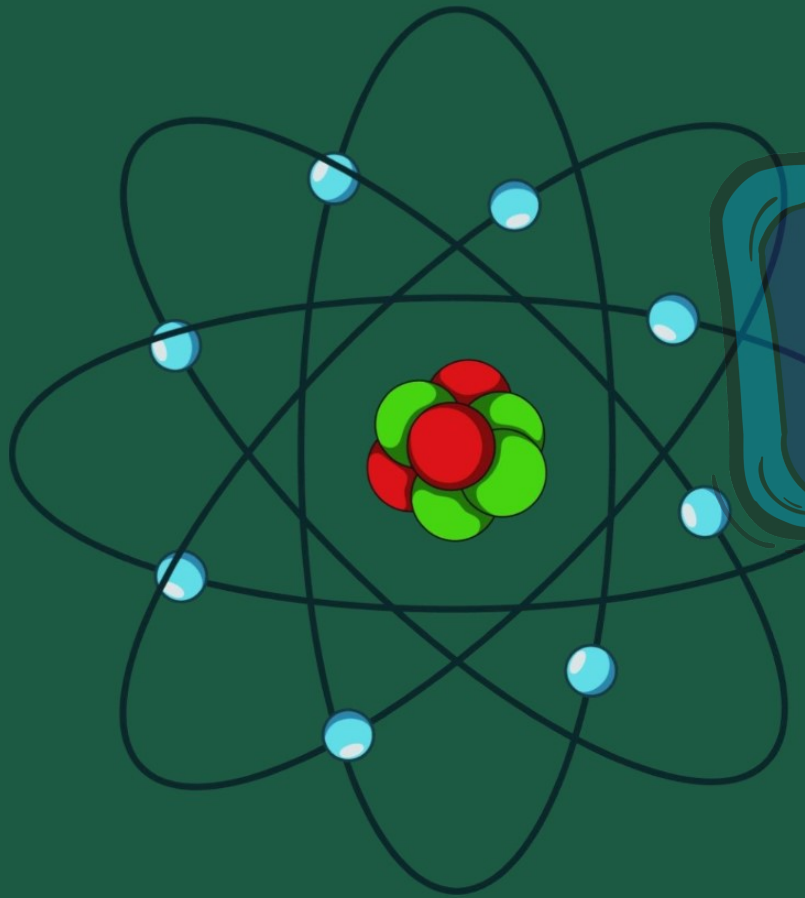
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Class–9

SCIENCE

Chapter – 4

Structure of the Atom

Part – 5

Exercise

Deeksha Pahilajani

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1 Compare the properties of electrons, protons and neutrons.

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Answer :

Electron	Proton	Neutron
Electrons are present outside the nucleus of an atom.	Protons are present in the nucleus of an atom.	Neutrons are present in the nucleus of an atom.
Electrons are negatively charged.	Protons are positively charged.	Neutrons are neutral.
The mass of an electron is considered to negligible.	The mass of a proton is approximately 2000 times as the mass of an electron.	The mass of neutron is nearly equal to the mass of a proton.

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2 Compare all the proposed models of an atom given in this chapter.

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Answer :

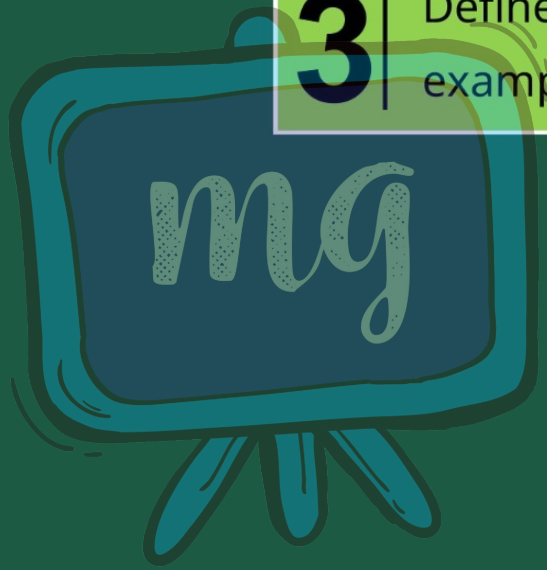
Thomson's model	Rutherford's model	Bohr's Model
An atom consists of a positively charged sphere with electrons embedded in it.	☛ An atom consists of a positively charged particles concentrated at the center known as the nucleus. ☛ The size of the nucleus is very small as compared to the size of atom. ☛ The electrons revolve around the nucleus in well - defined orbits.	☛ There are only certain orbits known as discrete orbits inside the atom in which electrons revolve around the nucleus. Electrons do not radiate energy while revolving.

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3 Define the term valency by giving examples of silicon and oxygen.

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3 Define the term valency by giving examples of silicon and oxygen.

Answer :

The valency of an element is the combining capacity of that element.

For Silicon

K	L	M
2	8	4

Silicon needs 4 more electrons





K L M
2, 6

Oxygen needs 2 electrons

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4 Na^+ has completely filled K and L shells. Explain.

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4 Na^+ has completely filled K and L shells. Explain.

Answer :

Na, atomic number 11, so its electronic configuration is = 2, 8, 1.

To complete it's octet, it gives away one valence electron to become Na^+.

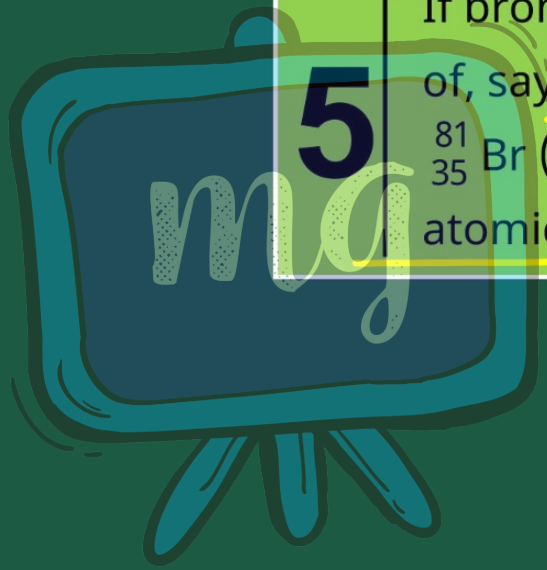
Outermost shell of Na^+ now has 8 electrons

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5 If bromine atom is available in the form of, say, two isotopes $^{79}_{35}Br$ (49.7%) and $^{81}_{35}Br$ (50.3%), calculate the average atomic mass of bromine atom.

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Answer : The average atomic mass of bromine

$$= \frac{(79 \times 49.7) + (81 \times 50.3)}{100}$$

$$= \frac{(3926.3 + 4074.3)}{100}$$

$$= \frac{8000.6}{100}$$

$$= 80 \text{ u}$$

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↑Atomic number

6 If Z = 3, what would be the valency of the element? Also, name the element.



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6 If Z = 3, what would be the valency of the element? Also, name the element.

Answer :

By Z = 3, we mean that the atomic number of the element is 3. Its electronic configuration is 2, 1.

Hence, the valency of the element is 1 (since the outermost shell has only one electron).

Therefore, the element with Z = 3 is lithium.

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7 Composition of the nuclei of two atomic species X and Y are given as under —

		X	Y
Protons	=	6	6
Neutrons	=	6	8

Atomic number

Give the mass numbers of X and Y.

What is the relation between the two species?

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Imp

Answer :

Mass number of X

= No. of protons + No. of neutrons

= 6 + 6 = 12

Mass number of Y

= No. of protons + No. of neutrons

= 6 + 8 = 14

These two atomic species X and Y have the same atomic number, but different mass numbers. Hence, they are isotopes.

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8 Which one of the following is a correct electronic configuration of sodium?

- A 2, 8
- B 8, 2, 1
- C 2, 1, 8
- D 2, 8, 1 ✓

Atomic number = 11

K L M
2 8 1

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Imp

9 Complete the following table.

Atomic Number (Protons)	Mass Number	Number of Neutrons	Number of Protons	Number of Electrons	Name of the Atomic Species
9	19	10	9	9	
16	32	16	16	16	Sulphur
12	24	12	12	12	
1	2	1	1	1	Deuterium
1	1	0	1	0	Hydrogen ion

$^{1}_{1}H$

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10 Write the correct representation of an element 'X' which contains 15 electrons and sixteen neutrons.

31

15

X

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10 Write the correct representation of an element 'X' which contains 15 electrons and sixteen neutrons.

Answer :

The correct representation of the element X is $^{31}_{15}X$.

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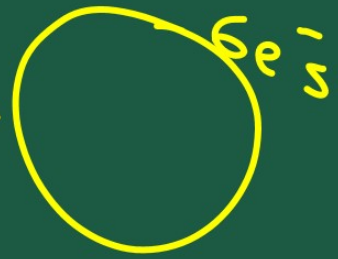
Charge will be (−2)

X^{-2}

Imp

In the atom of an element X, 6 electrons are present in the outermost shell. If it acquires noble gas configuration by accepting requisite number of electrons, then what would be the charge on the ion so formed?

2 electrons are accepted by X



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12 Predict the valency of the following elements

(i) A (Atomic number 5)

(ii) B (Atomic number 14)

(iii) C (Atomic number 17)

(i) K L M
2 3
3 electrons will be given/donated
Valency = 3

(ii) K L M
2 8 4
4 more electrons needed
Valency = 4

(iii) K L M
2 8 7
one more electron needed
Valency = 1