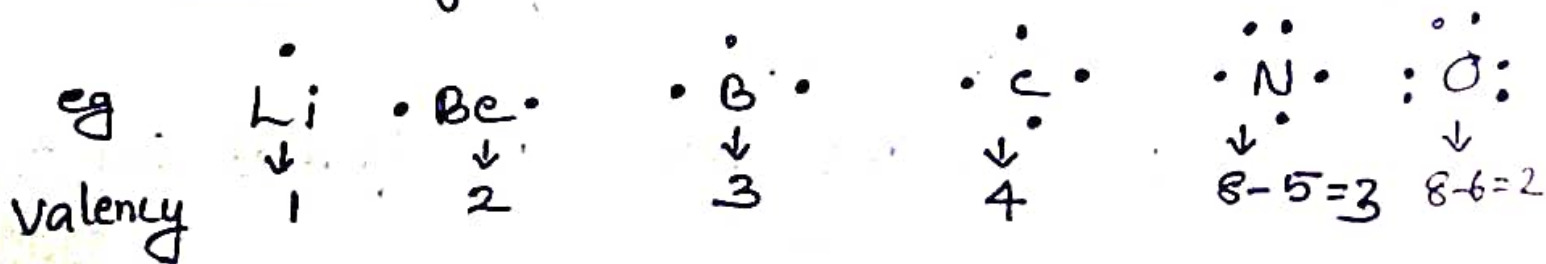


chemical bond: The force of attraction which binds the atoms together in a molecule is called bond.

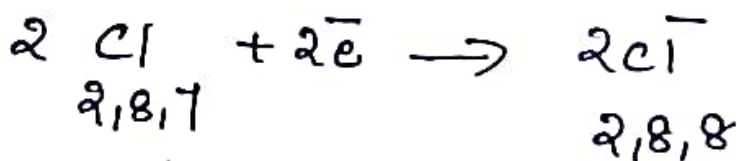
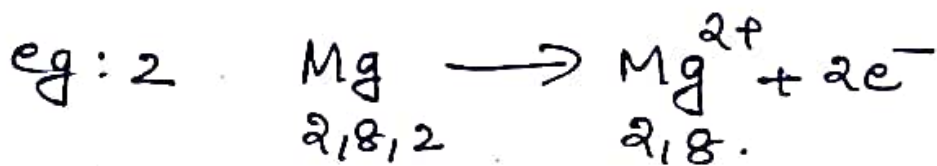
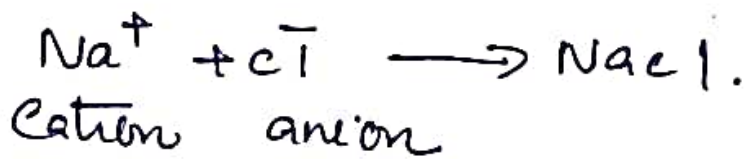
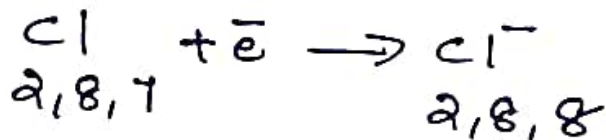
Octet rule: The inertness of Noble gas elements were due to the presence of 8 e⁻s in their outermost shell. Based on this observation Lewis forwarded Octet rule. Which states that atoms enter in chemical combinations in order to attain 8 e⁻s in its valence shell.

Lewis Symbols: Only valence e⁻s of an atom involved in chemical bond formation. Lewis symbol indicates the valency of the atom. The common valency of the element is either equal to the number of dots or 8 - the number of dots.



Different modes of chemical combination

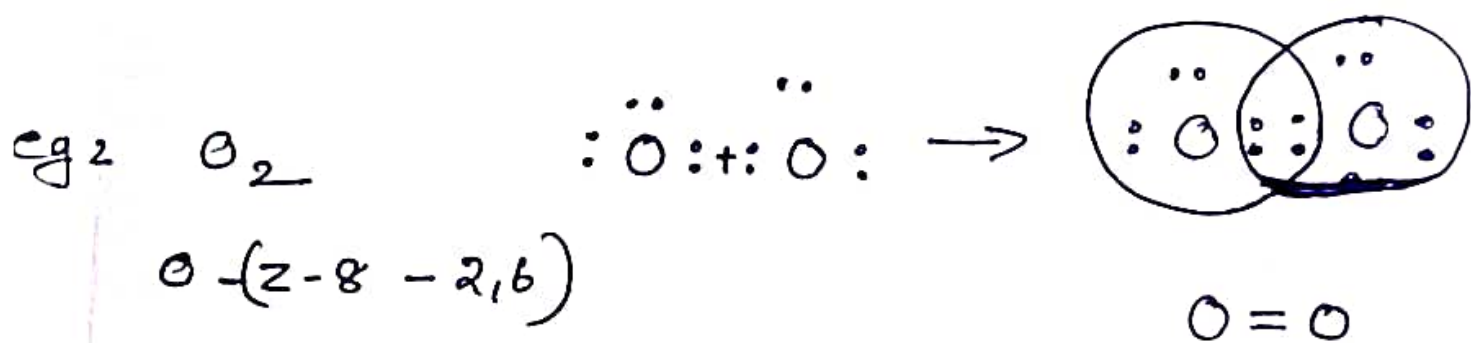
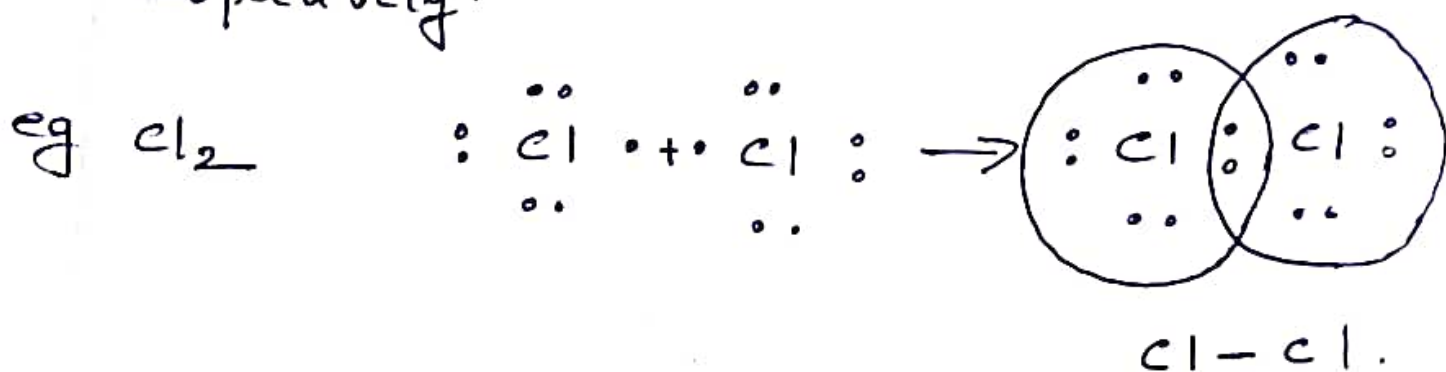
1. By transfer of electrons — Here e^- is transferred from one atom to another. This gives rise to ionic bond or electrovalent compound. [type of linkage formed from the electrostatic attraction between oppositely charged ions in a chemical compound.]



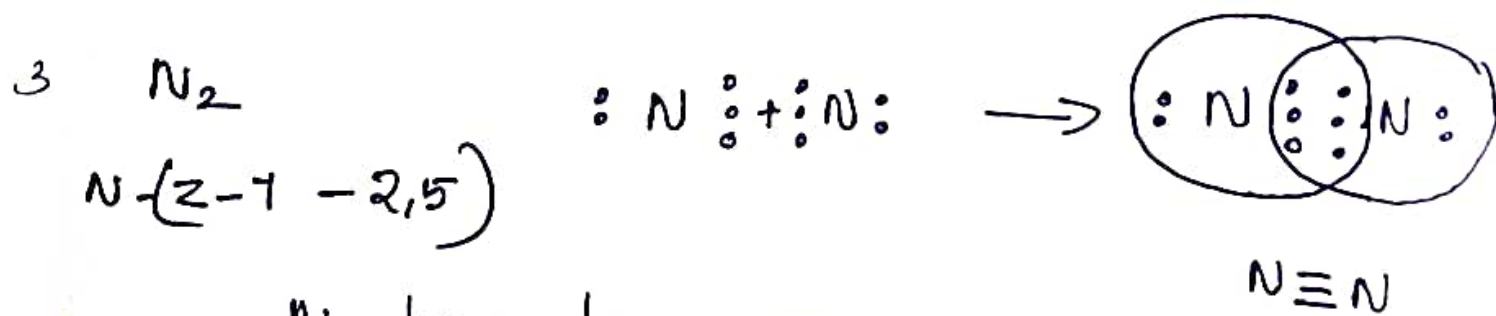
2. By mutual sharing of the electrons — Covalent bond.

A covalent bond is formed by the

mutual sharing of electrons between two atoms. The covalent bond formed by the sharing of one, two and three pairs of electrons are called single covalent bond, double covalent bond (=) and triple covalent bond (\equiv) respectively.



Oxygen molecule contains double bond.



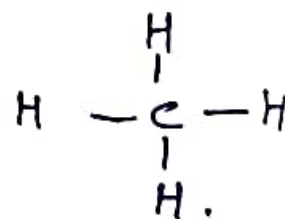
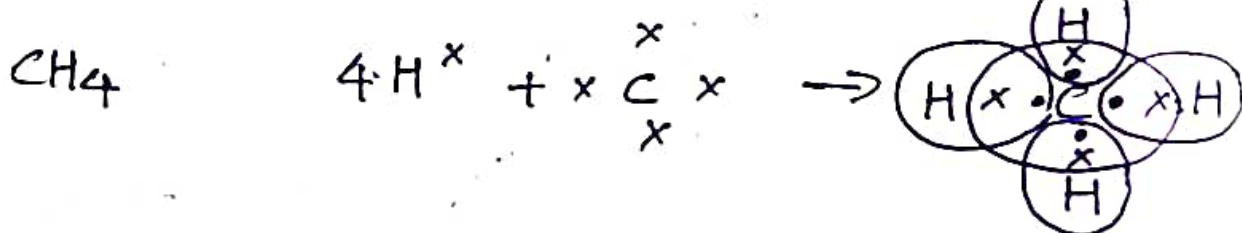
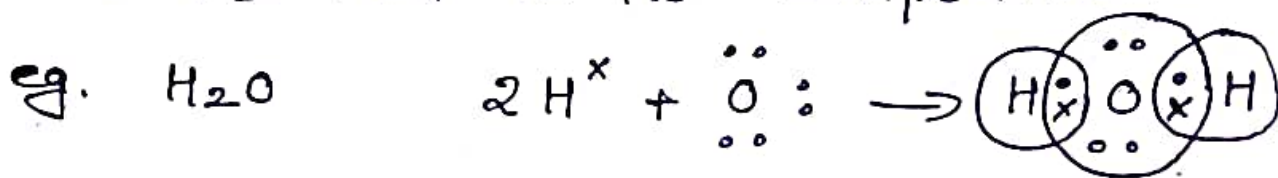
N - has five e⁻s in its outermost shell. It needs 3 more e⁻s to complete its octet. Therefore octet state is

attained by mutual sharing of three pairs of electrons between two nitrogen atoms. Thus nitrogen molecule contains a triple bond.

Exception to the octet rule

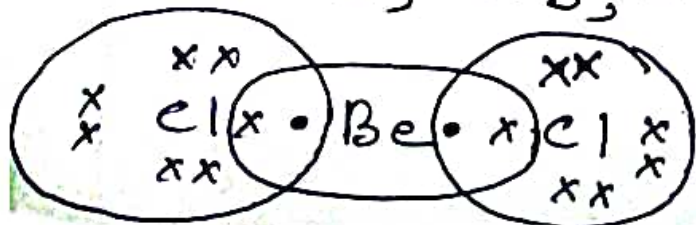
1. Hydrogen, Helium.

hydrogen has only two electrons in H_2 and in its compounds.

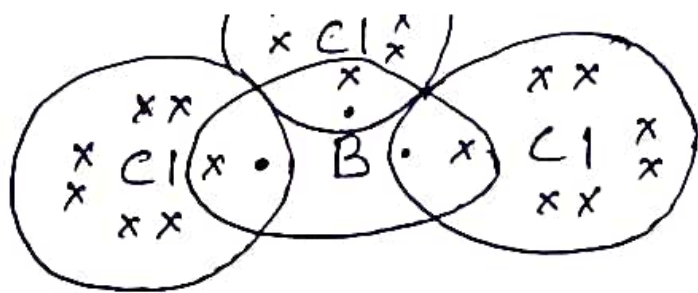


2. Octet rule failed to explain the formation of certain molecules of beryllium, boron, aluminium etc.

($BeCl_2$, BF_3 , $AlCl_3$ etc)



Only 4 e^s around Beryllium atom.

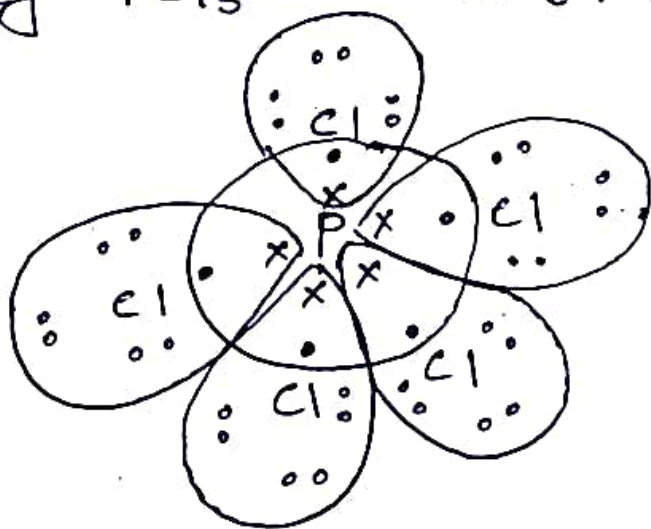


Hexagon is atom
only $6\bar{e}s$.

2. These are examples of incomplete octet of the central atom.

3. Expanded octet — also called super octet molecule: These have more than $8\bar{e}s$ around the central atom in a molecule.

eg PCl_5 SF_6 . [$12\bar{e}s$ around S atom]



$10\bar{e}s$ around
Phosphorous
atom.

4. Formation of odd electron molecule.

eg. Nitric oxide $\ddot{N}=\ddot{O}:$ ($11\bar{e}s$)

Nitrogen dioxide: $\ddot{O}:\ddot{N}:\ddot{O}:$ ($17\bar{e}s$)