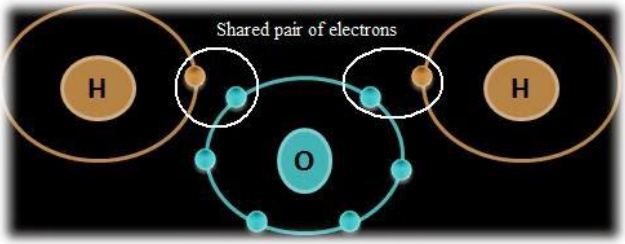
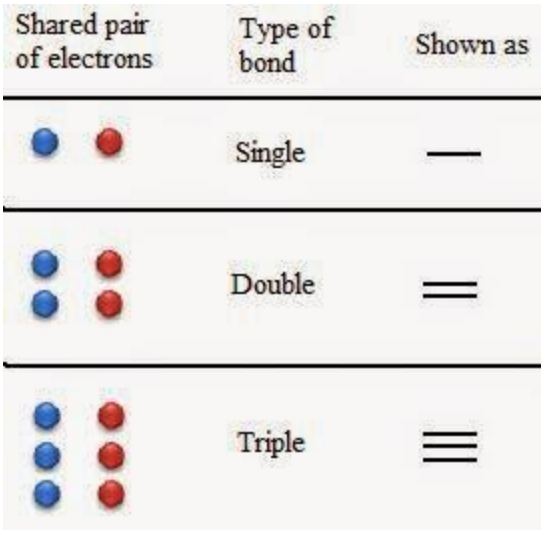
SHARING IN ELEMENTS: COVALENT BOND

Do Elements love sharing? Yes, they step forward to share their electrons to achieve octet. If you write the electronic configuration of oxygen (^{8}O): $1s^2$, $2s^2$, $2p^4$ you see it has 6 electrons in its outer most orbit ($2s^2$, $2p^4$). To complete its octet it has to find 2 more electrons anyhow. And if you write electronic configuration of Hydrogen (^{1}H): $1s^1$ it has single electron. For hydrogen to achieve octet is next to impossible because orbit 1 allows maximum 2 electrons. So there is a relaxation in octet rule for hydrogen. Hydrogen has to complete its outer most orbit that is orbit 1. To do so it has to find 1 electron from anywhere.



Bonding inWater Molecule

When we look at the situation of Oxygen and Hydrogen, both has lesser electrons and they in no condition to borrow or to donate to each other. So they decide to share electrons and help each other to achieve octet. But the problem is that Oxygen wants 2 electrons and Hydrogen has 1. If Hydrogen manages to bring another Hydrogen atom with it, the problem will be solved. Now 1 Oxygen atom and 2 Hydrogen atoms come forward to share their electrons. Let’s see how they share electrons.



Type of Covalent Bonds

These shared pair of electrons form the bonds and called as bonding electrons. When there is single shared pair between 2 atoms, it forms single bond. As above, Oxygen forms single bond with each of the Hydrogen atoms. When there is 2 shared pairs of electrons, they form double bond and 3 shared pair of electrons form triple bond.

Now Oxygen and Hydrogen are not individual elements they become H_2O molecule. Oxygen and Hydrogen are gases but as they combine together they form the most abundant substance of the earth and also of our body. Yes, you guessed right, H_2O is the water.

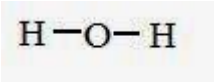
When elements come together they form “Molecule”. Molecule has its own identity and its characteristics are totally different from its constituent elements. As you see, water is liquid while Oxygen and Hydrogen are gases.

How do we write that how many elements bond together and how many pair of electrons they share? There are few scientific manners of presenting all these information in a precise way.

- Formula: It shows the number of elements and their ratio. As formula of water (H_2O), tells us that a molecule of water is formed by 2 atoms of Hydrogen and 1 atom of Oxygen.
- Lewis dot structure: It is named after American chemist Gilbert Newton Lewis. In this method electrons of outer orbit are shown in the form of dots around the symbol of element.

Lewis dot structure

- Kekulé structures: in this method element's symbol and bonding electrons are drawn as lines.



Kekulé structure

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