Science(Chemistry)

Covalent and Ionic Bonding Notes

Name: _____( ) Class: _____ Date: _____

1. Bonds are formed because the atoms that combine want to achieve the more stable **duplet or octet electronic structure (noble gas structure)**. The electronic structures of the noble gases are as follows:

a) Helium, He(2) – this is called the duplet structure. (has completely filled up the first and only outershell)

b) The octet structures of neon, Ne (2,8) of 10 electrons and argon, Ar (2,8,8) of 18 electrons.

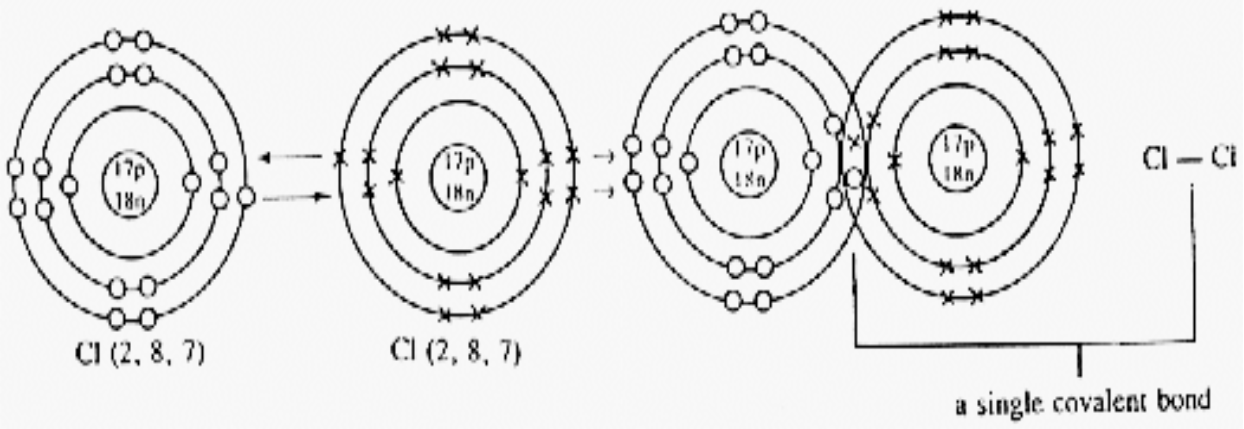
2. Ionic bonds are formed between **metals** and **non-metals**.
Example: between sodium and chlorine to form NaCl (sodium chloride)

a) The sodium atom (atom of metal) with electronic structure (2, 8, 1) **loses** its 1 outermost electron to become the more stable sodium ion, Na^+ with electronic structure (2, 8)

b) The chlorine atom (atom of non-metal) with electronic structure (2, 8, 7) **gains** an electron to become the more stable chloride ion, Cl^- (2, 8, 8)

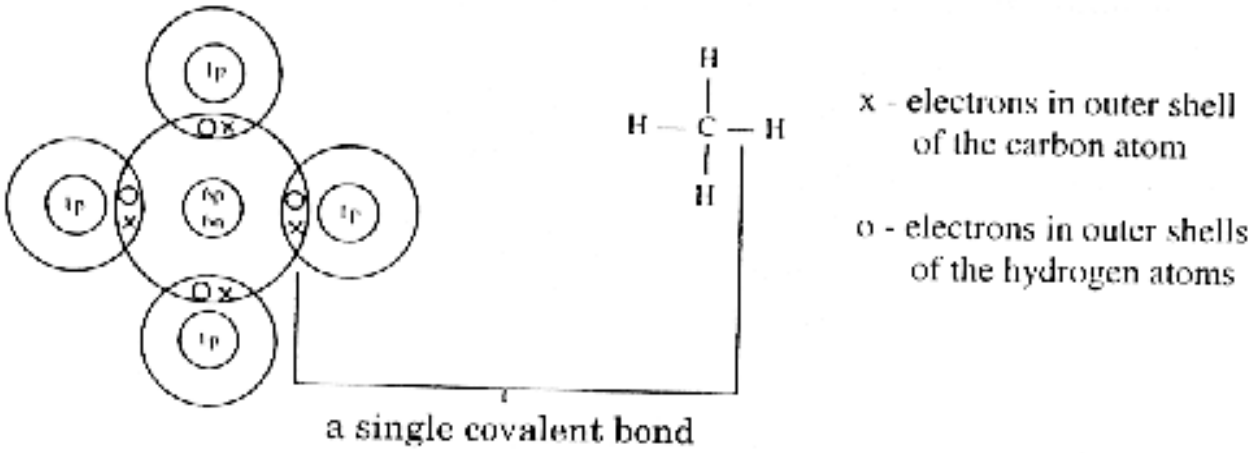
3. Covalent bonds are formed between:

a) **atoms** of the **same non-metallic** element,
example: chlorine gas where chlorine atom with electronic structure (2, 8, 7) shares its one electron with another chlorine atom, (to form a chlorine molecule) as follows:



b) **atoms** of **different non-metallic** elements

example: between carbon and hydrogen where carbon (2, 4) shares its 4 outermost electrons with 4 hydrogen atoms.



4. Differences in properties

Ionic compound	Covalent compound
1. Consists of oppositely charged ions.	Consist of molecules.
2. Strong attractive forces between particles (ions)	Relatively weak attractive forces between particles (molecules)
3. Relatively high melting and boiling points.	Relatively low melting and boiling points.
4. Mostly solids because of their high melting point.	Mostly liquids or gases at room temperatures
5. Non-volatile because they have high melting point.	Volatile because they have low boiling point.
6. Usually soluble in water	Usually insoluble in water but dissolve in organic solvents like ethanol.
7. Conduct electricity in molten or aqueous state. They are electrolytes. In solid state, they do not conduct electricity because of the immobile ions.	They do not conduct electricity whether in solid or liquid state. They are usually non-electrolytes. They do not exist as ions.