Structure of Atom

Valence Shell and Valence Electrons

- From Bohr-Bury sequence, we know that maximum number of electrons which can be accommodated in outermost shell is 8.
- Every element has an urge to have 8 electrons in its outermost shell; in achieving 8 electrons an atom can either gain electrons or loose electrons.
- The number of electrons lost or gained by an element in achieving 8 electrons in its outermost shell will be called its Valence.

For example,

S. No.	Element	Electron distribution	Valence
1.	C_6	2, 4	4
2.	N_7	2, 5	3
3.	O_8	2, 6	2
4.	F_9	2, 7	1
5.	Ne_{10}	2, 8	0
6.	Na_{11}	2, 8, 1	1
7.	Mg_{12}	2, 8, 2	2
8.	Ca_{20}	2, 8, 8, 2	2

- For elements like H, He, Li, Be and B, these elements lose their outermost electron to achieve 2 electrons in their outermost shell. These elements will have valence in accordance to this act.

S. No.	Element	Electron distribution	Valence
1.	H_1	1	1
2.	He_2	2	0
3.	Li_3	2, 1	1
4.	Be_4	2, 2	2
5.	B_5	2, 3	3

Isotopes :

Isotopes are atoms of same elements having same atomic number and different mass numbers.

E.g., Chlorine has two isotopes of mass numbers 35 and 37 respectively.

$^{35}Cl_{17}$ and $^{37}Cl_{17}$.

Uses of isotopes

(i) Uranium isotope is used as fuel in nuclear reactor.

(ii) Isotope of cobalt is useful in treatment of cancer.

(iii) An isotope of iodine is used in the treatment of goiter.

Isobars

Isobars are the atoms of those elements which have the same mass number but different atomic numbers are called isobars.

$^{40}Ca_{20}$ and $^{40}Ar_{18}$ have same mass number and different atomic number.

$^{24}Na_{11}$ and $^{24}Mg_{12}$ are other examples.

Isotopes & Isobars

ISOTOPES	ISOBARS
Chemically same, physically different	Chemically different, physically same
Number of electrons is same	Number of electrons is different
Cannot be separated by chemical means	Can be separated by chemical means

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