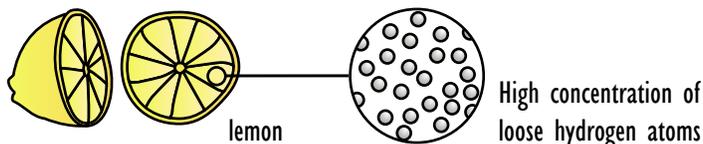


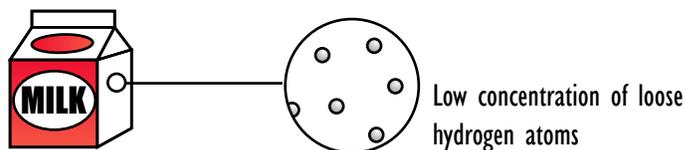
Why do some foods taste sour?

What is it that makes some foods taste sour?

Sourness is caused by one kind of atom - a hydrogen atom. When foods have a high concentration of loose hydrogen atoms (also called hydrogen ions) they taste sour. The higher the concentration of loose hydrogen atoms in a food, the more sour it tastes.



You can make a dye that tells you how many loose hydrogen atoms are in something, and use this dye to test foods for sourness. With the dye, you won't even need to taste the foods to find out how sour they are!



What you need:

- one red cabbage
- blender or food processor (if you don't have this, you need a sharp knife)
- one coffee cup
- hot water (recently boiled)
- one strainer
- one bowl
- one white ice cube tray, or empty white styrofoam egg carton
- one teaspoon or other small spoon
- vinegar
- water
- paper and pencil
- light-colored liquid food and drink, some of them sour (e.g. orange juice, lemon juice, milk, juice squeezed from fruits)

Make your dye:

If you **do** have a blender or food processor:

- Peel two whole large leaves from the red cabbage.
- Tear the leaves into small pieces and put them in the blender.
- Half fill a coffee cup with the hot water, then pour the water onto the cabbage leaves in the blender.
- Run the blender until the cabbage leaves are turned into mush.
- Hold the strainer over the bowl.
- Pour the cabbage leaf mush into the strainer so that the dark purple juice runs into the bowl.
- Throw away the mush in the strainer.
- The purple juice in the bowl is your dye.

If you **don't** have a blender or food processor:

- Peel two whole large leaves from the red cabbage.
- Chop the leaves with a knife as finely as possible. The finer you chop the better your dye will be.
- Half fill a coffee cup with the red cabbage pieces.
- Pour hot water over the cabbage pieces until they are just covered.
- Leave the cabbage soaking in the hot water overnight.
- The next day, hold the strainer over the bowl.
- Pour the soaked cabbage pieces and water into the strainer, so that the dark purple juice runs into the bowl.
- Throw away the mush in the strainer.

Test your dye:

- Fill the measuring spoon with vinegar, then put the vinegar in **one** well of the ice cube tray.
- Wash off the spoon.
- Add one spoonful of your dye to the well of vinegar.

What color does the dye turn?

The dye turns this bright pink color when it is mixed with something that has a lot of hydrogen ions, that is, things that taste sour.

So when a food makes the dye turn bright pink, it is sour.

- Write "sour" on a piece of paper and put it next to the well of vinegar and dye.

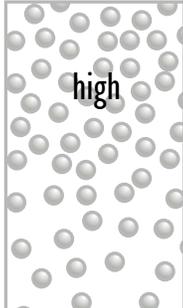
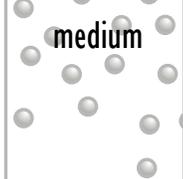
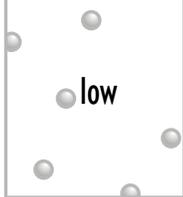
- Now wash off the spoon and fill it with water.
- Put the water in an empty well of the ice cube tray.
- Add one spoonful of your dye to the well of water.

The dye stays this purple color when it is mixed with something that has only a few hydrogen ions, that is, something that isn't sour.

So when the food doesn't change the dye's color, it isn't sour.

- Write "not sour" on a piece of paper and put it next to the well of water and dye.

When a food turns the dye a color between bright pink and purple, the food is just a little bit sour.

color of your dye	concentration of loose hydrogen atoms	sourness
bright pink		sour
pinky-purple		a little sour
purple (or sometimes green/yellow)		not sour

Now test the foods:

Now that you know what the dye looks like in foods that are sour and food that are not, let's test some unknown foods and predict how sour they are.

- Ask a friend to put one spoonful of each food in its own well of the ice cube tray (don't peek! You should not know what food is in each well). Make sure they wash off the spoon between each food.
- Ask your friend to add one spoonful of dye to each well of food.
- Now you look at the color of the dye for each food. Compare the colors with the tests you did before.
- Write down your predictions of which foods are sour and which are not. Which are a little sour?
- Ask your friend to reveal what each food is, and both of you taste the foods, to check your predictions.
- As you taste, think about what is happening on your tongue: trillions of tiny hydrogen atoms are interacting with molecules on your tongue, making you experience the sour taste.