with sparkling white (could be sparkling white, champagne or prosecco). Which has the most bubbles?

You should notice that "B" has more bubbles. This is because bubbles need a nucleation point to seed on. In this case the fibres (cellulose to be precise) in the paper towel act as perfect points for dissolved carbon dioxide gas to be prompted to come out of solution.

Planning to serve bubbles at your next event? Avoid dishwashers and over cleaning glasses, unless you plan to polish them with cotton, linen or paper towel before serving.

Detergent and fat can also inhibit bubbles - so glasses that aren't rinsed of all cleaning products, lipstick and fatty meals can also limit your bubble experiences!

Soda water

Try soda water and still water at the same temperature. Which is more refreshing to you?

Chances are, if you drink sparkling water and still water, both at the same temperature, the sparkling water will seem more refreshing. In a sensory puzzle, it seems carbonation effects our sense of a drink's temperature.