

>> Diane Jewell: Why do chemical reactions occur? Well, chemical reactions occur because elements desire to have full valence shells. For the most part, when we refer to full valence shells, we're talking about having eight electrons in their valence shell. But in the case of hydrogen, hydrogen is actually very satisfied with two electrons. We have a hydrogen here plus a hydrogen here. They form a single bond between them. This is H<sub>2</sub> which is hydrogen gas. It can also be written as H with the line indicating that there's a bond there. And this is very stable. It's got a full valence shell. We don't think that. That seems kind of odd to us because we think of a full valence shell being eight electrons. But for hydrogen, hydrogen wants to be like its closest noble gas. And its closest noble gas, it's actually helium. Helium has two electrons. Okay. So two electrons is a full valence shell for hydrogen, okay, and that's very stable. Now most of our elements – so they desire to have eight electrons around them in their valence shell. We can see two fluorines. What happens when two fluorines come together, each one of these has seven electrons in its valence shell. So this one here is missing a partner. This one here is missing a partner. Each one of them desire to have one more electron. What happens? Well, they come close enough together so that there is an overlap of these electrons between both of them. Now both of these electrons are actually orbiting both of these elements like this. And what happens now is this fluorine here has eight electrons and this fluorine here has eight electrons. They both have an octet now and so they are very stable. They have their full valence shell, eight electrons, the magic word is octet. They always want to have that octet. So you have your octet here. And these hydrogens each have not an octet but they do have their full valence shells also.