

Fruit Smoothie

(A Change In State Of Matter Experiment)



Time

20 minutes
(including eating and clean up)

WHAT YOU'LL NEED

(Provided in Primary Science Pack)

✓ Dry Ice (250g)



Always replace lid on dry ice box immediately after use.

You will also need:

✓ 750 ml smoothie

✓ 100g Sugar

✓ Food Processor with blade

✓ Plastic/Ceramic Bowl

✓ Disposable spoons & bowls

BACKGROUND

This experiment explores the effect of temperature on a fruit smoothie changing it to a sorbet.

The most delicious demonstration we have! This works well as an end-of-term treat or perhaps for an open day/sports day crowd-pleaser. Hopefully most of the class can enjoy this non-dairy treat, but please check for fruit/food allergies.

Some of the carbon dioxide evolved from the dry ice will absorb into the mixture and will provide a very small amount of fizz – be prepared for applause!



Picture courtesy St Hilary's School, Godalming

What To Do



1. Place 250g dry ice in a food processor. Blitz for approx 10 seconds until the ice turns to powder
2. Pour the powder into a bowl. Examine the powder to satisfy yourself there are no large lumps of dry ice remaining. If you do see residual pellets you will need to blitz again.
3. Pour smoothie mixture into the food processor and add the sugar. Pulse a few times to help the sugar dissolve.
4. Add about half the dry ice and as soon as possible switch processor on. You will see a column of white fog leaving the machine and you should pick up the aroma of the smoothie.
5. When the fogging has died down remove the bowl and add small amounts of additional powdered dry ice, continually stir with a wooden spoon or whisk. You will start to see that the smoothie is becoming a thick liquid and that the dry ice causing it to foam and bubble in the bowl. Keep adding small amounts of dry ice until the smoothie mix has set like an ice cream.
6. Wait a few minutes before serving to ensure the dry ice has sublimed. The fruit sorbet mixture should not be too hard - if you can cut it easily with a spoon the dry ice has gone and it is ready to eat. (If dry ice were still present it would freeze adjacent smoothie mixture rock hard.) This is another reason for breaking the dry ice into a powder in your processor.



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What's Happening?



When the sorbet mixture is chilled water ice crystals start to form and this continues through the chilling process. When an ice crystal is formed it attracts surrounding moisture to it and therefore grows in size. The objective is to create lots of small ice crystals so that the resultant ice cream feels smooth and creamy in your mouth, rather than fewer larger water ice crystals which will feel gritty and sharp in the mouth. For this reason it is necessary to chill down the contents as quickly and evenly as possible.

Food grade dry ice for chilling down is a good choice as it is very cold and can be mixed into the bulk of the ice cream mixture. Dry ice works best with fruit flavoured ices and sorbets, this is because any residual CO₂ absorbed into the smoothie from the dry ice causes a slight tartness on the tongue due to formation of carbonic acid with water which complements fruity flavours.

i TEACHER'S NOTES

Using the equipment supplied and following these instructions means that the demonstration is very safe – as always please read the safety information on dry ice provided with these downloads and available from www.chillistick.com

Make sure all the dry ice used to freeze the sorbet mix has sublimed before serving.



Picture courtesy The Greyhouse School, Hartley Witney