

What Atoms Are In Sour Foods?

Materials Needed:

Five amber dropper bottles filled with:

orange juice (pulp free)

milk

lemon juice

vinegar

water

dropper bottle with green dye (pH indicator diluted to 20% in water

Mircoessential lab 718-338-3618 #UI102)

plastic cups

marker

Notes:

All liquids are undiluted. Any indicator dye that can differentiate between pH 2, 4 and 6 will work

The Science Behind the Investigation:

Dye is added to unknown liquids. The dye turns different colors depending on the concentration of loose hydrogen atoms (hydrogen ions). Each food turns a different color, and the foods that are the most sour have the highest concentration of loose hydrogen atoms. The foods that are the least sour have the lowest concentration of loose hydrogen atoms. By looking at the color of the dye, students can predict which foods are the most sour and which are the least sour.

Related Science:

Foods that taste more acid have a higher concentration of loose hydrogen atoms (hydrogen ions). Hence the vinegar and lemon juice, that taste most sour are acids. The orange juice, that tastes a little sour, is also acidic, but less so than the vinegar and lemon juice.

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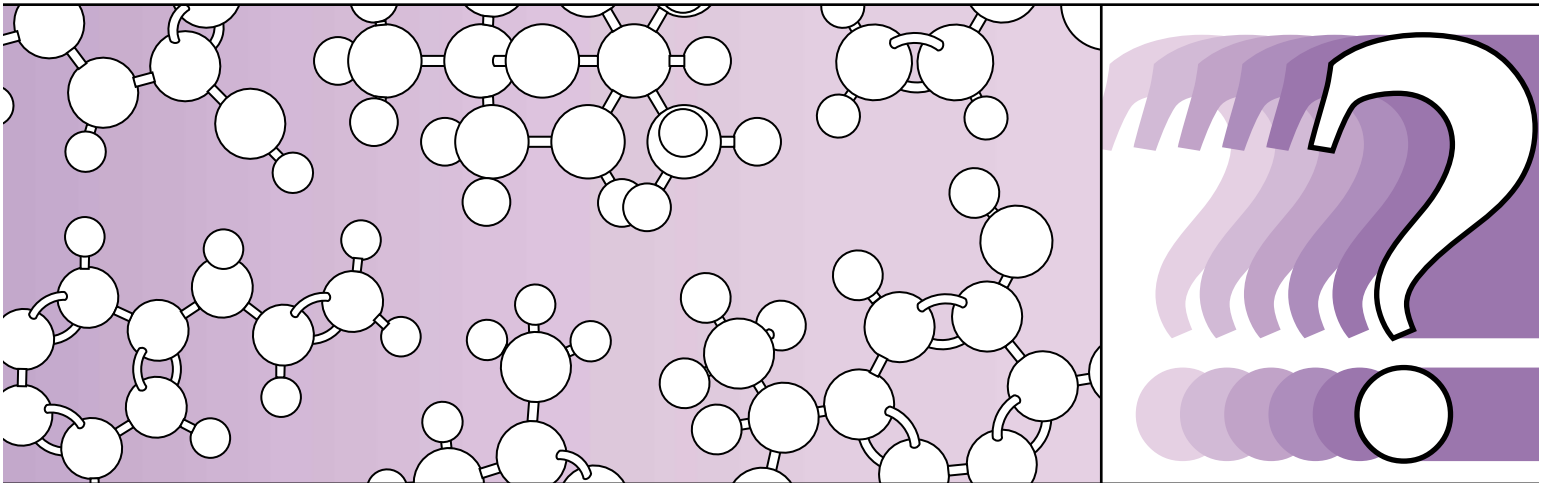
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Discovery Lab

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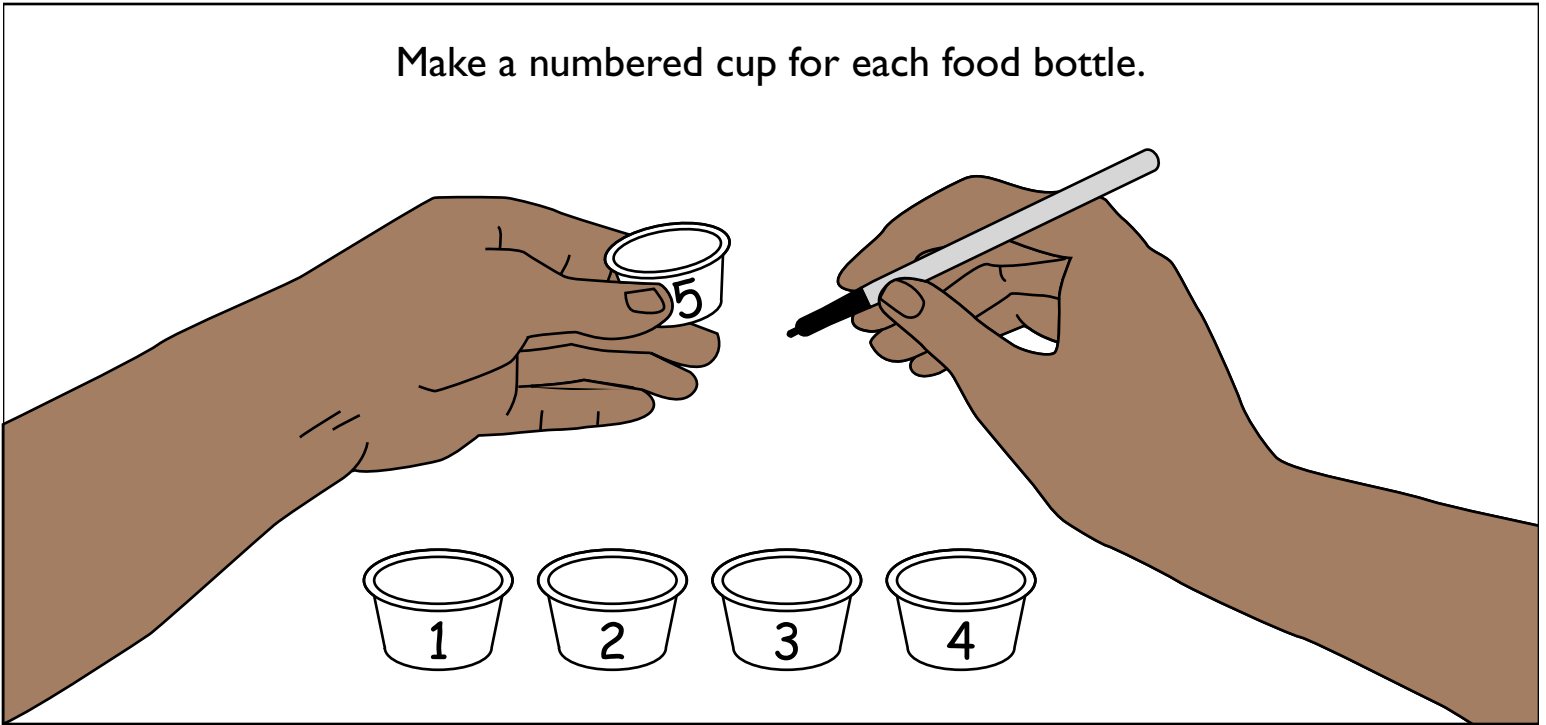
What is it that makes some foods taste so sour?

Foods are sour when they have a high concentration of loose hydrogen atoms.

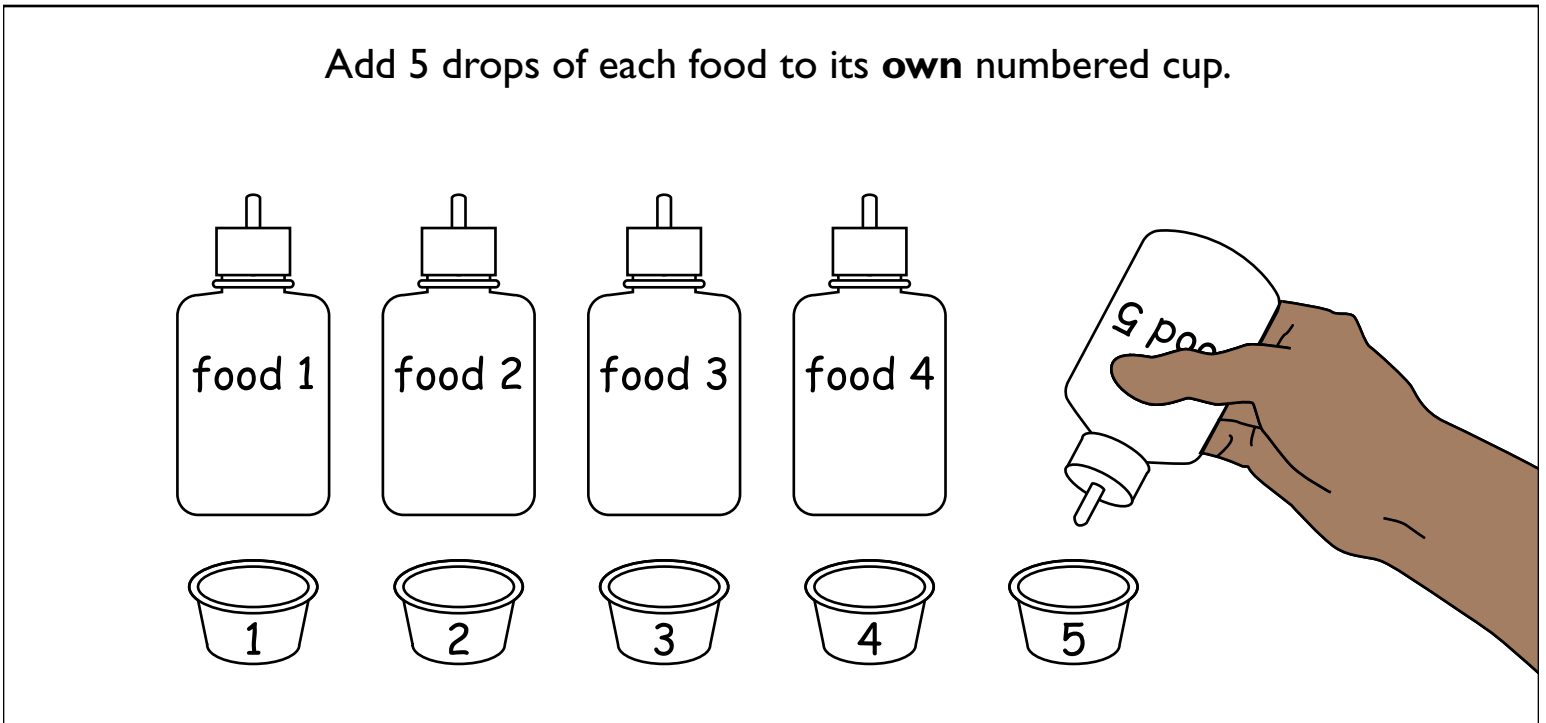
Atoms are tiny particles that make up us and everything we see around us. Atoms link together to make molecules.

Do an experiment to predict how sour some foods are without tasting them.

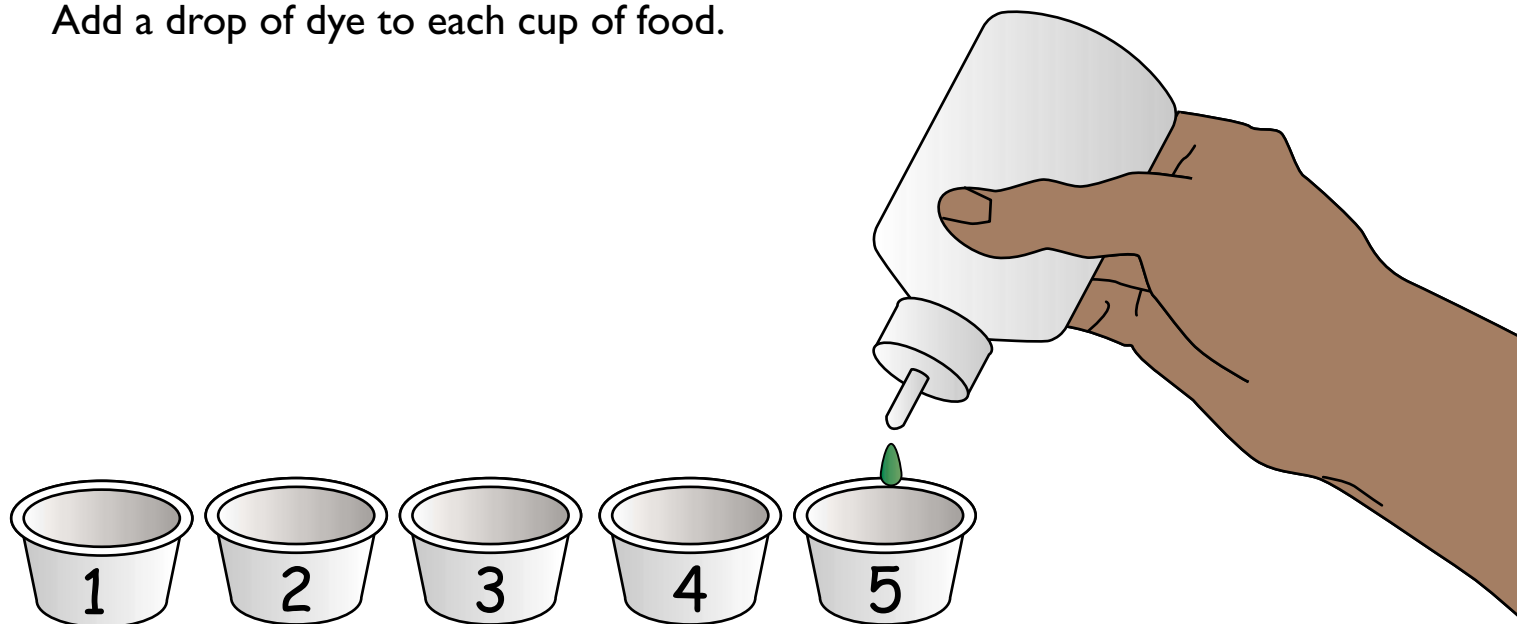
Make a numbered cup for each food bottle.



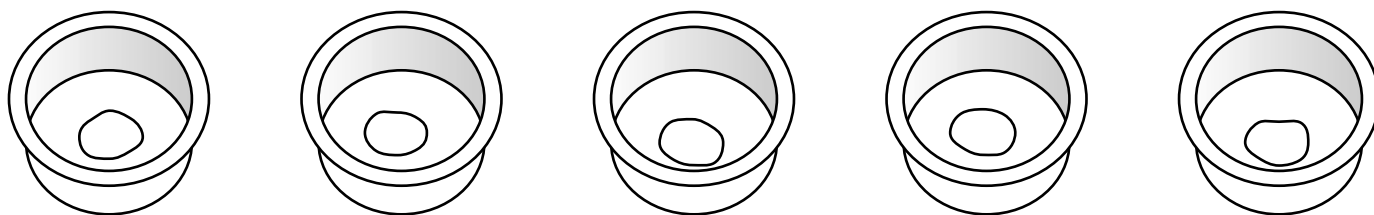
Add 5 drops of each food to its **own** numbered cup.



Add a drop of dye to each cup of food.



The color of the dye shows the concentration of loose hydrogen atoms in the food.

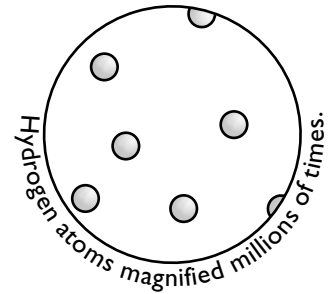
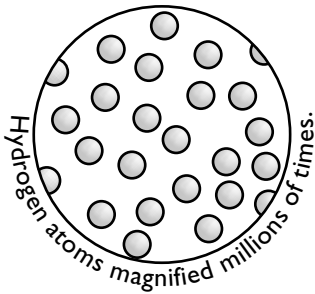


This chart shows you what the dye colors mean:



High concentration of loose hydrogen atoms

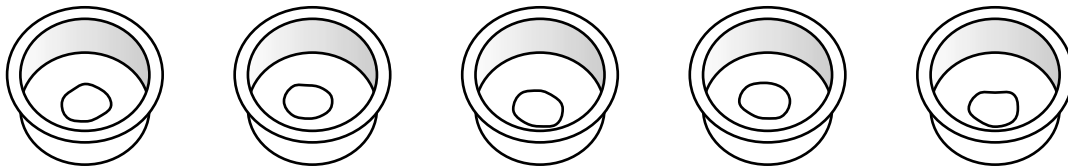
Low concentration of loose hydrogen atoms



Put the cups in order, from high concentration to low concentration of loose hydrogen atoms:

High concentration of loose hydrogen atoms

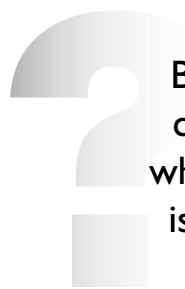
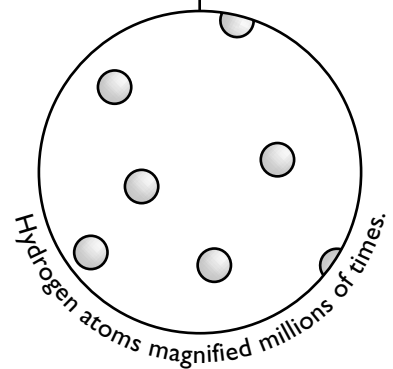
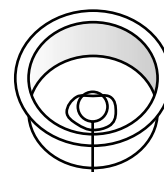
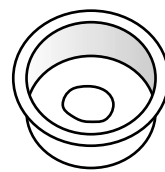
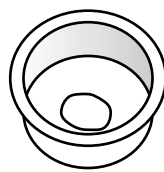
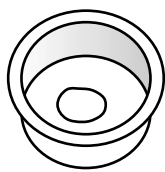
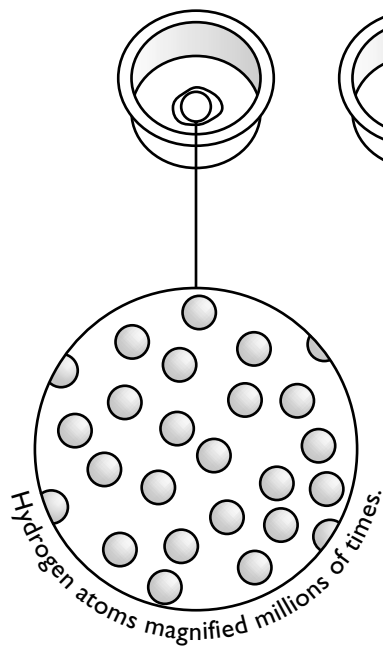
Low concentration of loose hydrogen atoms



Some foods might be the same.

The food with a **high concentration** of loose hydrogen atoms is the **most sour**.

The food with a **low concentration** of loose hydrogen atoms is the **least sour**.



By looking at the color of the dye, which number food is the most sour?



Which number food is the least sour?

Lift the flap to find out what each of the foods are.



Vinegar



Water



Milk



Lemon
juice

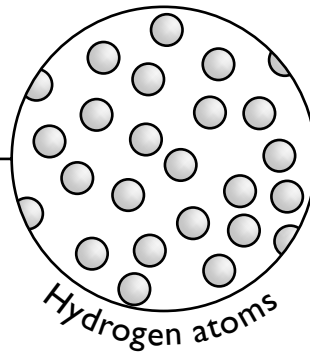
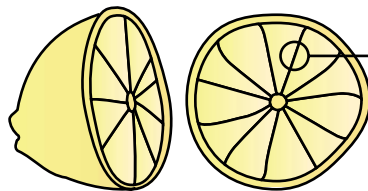


Orange
juice



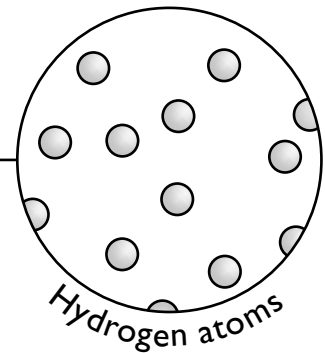
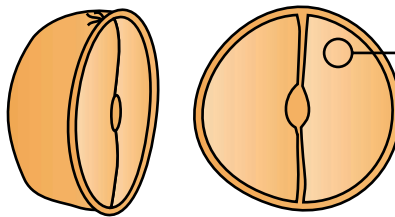
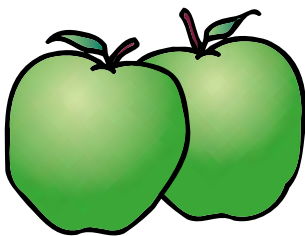
Does the sourness of these foods match
what you predicted using the dye?

These foods are all very sour because they have a high concentration of loose hydrogen atoms.

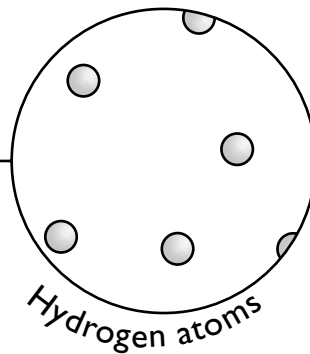
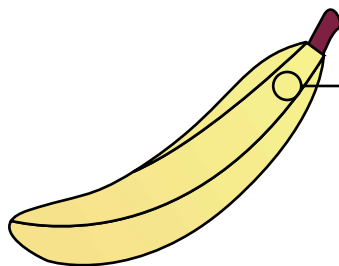


What other sour foods can you think of?

These foods are just a little bit sour because they have an intermediate concentration of loose hydrogen atoms.



These foods are not sour because they have a low concentration of loose hydrogen atoms.



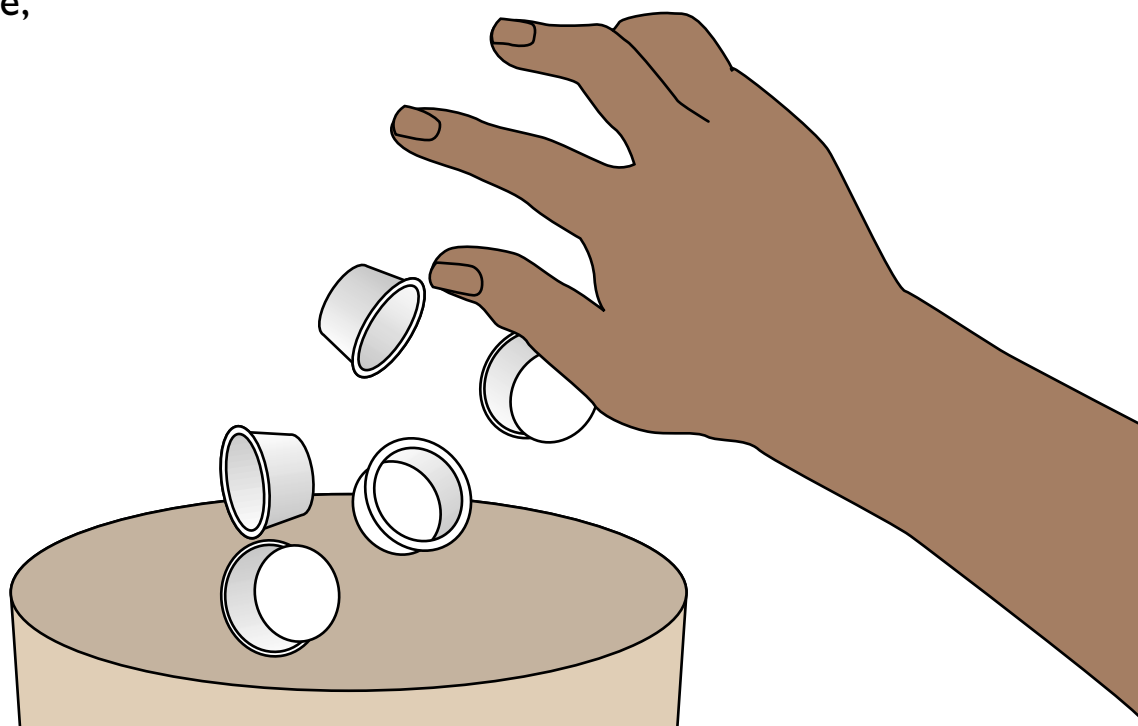
What other foods can you think of that are not sour?

Do you have questions about this activity,
or about food and molecules?

Maybe you can find the answer by
experimenting some more.

Ask a staff person if
you need help.

When you are done,
please throw the
cups in the trash.



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