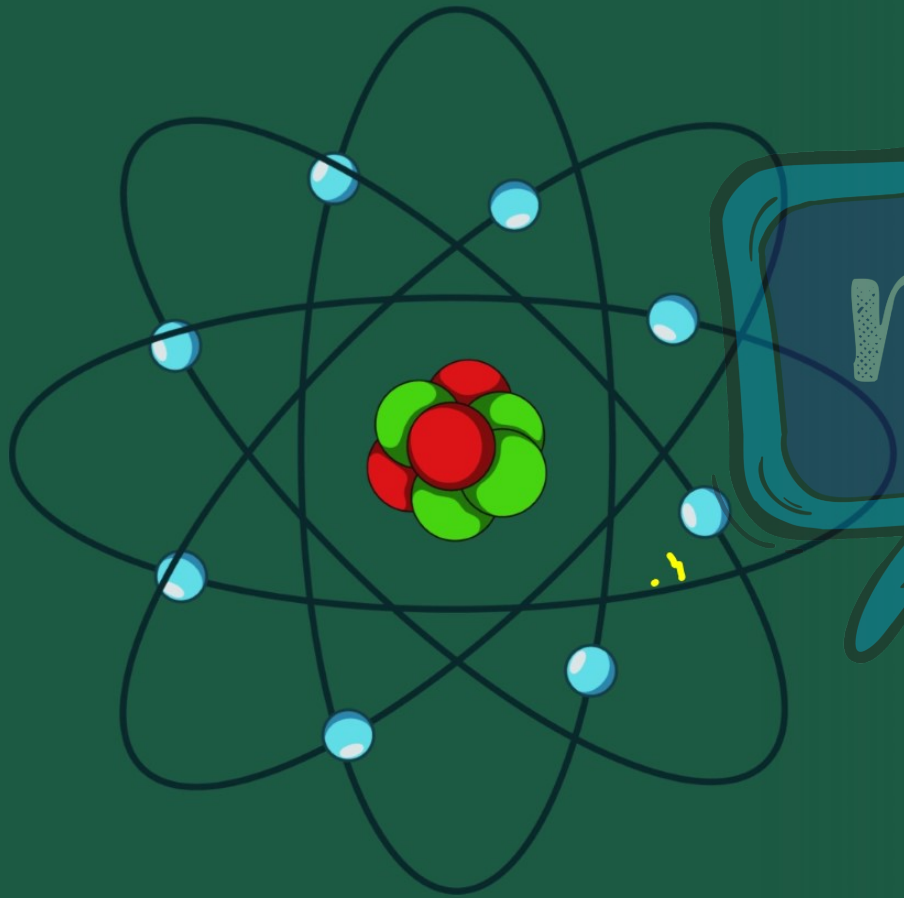
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Class–9

SCIENCE

Chapter – 4

Structure of the Atom

Part – 4

Intext Questions

Deeksha Pahilajani

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INTEXT QUESTION

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1 | What are canal rays?

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1 | What are canal rays?

Answer :

Canal rays are positively charged radiations which led to the discovery of positively charged sub-atomic particle called proton.

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INTEXT QUESTION

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2 On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

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2 On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

Answer : According to Thomson's model of an atom —

(i) An atom consists of a positively charged sphere and the electrons are embedded in it.

(ii) The negative and positive charges are equal in magnitude. So the atom is electrically neutral.

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3 On the basis of Rutherford's model of an atom, which sub-atomic particle is present in the nucleus of an atom?

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3 On the basis of Rutherford's model of an atom, which sub-atomic particle is present in the nucleus of an atom?

Answer : As per Rutherford's model of an atom, the protons which are positively charged, are present in the nucleus of an atom.

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4 Draw a sketch of Bohr's model of an atom with three shells.

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4 Draw a sketch of Bohr's model of an atom with three shells.

Answer :

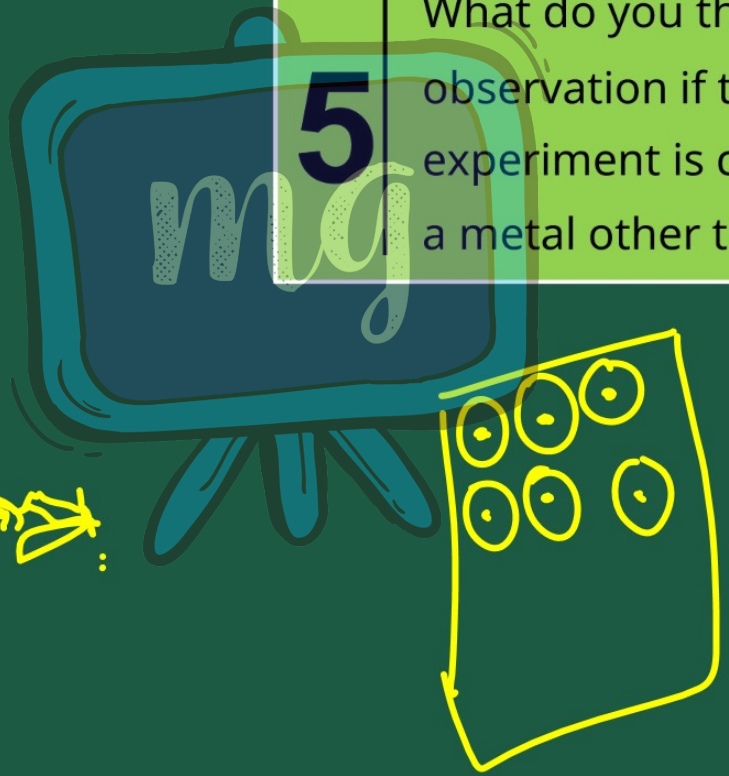


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5 What do you think would be the observation if the α-particle scattering experiment is carried out using a foil of a metal other than gold?

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5 What do you think would be the observation if the α-particle scattering experiment is carried out using a foil of a metal other than gold?

Answer : On using any metal foil, the observations of the α-particle scattering experiment would remain the same as all atoms would have same structure.

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6 Name the three sub-atomic particles of an atom.

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6 Name the three sub-atomic particles of an atom.

Answer : The sub-atomic particles of an atom are —

Protons → Positively charged

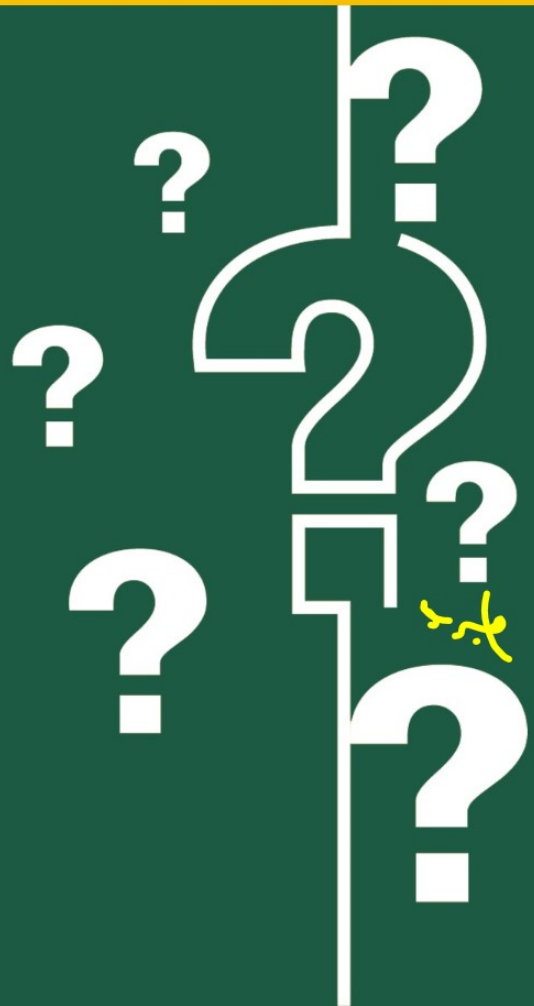
Electrons → Negatively charged

Neutrons → No charge

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7 Helium atom has an atomic mass of 4 u and two protons in its nucleus. How many neutrons does it have?

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7 Helium atom has an atomic mass of 4 u and two protons in its nucleus. How many neutrons does it have?

Answer : Atomic mass of He = 4u.

Atomic mass = No. of protons + No. of neutrons

$\therefore$ 4 = 2 + No. of neutrons

$\therefore$ No. of neutrons = 4 – 2 = 2

Helium atom has 2 neutrons.

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

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

Answer :

Carbon — Atomic number = 6

∴ No. of protons = 6

and Number of protons = Number of electrons

∴ Distribution of electrons = K L

2 4

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Sodium — Atomic number = 11

∴ No. of protons = 11 = No. of electrons

∴ Distribution of electrons = K L M

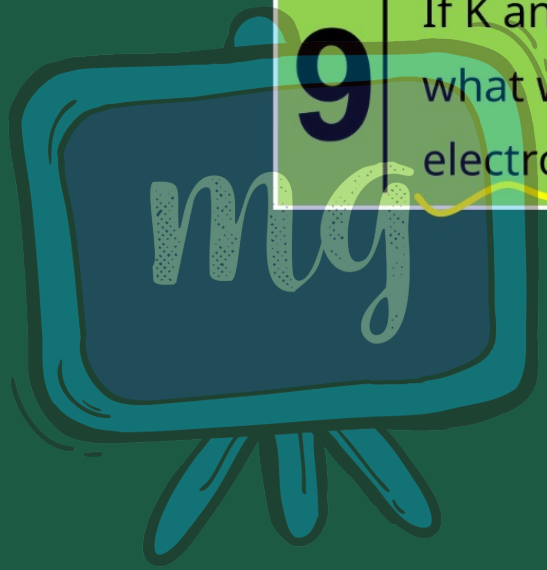
2 8 1

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

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

Answer :

K shell can hold 2 electrons and L shell can hold 8 electrons. When both the shells are full, there will be (8 + 2) 10 electrons in the atom.

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10 How will you find the valency of chlorine, sulphur and magnesium?

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10 How will you find the valency of chlorine, sulphur and magnesium?

Answer :

Valency is the combining capacity of an atom of an element.

Chlorine — Atomic number = 17

∴ No. of protons = 17, Electrons = 17

∴ Distribution of electrons = K L M

2 8 7

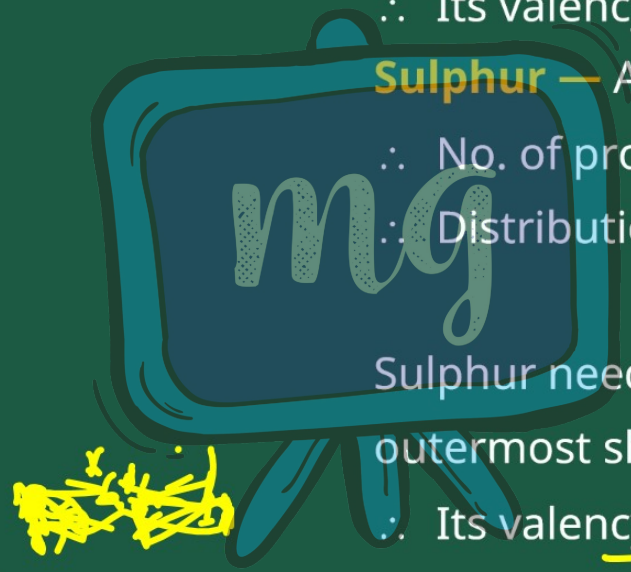
Chlorine needs 1 electron to complete its outermost orbit/shell.

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∴ Its valency is 1 (gains 1 electron).

Sulphur — Atomic number = 16

∴ No. of protons = 16, Electrons = 16

∴ Distribution of electrons = K L M

2 8 6

Sulphur needs 2 electrons to complete its outermost shell.

∴ Its valency is 2 (gains 2 electrons)

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Magnesium — Atomic number = 12

∴ No. of protons = 12, Electrons = 12

∴ Distribution of electrons = K L M

2 8 2

Magnesium needs to donate 2 electrons from its outermost shell to become stable.

∴ Its valency is 2 (donates 2 electrons).

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11 If number of electrons in an atom is 8 and number of protons is also 8, then

(i) What is the atomic number of the atom?

and

(ii) What is the charge on the atom?

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Answer :

No. of electrons = 8

No. of protons = 8

(i) Atomic number = no. of protons = 8

(ii) As, Electrons = Protons

$\oplus = \ominus$

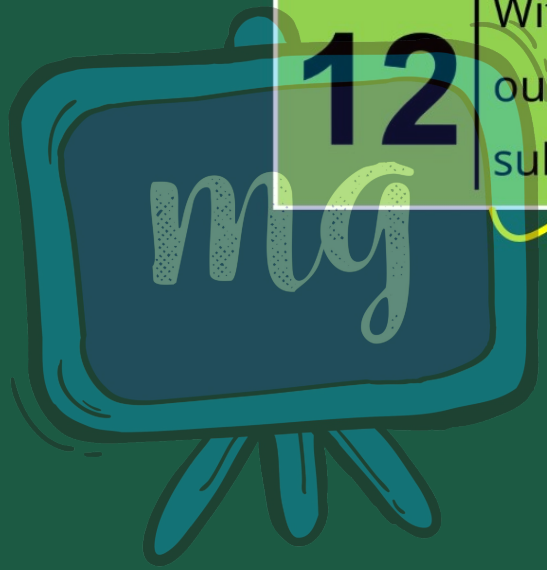
∴ Atom is electrically neutral (No charge)

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12 With the help of given Table 4.1, find out the mass number of oxygen and sulphur atom.

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Name of Element	Symbol	Atomic Number	Number of Protons	Number of Neutrons	Number of Electrons	Distribution of Electrons				Vale-ncy
						K	L	M	N	
Hydrogen	H	1	1	-	1	1	-	-	-	1
Helium	He	2	2	2	2	2	-	-	-	0
Lithium	Li	3	3	4	3	2	-	-	-	1
Beryllium	Be	4	4	5	4	2	1	-	-	2
Boron	B	5	5	6	5	2	2	-	-	3
Carbon	C	6	6	6	6	2	3	-	-	4
Nitrogen	N	7	7	7	7	2	4	-	-	3
Oxygen	O	8	8	8	8	2	5	-	-	2
Fluorine	F	9	9	10	9	2	6	-	-	1

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Name of Element	Symbol	Atomic Number	Number of Protons	Number of Neutrons	Number of Electrons	Distribution of Electrons K	L	M	N	Vale-ncy
Neon	Ne	10	10	10	10	2	7	-	-	0
Sodium	Na	11	11	12	11	2	8	-	-	1
Magnesium	Mg	12	12	12	12	2	8	-	-	2
Aluminium	Al	13	13	14	13	2	8	1	-	3
Silicon	Si	14	14	14	14	2	8	2	-	4
Phosphorus	P	15	15	16	15	2	8	3	-	3,5
Sulphur	S	16	16	16	16	2	8	4	-	2
Chlorine	Cl	17	17	18	17	2	8	5	-	1
Argon	Ar	18	18	22	18	2	8	6		0

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Answer :

Oxygen — No. of protons = 8

∴ No. of neutrons = 8

∴ Atomic number = 8

Atomic mass number = P + N = 8 + 8 = 16

Sulphur — No. of protons = 16

∴ No. of neutrons = 16

∴ Atomic number = 16

Atomic mass number = P + N = 16 + 16 = 32

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13 For the symbol H, D and T tabulate three sub-atomic particles found in each of them

Answer :

(Protium) H → ($_{1}^{1}$H) Atomic number = 1,

Mass number = 1

∴ No. of protons = 1

No. of electrons = 1

No. of neutrons = Nil

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(Deuterium) D → ($_1^2$H) Atomic number = 1,
Mass number = 2
∴ No. of protons = 1
No. of electrons = 1
No. of neutrons = 1

1+1=2

(Tritium) T → ($_1^3$H) Atomic number = 1,
Mass number = 3
∴ No. of protons = 1
No. of electrons = 1
No. of neutrons = 2

1+2=3

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14 Write the electronic configuration of any one pair of isotopes and isobar.

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INTEXT QUESTION

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14 Write the electronic configuration of any one pair of isotopes and isobar.

Answer :

Isotopes : Atoms of same element having same atomic number but different mass number.

∴ Electronic configuration of isotopes remain the same.

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Isotope

Example : $^{12}_{6}C$ $^{14}_{6}C$

6e⁻s

Electronic Configuration	K	L
$^{12}_{6}C$	2	4
$^{14}_{6}C$	2	4

Isobars : Atoms of different elements with different atomic number but same mass number.

Example : $^{40}_{20}Ca$ $^{40}_{18}Ar$

Electronic Configuration	K	L	M	N
$^{40}_{20}Ca$	2	8	8	2
$^{40}_{18}Ar$	2	8	8	