Backyard chemistry

Prof Hal Sosabowski presents experiments you can do on your own

In this issue: the science of Space Dust

HALA JAWAD

Backyard science regularly examines the properties of confectionery. The experience of eating food in general but sweets and desserts in particular, is a combination of taste, smell and mouthfeel. Taste and smell combined are known as flavour, which curiously is much more smell than taste. Mouthfeel is all about texture. For example the creaminess of ice cream is caused by the particle size of both fat particles and ice crystals. If these are too big, the ice cream loses its creamy texture and feels rough. Some of the qualities that describe the concept of mouthfeel include: brittleness, crumbliness, crunchiness, density, viscosity, smoothness, and uniformity of bite/chew.

Some sweets rely almost solely on mouthfeel and have little if any taste. Sherbet tastes tart and fizzy since it contains citric acid (tart) and releases carbon dioxide (fizzy).

Space Dust is a rocky type of bagged sweet which was in vogue in the early 1980s. Although it is supplied in various flavours, like sherbet, it relies mainly on mouth sensation for its uniqueness. The sensation experienced when chewing Space Dust is of very small detonations (pops) in your mouth. This led to an urban myth that when Space Dust eaten along with some fizzy drink, there was a risk of your stomach exploding! This led to it being temporarily discontinued in 1983 in the US.

In this experiment we will demonstrate that a small crystal of Space Dust contains more than its volume of carbon dioxide. This is possible due to the manufacturing process which causes pressurised carbon dioxide to be trapped inside the crystals of space dust.

Materials

You will need:

- Space Dust (available on ebay or Amazon, branded as Fizz Wizz, 10 packets for about £1.40 + postage)
- tablespoon or a pestle and mortar
- 0.5 l bottle of fizzy drink
- balloon
- narrow-mouthed jar.

Method

Experiment1:

Eat some Space Dust and feel the pop when you chew the rocks.

Experiment 2: crushing Space Dust

Place some crystals on a hard surface or in the mortar and crush them with the back of the spoon or the pestle. As the crystal ruptures, the carbon dioxide rapidly escapes causing a pop. This is directly analogous to a balloon popping.

Experiment 3: measuring the amount of CO_2 in Space Dust

Pour a bag of Space Dust into the empty balloon. Attach the balloon to the neck of the full bottle. Don't let the Space Dust fall into the liquid. When the balloon is attached, lift up the balloon to allow all of the Space Dust to fall into the drink. The balloon should inflate.

The science

Space Dust contains sugars (sucrose, lactose, glucose, artificial flavour, and carbon dioxide). The sweets are prepared as any other, by melting the sugars and fusing them into rocks/crystals but this is done under fairly high pressure of carbon dioxide (4140 kPa) which causes bubbles of pressurised CO_2 to be trapped within the crystals.

Curiously, you may have noticed that the balloon doesn't inflate very much and conclude that there isn't much CO_2 within the packet of Space Dust. You would be correct. But there is even less than this experiment has shown. Adding anything with rough edges to fizzy drink causes the dissolved carbon dioxide to come out of solution more quickly. Most of the CO_2 in the balloon is from the fizzy drink and not from the Space Dust. So,we have conclusively demonstrated the low likelihood of Space Dust eaters' stomachs exploding and debunked an urban myth!

Did you know?

The urban legend that Pop Rocks and Space Dust caused your stomach to explode forced the US Food and Drug Administration to set up a hotline to reassure anxious parents.

Health & Safety

There are no particular health and safety issues connected with this experiment.

This article is based on an idea originally seen at Steve Spangler Science.