

Chemistry Study Materials for Class 9 (NCERT Questions –Answers of Chapter -04)

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Structure of the Atom

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Q1. Write the distribution of electrons in carbon and sodium atoms.

Answer: Carbon: The total number of electrons in a carbon atom is 6.

The distribution of electrons in carbon atom is given by:

First orbit or K-shell = 2 electrons

Second orbit or L-shell = 4 electrons

Or, we can write the distribution of electrons in a carbon atom as 2, 4.

Sodium: The total number of electrons in a sodium atom is 11.

The distribution of electrons in sodium atom is given by:

First orbit or K-shell = 2 electrons

Second orbit or L-shell = 8 electrons

Third orbit or M-shell = 1 electron

Or, we can write distribution of electrons in a sodium atom as 2, 8, 1.

Q2. If K and L shells of an atom are full, then what would be the total number of electrons in the atom?

Answer: The maximum capacity of K shell is 2 electrons and L shell can accommodate maximum 8 electrons in it. Therefore, there will be ten electrons in the atom.

VALENCY:- Noble gases have fully filled outermost shell. Due to this, they are stable and they do not react with other elements. Other elements also tend to attain stable configuration by completing the octet in their outermost orbit.

This is important to note that, the number of electrons in the outermost orbit of an element is closer to octet. An element can lose or gain electron in order to complete the octet. This tendency of losing or gaining electrons imparts valency to an element. Let us take example of hydrogen. Hydrogen can readily lose or gain an electron. So, its valency is one. Now, let us take example of Hydrochloric Acid (HCl). One atom of chlorine combines with one atom of hydrogen to form hydrochloric acid. In this case, hydrogen loses one electron and thus gets +1 charge. On the other hand, chlorine gains an electron and thus gets – 1 charge. So, valency of hydrogen and chlorine are one.

Valency can be defined as the combining capacity of an atom or ion.

Example :

Hydrogen molecule - Hydrogen has only one electron in its outermost orbit, thus it requires one more electrons to complete its outermost orbit. Therefore, in order to complete outermost orbit, hydrogen shares one electron with another hydrogen atom and form H_2 (hydrogen molecule).

In the case of LiCl (Lithium chloride) - Lithium has three electrons in its outermost orbit and chlorine has seven electrons in its outermost orbit. Thus in order to make outermost orbit completely filled lithium loses one electrons and chlorine gains one electron. After losing one electron, lithium has two electrons in its outermost orbit and after gaining one electron, chlorine has eight electrons in its outermost orbit. And they form LiCl (Lithium chloride)

Name, Symbol, Atomic number, Number of electrons, Distribution of electrons in shells (electronic configuration) and Valency of some elements (From Hydrogen to Calcium)

Elements	Symbol	Atomic Number	No. of electron	Distribution of electron				Valency
				K	L	M	N	
Hydrogen	H	1	1	1				1
Helium	He	2	2	2				0
Lithium	Li	3	3	2	1			1
Beryllium	Be	4	4	2	2			2
Boron	B	5	5	2	3			3
Carbon	C	6	6	2	4			4
Nitrogen	N	7	7	2	5			3
Oxygen	O	8	8	2	6			2
Fluorine	F	9	9	2	7			1
Neon	Ne	10	10	2	8			0
Sodium	Na	11	11	2	8	1		1
Magnesium	Mg	12	12	2	8	2		2
Aluminium	Al	13	13	2	8	3		3
Silicon	Si	14	14	2	8	4		4
Phosphorous	P	15	15	2	8	5		3
Sulphur	S	16	16	2	8	6		2
Chlorine	Cl	17	17	2	8	7		1
Argon	Ar	18	18	2	8	8		0
Potassium	K	19	19	2	8	8	1	1
Calcium	Ca	20	20	2	8	8	2	2
