[MUSIC PLAYING]

JESSICA HARROP: Hi, I'm Jessica. And I'm going to be talking about a chemical demonstration today that I like to call bringin' home the bacon. Now, before we get cooking let's take a look at the chemist's best friend. This is the periodic table. It was created in 1869 by the Russian chemist Dmitri Mendeleev back when only 65 elements were known.

Different elements on the periodic table require different numbers of electrons to be happy. Electrons live in the shells surrounding atoms. And when an atom's outermost shell is filled to capacity, the atom is happy. Now hydrogen, over here, has one electron in its outer shell and needs just one more to fill it. Carbon has four electrons in its outer shell and needs four more, a total of eight electrons, to fill it.

Now on the left and middle of the table, we have the metals. To get to eight electrons in their outer shell, the metals lose electrons. And on the right side of the table, we have nonmetals. To get to eight electrons, these elements gain electrons. And hydrogen is the only nonmetal that's on the left hand side of the periodic table.

Now one way atoms get eight electrons in their outer shell is through chemical bonds. A bond is the sharing of two electrons between two atoms. So carbon likes to have four bonds. And hydrogen likes to have one.

Knowing about where the electrons are and how they participate in bonding is central to many important things in the real world. For example, unsaturated fats have a double bond, lots of electrons. And that gives them special reactivity, which can lead to the spoiling of food when the bonds react with oxygen. So we like to know if there are double bonds in our food molecules. But how is that determined?

So this is what a happy carbon hydrogen molecule looks like. But in some cases, there are not enough hydrogen atoms. And the carbon will have to double bond with another carbon to share electrons. This molecule is more reactive than this one because a carbon-carbon double bond is not as stable as a carbon-carbon single bond.

Now let's watch as MIT's Dr. John Dolhun uses bromine to test for the presence of double bonds in a big ol' slab of bacon. Here he is at the Cambridge Science Festival.

[WHOOSH]

JOHN DOLHUN: I'm going to trun on my burner here. OK, there we go. So I'm going to take my bacon, the fat. Basically shake it up a bit. You can see the red color of the bromine is going away.

[WHOOSH]

JESSICA HARROP: So Dr. Dolhun heats up a piece of bacon and adds it to a flask filled with bromine. Bromine reacts with anything that has a carbon-carbon double bond. This includes the acrolein that's produced when you cook bacon, which looks like this, as well as the unsaturated fat that's already present in the bacon.

Unsaturated fats are fats that have carbon-carbon double bonds. Fully saturated fats have no carbon-carbon double bonds. They're all carbon-carbon single bonds. And they're the ones that are bad for you. The breaking of the double bond looks like this.

We can tell that the reaction happens because the red color disappears. That's the bromine reacting with those carbon-carbon double bonds. In our video recording of the experiment, it's hard to see the color change. So watch again very closely.

[WHOOSH]

Hope you enjoyed the video.

[MUSIC PLAYING]

I'll see you next time.