Fruit Cloud & Smoking Drinks

This demonstration allows you to offer a smoking drink to deserving students of all ages.

**Things you need**

- **Ice Cage** (provided with chilly science pack)
- **Cordial** (we like blackcurrant!)
- **Pitcher** provided with chilly science pack (please ensure it has been thoroughly washed)
- **Cups** for each student
- **Large White Bucket** (provided with chilly science pack)
- **Chillisticks** (provided with chilly science pack)
- **Hot Water**
- **Lightweight Gloves** (provided with chilly science pack)

**Time**

10-15 minutes

**Instructions**

Put some cordial into the washed clean jug provided with the Chillistick pack. Once prepared ask the students if they can smell the drink – how near do they need to get to smell the drink?

Load the ice cage as follows:

The Ice Cage is made from very strong polycarbonate. It has our safety valve system so that you can add dry ice to the cage and then put the cage into any drinking vessel or container you wish. The liquid will contact the dry ice within the cage giving a great smoke effect. The ice will not fall out as it is trapped so that this device can be used for pitchers/jugs of all types. See the photos above.
Before Use

- Wash the Ice Cage – it is dishwasher safe, drain and dry thoroughly.
- Please note that the Ice Cage has a flexible valve at one end, this valve is used to load dry ice into the Ice Cage, once loaded the dry ice can only leave by evaporation.
- A loading tube is supplied as part of the kit, see photo above.

Using the Ice Cage

- The Ice cage is filled by pushing the loading tube through the safety valve, see middle photo above.
- Wearing the gloves provided. Open the box of ice and scoop ice into the cage via the loading tube.
- When the Ice Cage is half full remove the loading tube and the ice cage is ready.

Drop the filled ice cage in to the filled pitcher, you will see the characteristic white fog develop. Your students should also be able to smell the drink as the aroma is being spread by the fog.

The dry ice is food grade and provided everything is clean there is no reason why the students shouldn’t be allowed a drink.

When pouring from the pitcher some fog will carry over into the glass. No dry ice will go into the glass as this is being contained with the ice cage.

For a more spectacular effect (perhaps an assembly) you could create a fruit cloud… Fill the large white plastic bucket half-full with very hot tap water, or water which has boiled and been allowed to rest for 3 minutes and place somewhere prominent. Add to this about 1/3rd of a bottle of squash. Using the polycarbonate cup provided in the pack fill in the ratio of one full cup (about 200g) to one litre of hot water. The hotter the water the better the cloud effect, but please do not use boiling water.

The fruit aroma should be very apparent! Note: this is not intended for drinking.

Also included in the education pack are 5 chillisticks. They have been included to show a solution to a problem and not to be used for serving cocktails! It is not safe to put a piece of dry ice in a drink as there is a chance that it might be swallowed.
so how do you make it safe? The chillistick is hollow and is designed to trap some dry ice behind a flexible plastic valve. I drinks and provide a safe fun effect at a wide range of social occasions. The only way the dry ice can leave the chillistick is by subliming to CO\textsubscript{2} gas!

**Class discussion**

CO\textsubscript{2} gas is dissolved into all carbonated fizzy drinks and dry ice is CO\textsubscript{2} in its solid form so if we drink a lot of soda we burp!!

**Why is the smell of the flavoured liquid so apparent?**

It is all about surface area. The diameter of the liquid droplets in the fog are about 20 microns (20 x10^{-6}m). We estimate that the volume of atomized liquid in the fog is 2ml. From this we can estimate the surface area of the fog and see how it compares with the static liquid surface in the original container.

Assuming a container with a diameter of 10cm we estimate that the cloud has a surface area over 300 times bigger than the original surface area. Some of the liquid in these tiny spheres will evaporate and some of these tiny droplets are bound to find their way up your nose! Some students might like to take this calculation on…..

**Is the drink fizzy?**

Probably not. If you leave dry ice in a small quantity of liquid for an extended time it will become slightly carbonated. For CO\textsubscript{2} gas to dissolve into a liquid you need low temperatures and high pressure, this is how fizzy drinks are made. We are adding dry ice to liquid at atmospheric pressure, so we only have low temperatures to help, and this is why you will only detect a small amount of fizziness when the liquid is very cold. But see the fizzy fruit experiment!

**What happens if we put this in a fizzy drink?**

Would you believe it – the drink will go flat! This is because the bubbles from the dry ice pull CO\textsubscript{2} which has been absorbed in the soda out of solution.

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