

How Do Antacids Work?

Materials Needed:

Bottle of antacid (the tablets should be broken into smaller pieces)
A Mortar and pestle
Dropper bottle with fake stomach juice = (0.01M HCl, or use vinegar)
Round wooden sticks in plastic container
Dropper bottle with dye= (pH indicator diluted to 20% in water,
Mircoessential lab 718-338-3618 #UI102)
Plastic cups

Notes:

Any indicator dye that can differentiate between pH 2 and 7 will work.

The Science Behind the Investigation:

Dye is added to fake stomach juice (hydrochloric acid). The dye changes color depending on the concentration of loose hydrogen atoms (hydrogen ions) around it. The fake stomach juice has a high concentration of loose hydrogen atoms and turns the dye red.

When crushed antacid is added to one cup, the dye slowly turns yellow, then green. The green color indicates there is a low concentration of hydrogen ions. The number of hydrogen ions has gone down because the molecules in the antacid soak up the loose hydrogen atoms in the fake stomach juice.

Heartburn is caused by stomach juice (an acid) burning the esophagus. Molecules in the antacid soak up the loose hydrogen atoms in stomach juice, and relieve the pain of heartburn.

The name antacid means anti-acid (against acid). Anything with a high concentration of loose hydrogen atoms (hydrogen ions) is an acid. Stomach juice is an acid. Antacids soak up loose hydrogen atoms, so are "against acid". We say they "neutralize" the acid.

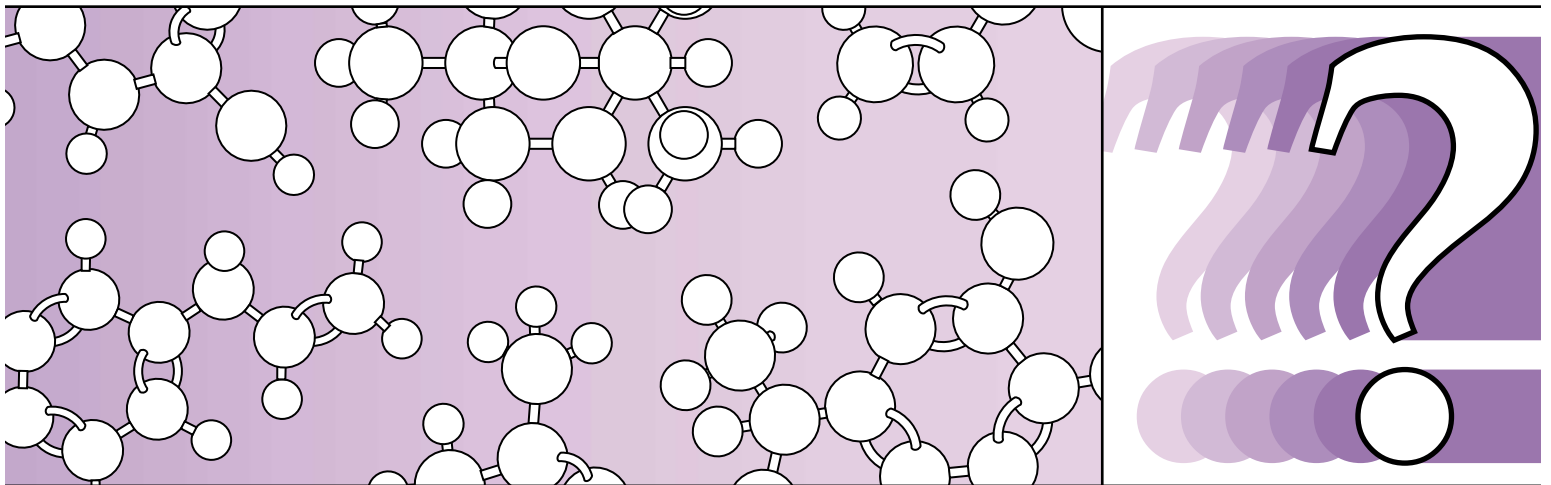
Related Science:

Any molecule that can soak up loose hydrogen atoms acts as an antacid. Try neutralizing the stomach acid with sodium bicarbonate or chalk.

The Pfizer Foundation Biochemistry

Discovery Lab

How do antacids work?

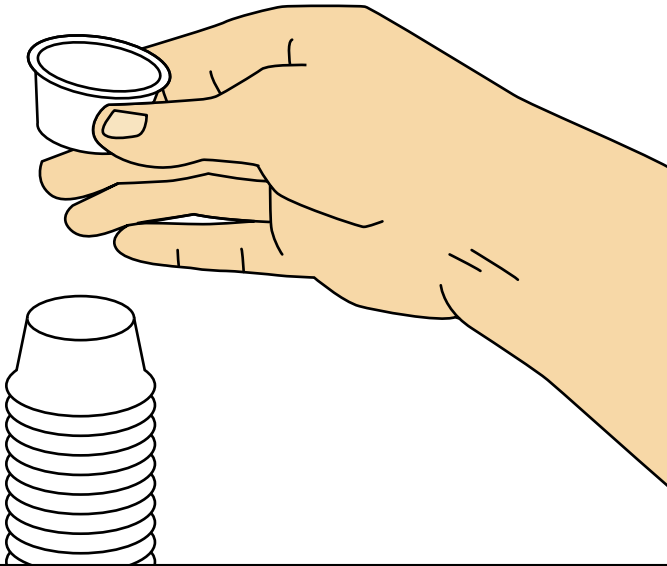


You just ate a big meal and feel heartburn coming on.

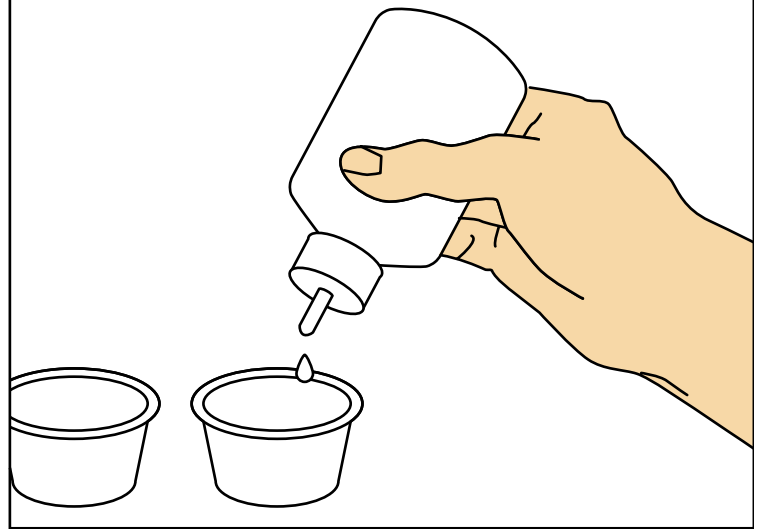
You take an antacid and soon feel better.

**Do an experiment to find
out how antacids work.**

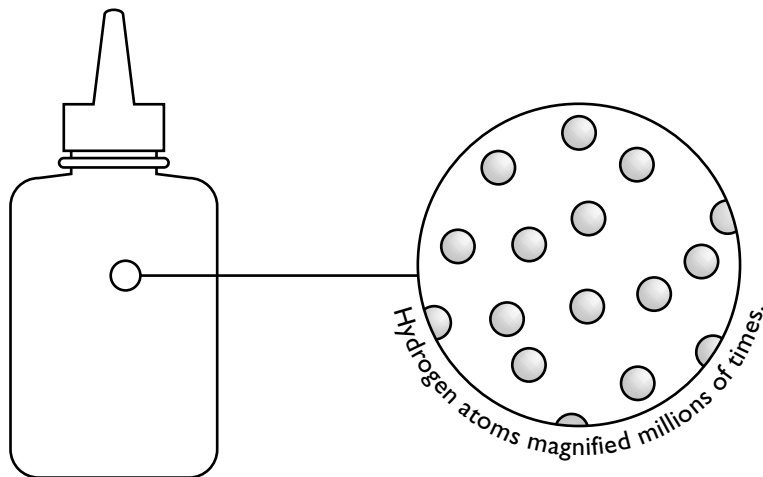
Collect two plastic cups.



Put 10 drops of fake stomach juice into each cup.



Stomach juice contains loose hydrogen atoms.

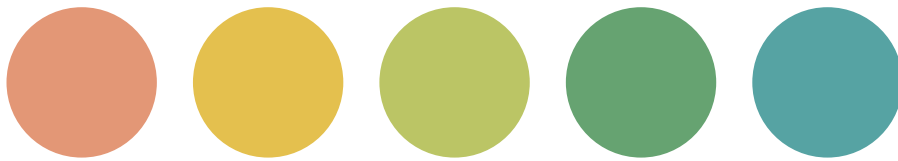


Atoms and molecules are tiny particles that make up us and everything around us.

Add a drop of dye
to both cups of
fake stomach juice.



The color of the dye shows you the number of
loose hydrogen atoms in the stomach juice.



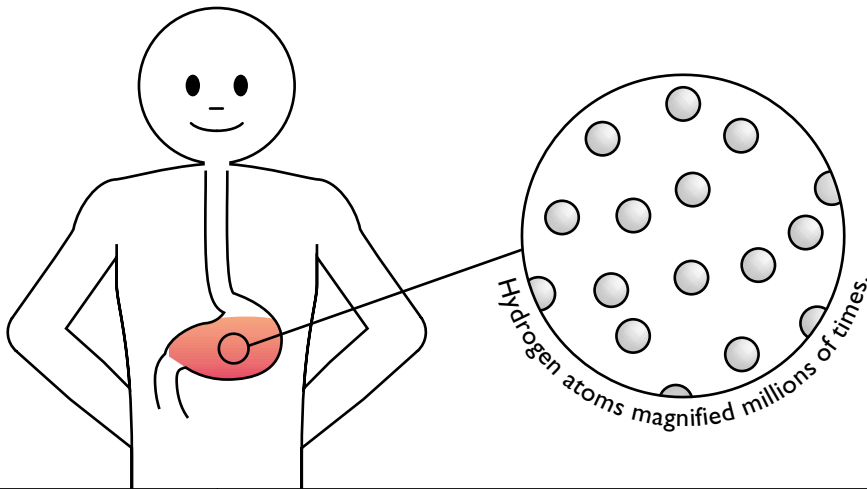
Lots of
hydrogen
atoms

Very few
hydrogen
atoms

How many
hydrogen atoms
are there in
stomach juice?

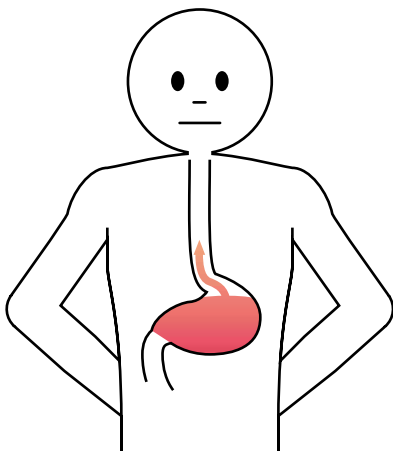
What about real stomach juice?

Real stomach juice, like the fake stomach juice in your experiment, has lots of loose hydrogen atoms in it.

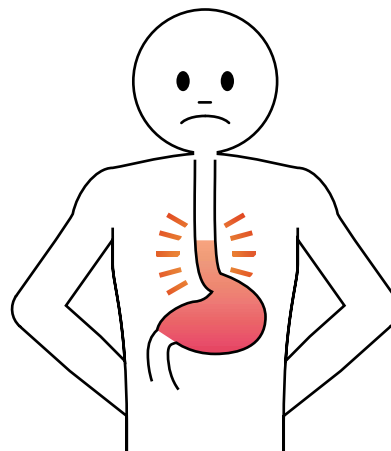


Your stomach uses the loose hydrogen atoms to digest food.

But sometimes stomach juice spills into the tube above the stomach.

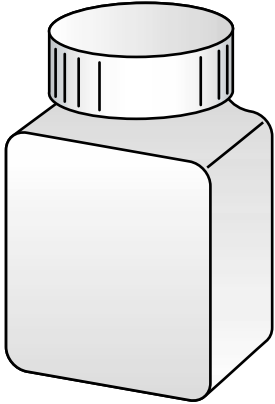


Hydrogen atoms are not meant to be in the tube above the stomach, and cause a burning feeling.



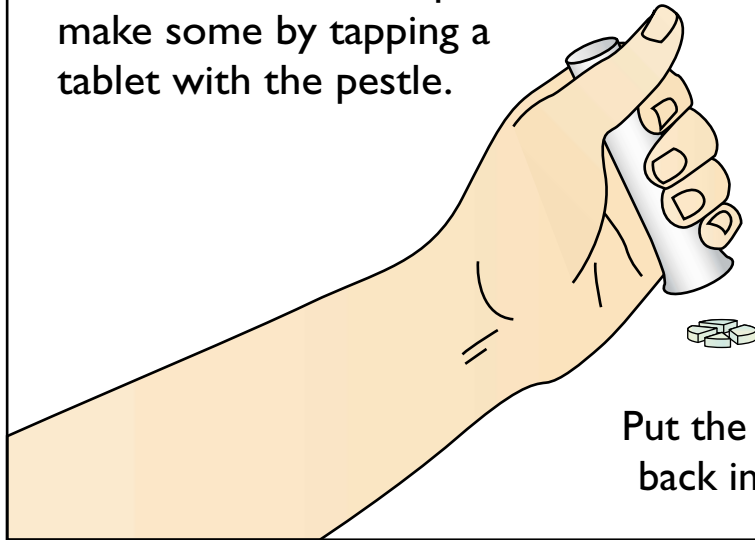
This pain is called heartburn.

When we get
heartburn,
we take an antacid.



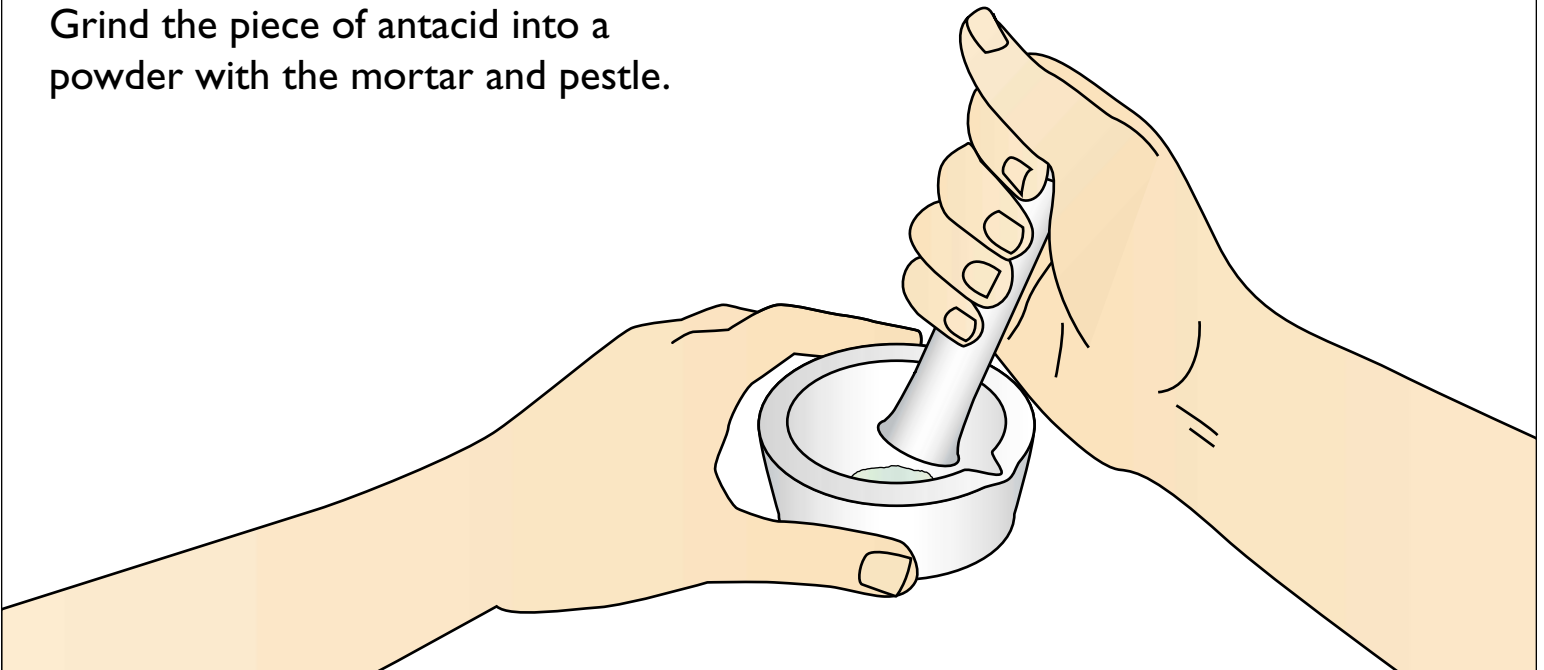
Take a small piece of antacid from the bottle.

If there are no small pieces,
make some by tapping a
tablet with the pestle.

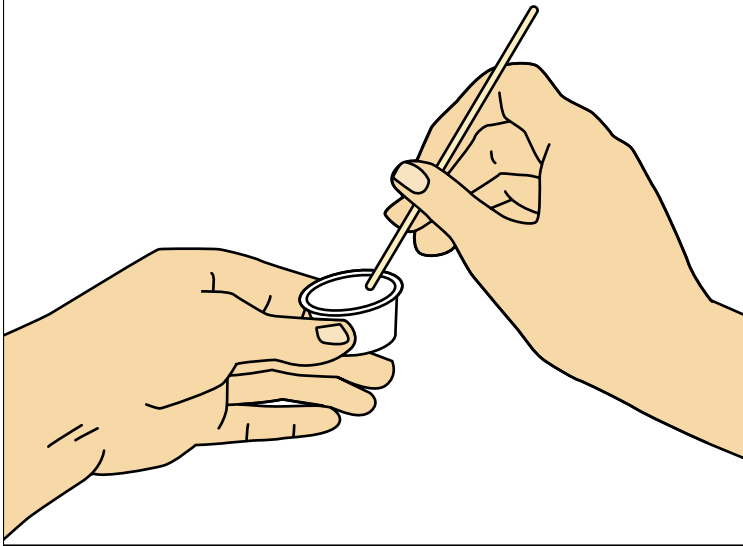


Put the extra pieces
back in the bottle.

Grind the piece of antacid into a
powder with the mortar and pestle.

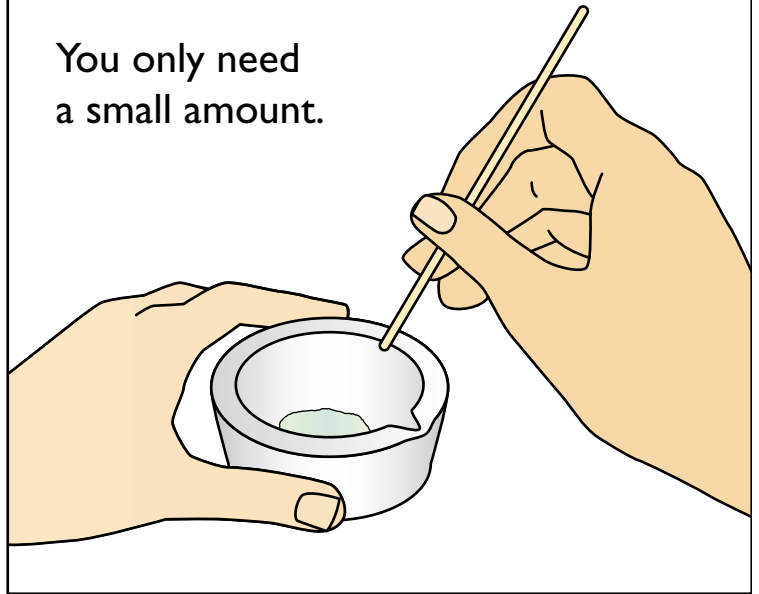


Dip a wooden stick into one of your cups of stomach juice to make it wet.



Pick up some of the antacid powder with the wet stick.

You only need a small amount.



Mix the antacid powder into one of your cups of stomach juice and dye.

Leave the other cup alone.

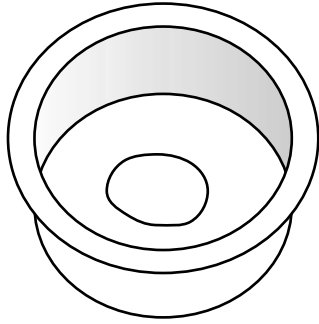


Keep mixing until the stomach juice changes color.

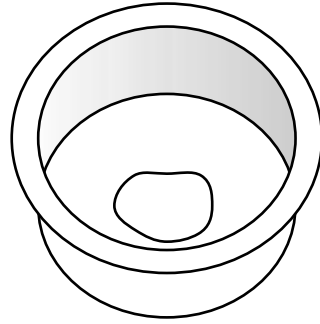
Be patient — it may take a minute.

Compare your two cups.

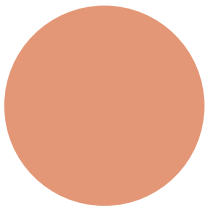
stomach
juice



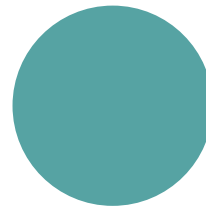
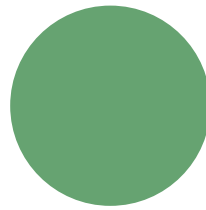
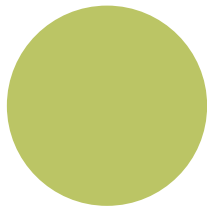
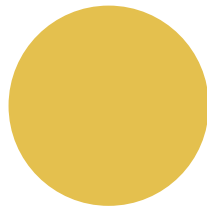
stomach juice
+ antacid



What did the antacid do to the number of hydrogen atoms in the stomach juice?



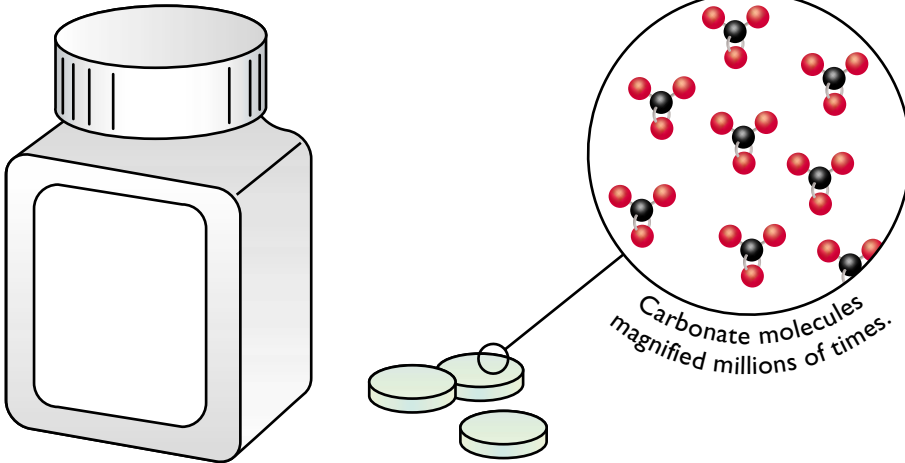
Lots of
hydrogen
atoms



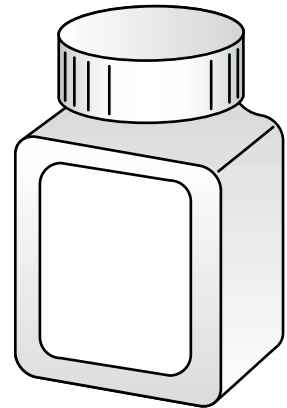
Very few
hydrogen
atoms

How did the antacid take away the hydrogen atoms?

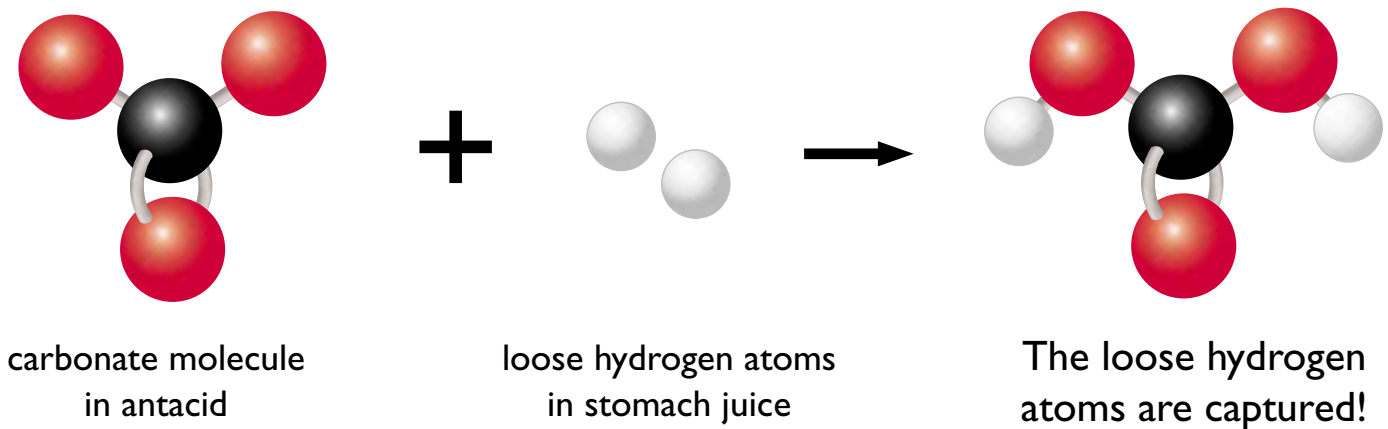
The antacid contains carbonate molecules.



Find carbonate in the active ingredients on the antacid bottle.

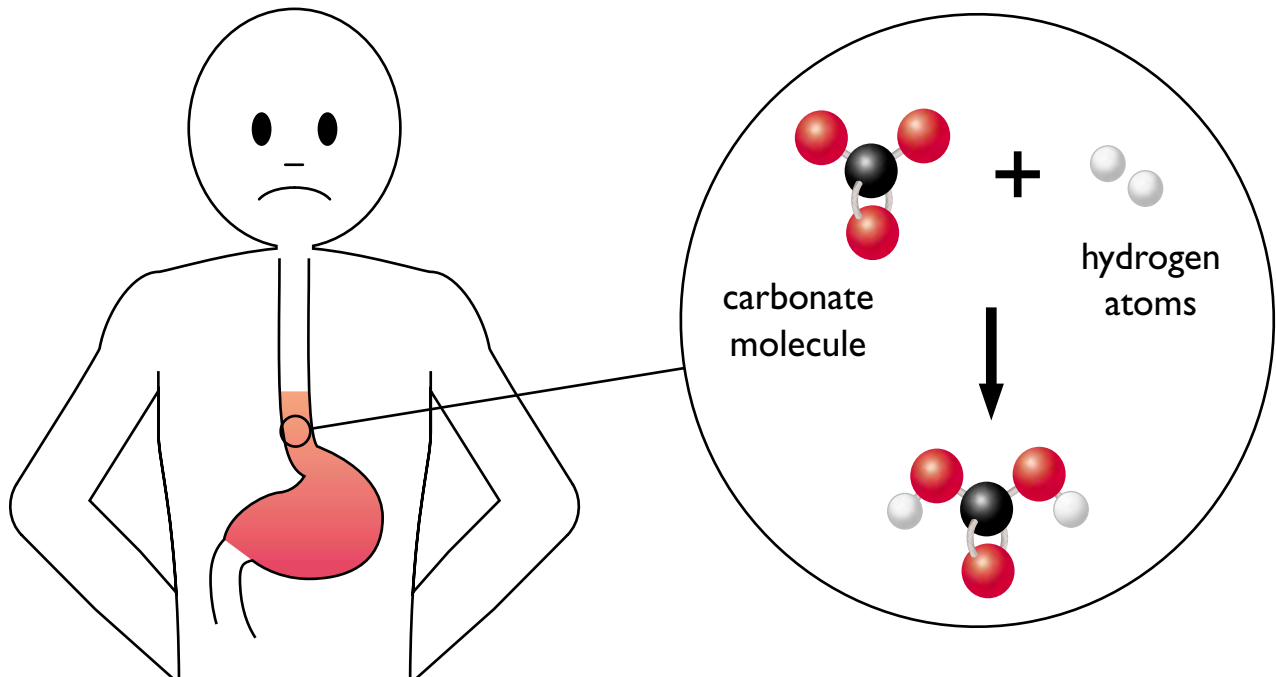


The carbonate molecules capture the loose hydrogen atoms to make a different molecule:

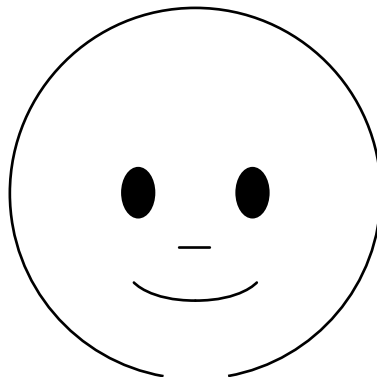


How do antacids get rid of heartburn?

Just like in your experiment, the carbonate molecules in the antacid capture the loose hydrogen atoms in your stomach tube ...



... and the burning pain of heartburn goes away.



antacid = "anti-acid"

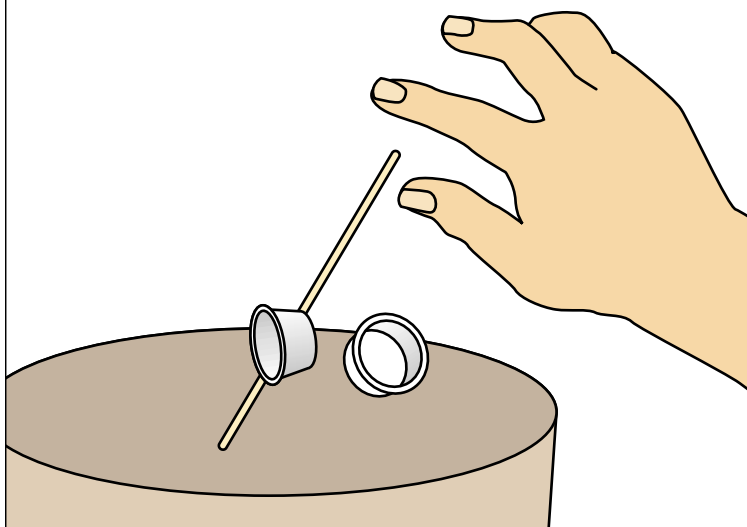
Antacids get their name because they remove (or neutralize) acid, which is the same as removing hydrogen atoms.

Do you have a question about molecules and antacids?

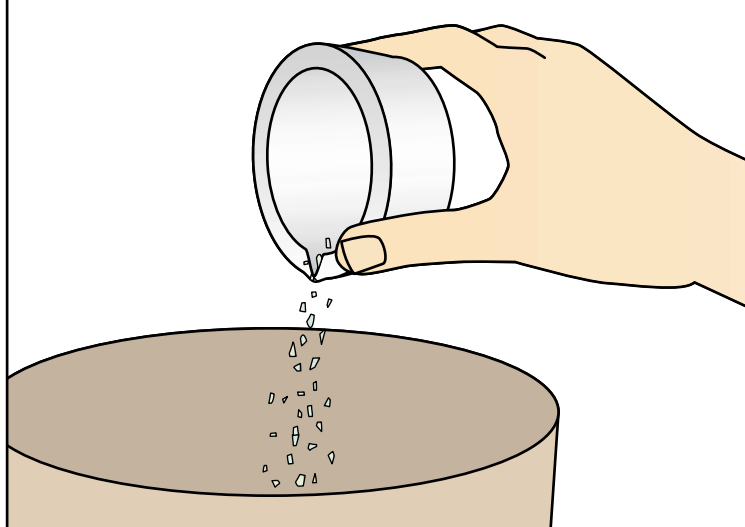
Maybe you can find the answer by experimenting some more.

Ask a staff person if you need help.

When you are done, throw the wooden stick and the cups in the trash ...



... and throw out the extra antacid powder.



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