ATOMIC STRUCTURE – 02
CS – (Section – B)
09 – 03 – 2021 (1ST Period)

Isotope: Isotopes are the atoms of same elements having same atomic number but different mass number. In other words, two or more atoms of same element having same number of protons but different number of neutrons are called isotopes. For example:

(1) Isotopes of Hydrogen:

Name of isotopes	**Ordinary hydrogen or Protium**	**Heavy hydrogen or Deuterium**	**Radioactive hydrogen or Tritium**
Symbol	$_1H^1$	$_1H^2$ or $_1D^2$	$_1H^3$ or $_1T^3$
At. No. (Z)	1	1	1
Mass No. (A)	1	2	3
No. of Protons (p)	1	1	1
No. of neutrons (n)	0	1	2
No. of electrons (e)	1	1	1

(2) Isotopes of Carbon:

Name of Isotope	**Ordinary Carbon**	**Radioactive Carbon**
Symbol	$_6C^{12}$	$_6C^{14}$
Atomic number (Z)	6	6
Mass number (A)	12	14
No. of Protons (p)	6	6
No. of neutrons (n)	6	8
No. of electrons (e)	6	6

Characteristics of Isotopes: Following are the important characteristics of isotopes.

1. Isotopes are the atoms of same element.
2. They are placed at the same place in the periodic table.
3. Isotopes have same electronic configuration.
4. They have same number of valence electrons.
5. Because of same number of electrons they have identical chemical properties.
6. They have different physical properties such as melting point, boiling point, density etc.

Isobar: Isobars are the atoms of different elements having same mass number but different atomic number. In other words, two or more atoms of different element having same number of nucleons but different number of protons are called isobars. For example:

1. $_{19}K^{40}$, $_{20}Ca^{40}$

Symbol	$_{19}K^{40}$	$_{20}Ca^{40}$
At. No. (Z)	19	20
Mass No. (A)	40	40
No. of Protons (p)	19	20
No. of neutrons (n)	21	20
No. of electrons (e)	19	20

2. $_{6}C^{14}$, $_{7}N^{14}$

Symbol	$_{6}C^{14}$	$_{7}N^{14}$
Atomic number (Z)	6	7
Mass number (A)	14	14
No. of Protons (p)	6	7
No. of neutrons (n)	8	7
No. of electrons (e)	6	7

Characteristics of Isobars: Following are the important characteristics of isobars.

1. Isobars are the atoms of different elements.
2. They are placed at the different places in the periodic table.
3. They have different electronic configuration.
4. They have different number of valence electrons.
5. Isobars have entirely different physical and chemical properties.

Difference between Isotopes and Isobars: The difference between Isotopes and Isobars are as follows.

	Isotopes	**Isobars**
1	Two or more atoms having same atomic number but different mass number are called isotopes.	Two or more atoms having same mass number but different atomic number are called isobars.
2	Isotopes are the atoms of same element.	Isobars are the atoms of different elements.
3	Isotopes occupy same place in periodic table.	Isobars occupy different places in periodic table.
5	They have same electronic configuration.	They have different electronic configuration.
4	They have same valence electrons.	They have different valence electrons.
6	They have identical chemical properties	They have entirely different chemical properties