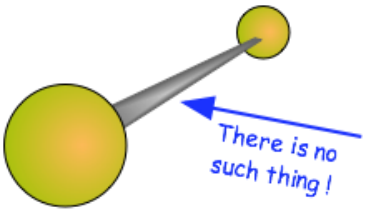
WHAT IS A CHEMICAL BOND?

You probably learned some time ago that chemical bonds are what hold atoms together to form the more complicated aggregates that we know as molecules and extended solids. Chemists talk about bonds all the time, and draw pictures of them as lines joining atom symbols. Teachers often identify them as the little sticks that connect the spheres that represent atoms in a plastic molecular model. So it's not surprising that we sometimes tend to think of chemical bonds as “things”. But no one has ever seen a chemical bond, and there is no reason to believe that they really even exist as physical objects.



"SOMETIMES IT SEEMS to me that a bond between two atoms has become so real, so tangible, so friendly, that I can almost see it. Then I awake with a little shock, for a chemical bond is not a real thing. It does not exist. No one has ever seen one. No one ever can. It is a figment of our own imagination."

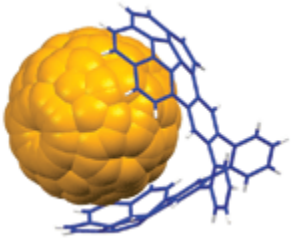
It is more useful to regard a chemical bond as an effect that causes certain atoms to join together to form enduring structures that have unique physical and chemical properties.

So although the "chemical bond" is no more than a convenient fiction, chemical bonding, which leads to the near-infinity of substances (31 million in mid-2007), lies at the very core of chemistry.

The forces that hold bonded atoms together are basically just the same kinds of electrostatic attractions that bind the electrons of an atom to its positively-charged nucleus;

chemical bonding occurs when one or more electrons are simultaneously attracted to two nuclei.

This is the most important fact about chemical bonding that you should know, but it is not of itself a workable theory of bonding because it does not describe the conditions under which bonding occurs, nor does it make useful predictions about the properties of the bonded atoms.



Our views of what constitutes chemical bonding are still evolving, according to a 2007 article in Chemical and Engineering News(85 37-40). This "buckyball-and-mitt" synthesized in 2007 by Andrzej Sygula is a case in point. The buckyball C60 resides in the C60H28"buckybowl". There are no traditional "chemical bonds" between the ball and the mit!

Source: http://www.chem1.com/acad/webtext/chembond/cb01.html#SEC1