UNIT 11

ATOMIC STRUCTURE

SXJA5

Learning Objectives

After studying this chapter, students will be able to

- understand Rutherford's gold foil experiment.
- identify the limitations of Rutherford's model.
- explain the main postulates of Bohr's atomic model.
- compare the charge and mass of sub-atomic particles.
- calculate number of protons, neutrons and electrons from the given atomic number and mass number of an element.
- draw the atomic structure of first 20 elements.
- differentiate isotopes, isobars and isotones.
- assign valency of various elements based on the number of valence electrons.
- recognize the significance of quantum numbers.
- state and illustrate the laws of multiple proportion, reciprocal proportion and combining volumes.

Introduction

Just as a small child wants to take a toy apart to find out what is inside, scientists have for long been curious about the internal structure of an atom. They wanted to find out what are the particles present inside an atom and how are these particles arranged in an atom. For explaining this many scientists proposed various atomic models.

We have learnt Dalton's atomic theory and J.J. Thomson's model in class VIII. Now we will learn about sub-atomic particles and the other atomic models to explain how these particles are arranged within an atom.

11.1 Discovery of Nucleus

In 1911, Lord Rutherford, a scientist from New Zealand, performed his famous experiment of bombarding a thin gold foil with very small positively charged particles called alpha(α) particles. He selected a gold foil because, he wanted as thin layer as possible and gold is the most malleable metal.

He observed that:

1. Most of the alpha particles passed straight through the foil.
2. Some alpha particles were slightly deflected from their straight path.
3. Very few alpha particles completely bounced back.

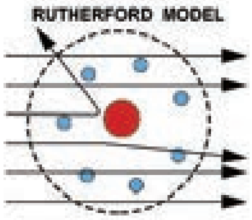


Figure 11.1 Deflected α-particle

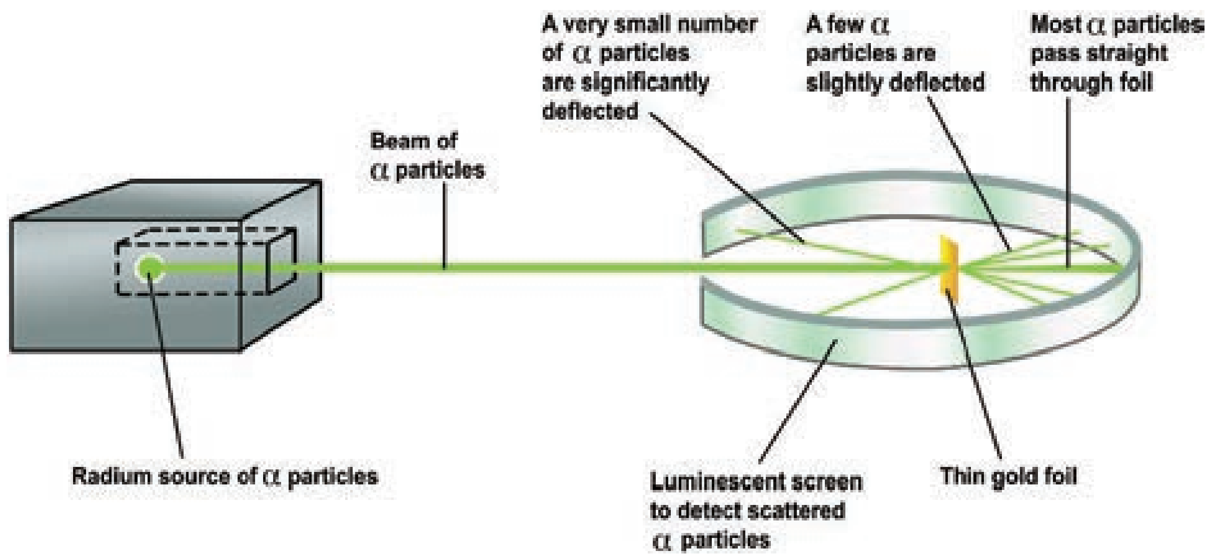


Figure 11.2 Deflection of α-particle by a gold leaf

Later, Rutherford generalized these results of alpha particles scattering experiment and suggested a model of the atom that is known as Rutherford's Atomic model.

11.1.1 Rutherford's Atomic model

According to this model :

i. The atom contains large empty space.

ii. There is a positively charged mass at the centre of the atom, known as nucleus.

iii. The size of the nucleus of an atom is very small compared to the size of an atom.

iv. The electrons revolve around the nucleus in close circular paths called orbits.

v. An atom as a whole is electrically neutral, i.e., the number of protons and electrons in an atom are equal.

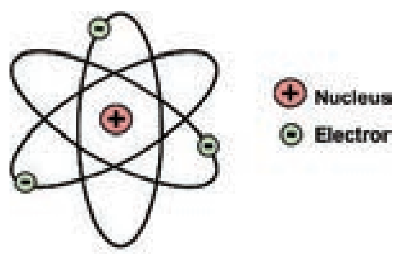


Figure 11.3 Rutherford's model of the atom was some what like that of the solar system.

Rutherford's model of atomic structure is similar to the structure of the solar system. Just as in the solar system, the Sun is at the centre and the planets revolve around it, similarly in an atom the nucleus present at the centre and the electrons revolve around it in orbits or shells.

11.1.2 Limitations in Rutherford's model

According to Electromagnetic theory, a moving electron should accelerate and continuously lose energy. Due to the loss of energy, path of electron may reduce and finally the electron should fall into the nucleus. If it happens so, atom becomes unstable. But atoms are stable. Thus, Rutherford's model failed to explain the stability of an atom.

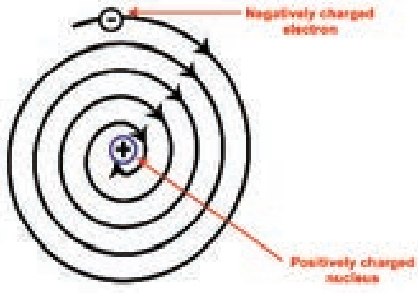


Figure 11.4 Showing an atom losing energy.

11.2 Bohr's model of an atom

In 1913, Neils Bohr, a Danish physicist, explained the causes of the stability of the atom in a different manner. The main postulates are:

i. In atoms, the electron revolve around the nucleus in stationary circular paths called orbits or shells or energy levels.

ii. While revolving around the nucleus in an orbit, an electron neither loses nor gains energy.

iii. An electron in a shell can move to a higher or lower energy shell by absorbing or releasing a fixed amount of energy.

iv. The orbits or shells are represented by the letters K,L,M,N,… or the numbers, n= 1,2,3,4,….

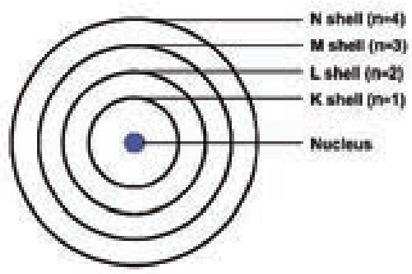


Figure 11.5 Energy levels around the nucleus of an atom: Bohr's model.

The orbit closest to the nucleus is the K shell. It has the least amount of energy and the electrons present in it are called K electrons, and so on with the successive shells and their electrons. These orbits are associated with fixed amount of energy , so Bohr called them as **energy level** or **energy shells**.

11.2.1 Limitations of Bohr's model

One main limitation was that this model was applicable only to hydrogen and hydrogen like ions (example, He^{+}, Li^{2+}, Be^{3+}, and so on). It could not be extended to multi electron nucleus.

11.3 Discovery of Neutrons

In 1932 James Chadwick observed when Beryllium was exposed to alpha particles, particles with about the same mass as protons were emitted.

Beryllium + alpha ray ⟶ carbon + neutron

These emitted particles carried no electrical charges. They were called as neutrons. It is denoted by $_{0}n^{1}$. The superscript 1 represents its mass and subscript 0 represents its electric charge.

Properties of Neutrons

1. This particle was not found to be deflected by any magnetic or electric field, proving that it is electrically neutral.
2. Its mass is equal to 1.676×10^{-24} g (**1 amu**).

> DO YOU KNOW?
>
> In 1920 Rutherford predicted the presence of another particle in the nucleus as neutral. James Chadwick, the inventor of neutron was student of Rutherford

11.4 Characteristics of Fundamental particles

The atom is built up of a number of sub-atomic particles. The three sub-atomic particles of great importance in understanding the structure of an atom are electrons, protons and neutrons, the properties of which are given in Table 11.1.

Table 11.1 Properties of sub-atomic particles

Particle	Symbol	Charge (electronic units)	mass (amu)	mass (grams)
Electron	$_{-1}e^{0}$	−1	1/1837	9.1×10^{-28}
Proton	$_{1}H^{1}$	+1	1	1.6×10^{-24}
Neutron	$_{0}n^{1}$	0	1	1.6×10^{-24}

There are two structural parts of an atom, the nucleus and the empty space in which there are imaginary paths called **orbits**.

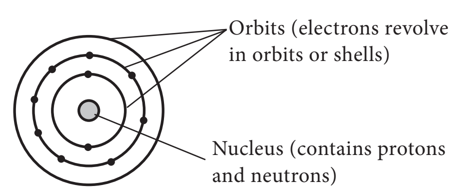


Figure 11.6 Showing structure of an atom.

Nucleus: The protons and neutrons [collectively called **nucleons**]are found in the nucleus of an atom.

Orbits: Orbit is defined as the path, by which electrons revolve around the nucleus.

> **DO YOU KNOW?**
> Besides the fundamental particles like protons, electrons and neutrons some more particles are discovered in the nucleus of an atom. They include mesons, neutrino, antineutrino, positrons etc.

11.5 Atomic number and Mass number

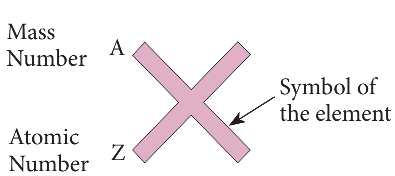
Only hydrogen atoms have one proton in their nuclei. Only helium atoms have two protons. Indeed, only gold atoms have 79 protons. This shows that the number of protons in the nucleus of an atom decides which element it is. This very important number is known as the **atomic number** (proton number, given the symbol Z) of an atom.

Atomic number(Z) = Number of protons = Number of electrons

Protons alone do not make up all of the mass of an atom. The neutrons in the nucleus also contribute to the total mass. The mass of the electron can be regarded as so small that it can be ignored. As a proton and a neutron have the same mass, the mass of a particular atom depends on the total number of protons and neutrons present. This number is called the **mass number** (or nucleon number, given the symbol A) of an atom.

Mass number = Number of protons + Number of neutrons

For any element, the atomic numbers are shown as subscripts and mass number are shown as superscripts.



For example, nitrogen is written as $^{14}_{7}\mathrm{N}$

Here **7** is its atomic number and **14** is its mass number.

Activity 1

Symbolically represent the following atoms using atomic number and mass number. [Refer table 11.1]

a) Carbon b) Oxygen
c) Silicon d) Beryllium

The difference between the mass number of an element and its atomic number gives the number of neutrons present in one atom of the element.

Number of neutrons (n) = Mass number (A) – Atomic number (z)

For example, the number of neutrons in one atom of $^{24}_{12}\mathrm{Mg}$ is

Number of neutrons (n) = 24 – 12 = 12
$(A)\ \ (Z)$

Test Yourself

Calculate the number of neutrons in the following atoms:

a) $^{27}_{13}\mathrm{Al}$ b) $^{31}_{15}\mathrm{P}$ c) $^{190}_{76}\mathrm{Os}$ d) $^{54}_{24}\mathrm{Cr}$

> **DO YOU KNOW?**
> Atomic number is designated as Z why?
> Z stands for Zahl, which means NUMBER in German.
> Z can be called Atomzahl or atomic number
> A is the symbol recommened in the ACS style guide instead of M (massenzahl in German).

Problem 1

Calculate the atomic number of an element whose mass number is 39 and number of neutrons is 20. Also find the name of the element.

Solution

Mass Number = Atomic number + Number of neutrons

Atomic Number = Mass number – Number of neutrons

= 39 – 20

Atomic Number = 19

Element having atomic number 19 is Potassium (K)

11.5.1 Electronic configuration of atoms

You already know that electrons occupy different energy levels called orbits or shells. The distribution of electrons in different shells is called electronic configuration. This distribution of electrons is governed by certain rules or conditions, known as Bohr and Bury Rules of electronic configuration.

Rule 1: The maximum number of electrons that can be accommodated in a shell is equal to $2n^2$ where 'n' is the serial number of the shell from the nucleus.

Shell	Value of (n)	Maximum number of electrons ($2n^2$)
K	1	$2 \times 1^2 = 2$
L	2	$2 \times 2^2 = 8$
M	3	$2 \times 3^2 = 18$
N	4	$2 \times 4^2 = 32$

Rule 2: Shells are filled in a **stepwise manner** in the increasing order of energy.

Rule 3: The outermost shell of an atom cannot have more than 8 electrons , even if it has capacity to accomodate more electrons. For example, electronic arrangement in calcium having 20 electrons is,

K	L	M	N
2	8	8	2

Problem 2

What is the Electronic configuration of Aluminium?

Solution

Electronic configuration of Aluminium atom: (Z = 13) **K shell = 2 , L shell = 8 and M shell = 3 electron**.

So its electronic configuration is 2, 8, 3

DO YOU KNOW? The forces between the protons and the neutrons in the nucleus are of special kind called Yukawa forces. This strong force is more powerful than gravity.

Geometric Representation of atomic structure of elements

Knowing the mass number and atomic number of an element we can represent atomic structure.

Example:

Geometric Representation of oxygen atom $^{16}_{8}O$

Mass number A = 16

Atomic number Z = 8

Number of neutrons = A – Z = 16 – 8 = 8

Number of protons = 8

Number of electron = 8

Electronic configuration = 2, 6

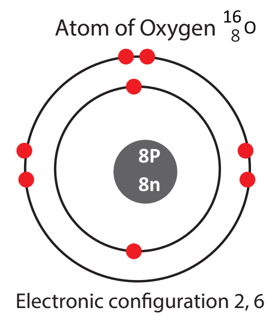


Figure 11.7 Atom of oxygen.

DO YOU KNOW? Atoms are so tiny their mass number cannot be expressed in grams but expressed in amu (atomic mass unit). New unit is U. Size of an atom can be measured in nano metre (1 nm = 10^{-9} m) Even though atom is an invisible tiny particle now-a-days atoms can be viewed through SEM that is Scanning Electron Microscope.

11.5.2 Valence electrons

In the above example, we can see that there are six electrons in the outermost shell of oxygen atom. These six electrons are called as valence electrons.

The outermost shell of an atom is called valence shell and the electrons present in the valence shell are known as valence electrons. The chemical properties of elements are decided by these valence electrons, since they are the ones that take part in chemical reactions.

The elements with same number of electrons in the valence shell show similar properties and those with different number of valence electrons show different chemical properties. Elements, which have 1 or 2 or 3 valence electrons (except Hydrogen) are **metals.** Elements with 4 to 7 electrons in their valence shell are **non-metals**.

11.5.3 Valency

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Valency of an element is the combining capacity of the element with other elements and is equal to the number of electrons that take part in a chemical reaction. Valency of the elements having valence electrons 1, 2, 3, 4 is 1, 2, 3, 4 respectively.

Valency of an element with 5, 6 and 7 valence electrons is 3, 2 and 1 (8–valence electrons) respectively. Because 8 is the number of electrons required by an element to attain stable electronic configuration. Elements having completely filled outermost shell show **Zero valency**.

For example: The electronic configuration of Neon is 2,8 (completely filled). So valency is **0**.

Problem 3

Find the valency of Magnesium and Sulphur.

Solution

Electronic configuration of magnesium is 2, 8, 2. So valency is 2.

Electronic configuration of sulphur is 2, 8, 6. So valency is 2 i.e.(8 – 6).

Activity 2

Assign the valency for Phosphorus, Chlorine, Silicon and Argon

Table 11.2 Arrangement of electrons in atoms of elements having atomic from 1 to 20.

Elements	Symbol	Atomic No (Z) No. of protons/ No. of electrons	Mass No. (A) No. of protons + neutrons	No. of neutrons (A – Z)	Electronic configuration				Valency	Metal/ non-metal/ noble gas
					1st or K-shell	2nd or L-shell	3rd or M-shell	4th or N-shell		
Hydrogen	H	1	1	–	1				1	Non-metal
Helium	He	2	4	2	2				0	Noble gas
Lithium	Li	3	7	4	2	1			1	Metal
Beryllium	Be	4	9	5	2	2			2	Metal
Boron	B	5	11	6	2	3			3	Non-metal
Carbon	C	6	12	6	2	4			4	Non-metal
Nitrogen	N	7	14	7	2	5			3	Non-metal
Oxygen	O	8	16	8	2	6			2	Non-metal
Fluorine	F	9	19	10	2	7			1	Non-metal
Neon	Ne	10	20	10	2	8			0	Noble gas
Sodium	Na	11	23	12	2	8	1		1	Metal
Magnesium	Mg	12	24	12	2	8	2		2	Metal
Aluminium	Al	13	27	14	2	8	3		3	Metal
Silicon	Si	14	28	14	2	8	4		4	Non-metal
Phosphorus	P	15	31	16	2	8	5		3	Non-metal
Sulphur	S	16	32	16	2	8	6		2	Non-metal
Chlorine	Cl	17	35, 37	18, 20	2	8	7		1	Non-metal
Argon	Ar	18	40	22	2	8	8		0	Noble gas
Potassium	K	19	39	20	2	8	8	1	1	Metal
Calcium	Ca	20	40	20	2	8	8	2	2	Metal

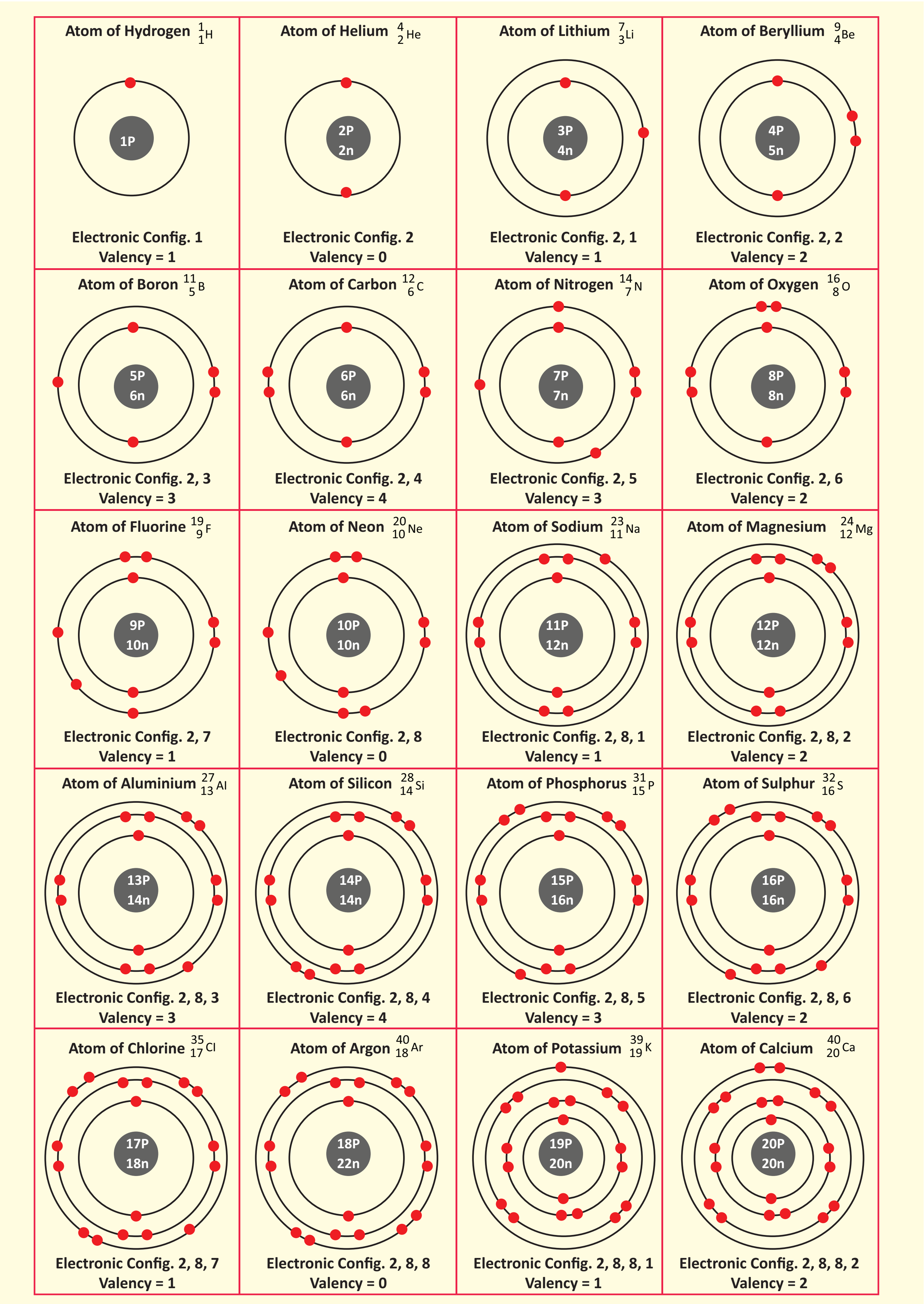
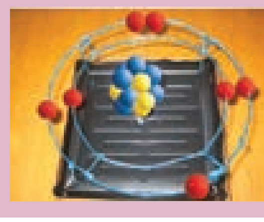


Figure 11.8 Geometric representation of atoms of the first twenty elements.

Activity 3

Look at the model given below. Make groups of five. Each group can make models of 4 elements by using available materials like balls, beads, string etc.



Activity 4

Draw the structures of the isotopes of oxygen O^{16} and O^{18}

Atomic number of oxygen = 8

11.6 Isotopes, Isobars and Isotones

11.6.1 Isotopes

In nature, a number of atoms of elements have been identified, which have the same atomic number but different mass numbers. For example, take the case of hydrogen atom, it has three atomic species as shown below:

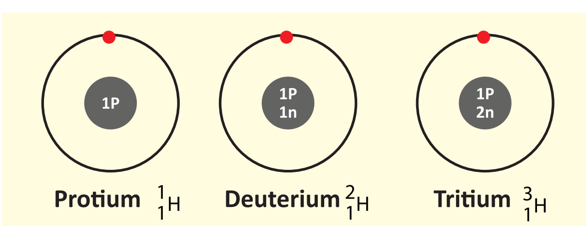


Figure 11.9 Isotopes

The atomic number of all the three isotopes is 1, but the mass number is 1, 2 and 3, respectively. Other such examples are: i) carbon, ${}^{12}_{6}C$, ${}^{13}_{6}C$ ii) Chlorine ${}^{35}_{17}Cl$ ${}^{37}_{17}Cl$

On the basis of these examples, isotopes are defined as the different atoms of the same element, having same atomic number but different mass numbers. There are two types of isotopes: **stable** and **unstable**. The isotopes which are unstable, as a result of the extra neutrons in their nuclei are radioactive and are called **radioisotopes**. For example, uranium-235, which is a source of nuclear reactors, and cobalt-60, which is used in radiotherapy treatment are both radioisotopes.

11.6.2 Isobars

Let us consider two elements – calcium (atomic number 20), and argon (atomic number 18).

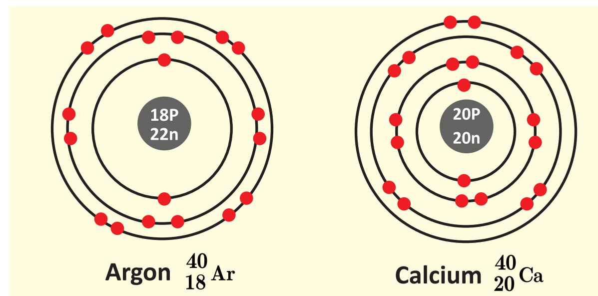


Figure 11.10 Isobars

They have (Fig. 11.10) different number of protons and electrons. But, the mass number of both these elements is 40. It follows that the total number of nucleons in both the atoms are the same. They are called isobars. Atoms of different elements with different atomic numbers, and same mass number are known as isobars.

More to Know

Thumb rule for isotopes and isobars. Remember **t** for top and **b** for bottom.
Isotope: Top value changes – Atomic mass
Isobars: Bottom value changes – Atomic number

11.6.3 Isotones

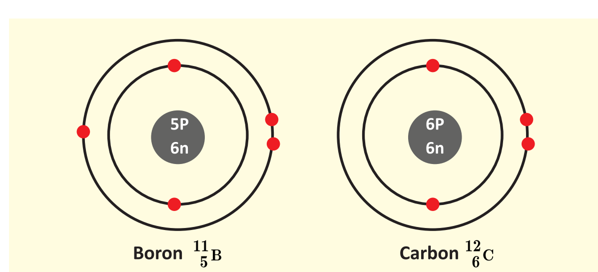


Figure 11.11 Isotones

No of neutrons in boron = 11 – 5 = 6

No of neutrons in carbon = 12 – 6 = 6

The above pair of elements Boron and Carbon has the same number of neutrons but different number of protons and hence different atomic numbers. Atoms of different elements with different atomic numbers and different mass numbers, but with same number of neutrons are called isotones

Activity 5

Draw the model of the following pairs of isotones:

(i)Fluorine & Neon (ii) Sodium & Magnesium (iii) Aluminum and Silicon

11.7 Laws of Chemical combination

In the seventeenth century, scientists had been trying to find out methods for converting one substance into another. During their studies of chemical changes, they made certain generalisations. These generalisations are known as laws of chemical combination. These are :

1. Law of conservation of mass
2. Law of constant proportions
3. Law of multiple proportions
4. Law of reciprocal proportions
5. Gay Lussac's law of gaseous volumes

Out of these five laws you have already learnt the first two laws in class VIII. Let us see the next three laws in detail in this chapter.

11.7.1 Law of multiple proportions

This law was proposed by **John Dalton in 1804.**

It states that, **"When two elements A and B combine together to form more than one compound, then different masses of A which separately combine with a fixed mass of B are in simple ratio".**

To illustrate the law let us consider the following example.

Carbon combines with oxygen to form two different oxides, carbon monoxide(CO) and carbon dioxide (CO_2). The ratio of masses of oxygen in CO and CO_2 for fixed mass of carbon is 1: 2.

	Mass of carbon (g)	Mass of oxygen (g)	Ratio of O in CO to O in CO_2
CO	12	16	1:2
CO_2	12	32	

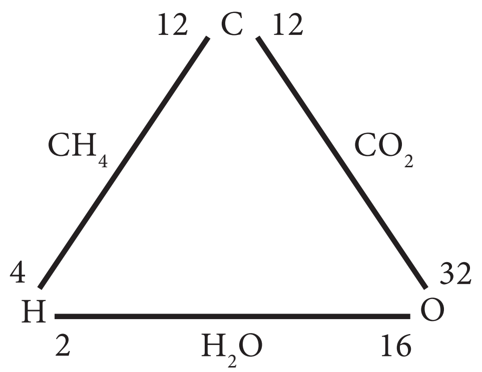
Let us take one more example, Sulphur combines with oxygen to form sulphur dioxide and sulphur trioxide. The ratio of masses of oxygen in SO_2 and SO_3 for fixed mass of Sulphur is 2:3.

11.7.2 Law of Reciprocal Proportions

The **law of reciprocal proportions** was proposed by Jeremias Ritcher in 1792.

It states that, "**If two different elements combine separately with the same weight of a third element, the ratio of the masses in which they do so are either same or a simple multiple of the mass ratio in which they combine among themselves.**"

Consider the three elements hydrogen, oxygen and water as shown below:



Here, hydrogen and oxygen combine separately with the same weight of carbon to form methane (CH_4) and carbon dioxide (CO_2)

Compounds	Combining elements		Combining weights	
CH_4	C	H	12	4
CO_2	C	O	12	32

Ratio of different mass of hydrogen (4g) and oxygen (32g) that combines with same mass of carbon } 4:32 (or) 1:8——(1)

Now, hydrogen and oxygen combine to form water (H_2O).

Ratio of mass of hydrogen to oxygen = 2:16 (or) 1:8 ———(2)

From 1 and 2, the ratio is the same as that of the first obtained. Thus, the law of reciprocal proportion is illustrated.

11.7.3 Gay Lussac's Law of Combining Volumes

According to Gay Lussac's Law, whenever gases react together, the volumes of the reacting gases bear a simple ratio, and the ratio is extended to the product when the product is also in gaseous state, provided all the volumes are measured under similar conditions of temperature and pressure.

This law may be illustrated by the following example.

It has been experimentally observed that one volume of hydrogen reacts with one volume of chlorine to form two volume of hydrogen chloride as shown in the figure 11.12.

The ratio of volume which gases bears is **1:1:2** which is a simple whole number ratio.

Activity 6

Nitrogen combines with hydrogen to form ammonia (NH_3). Illustrate Gay Lussac's law using this example.

11.8 Quantum Numbers

When you specify the location of a building, you usually list which country it is in, which state and city it is in that country.

Just like we have four ways of defining the location of a building (country, state, city, and street address), we have four ways of defining the properties of an electron, i.e.four quantum numbers.

Thus, the numbers which designate and distinguish various atomic orbitals and electrons present in an atom are called quantum numbers.

Four types of Quantum number are as follows:

Quantum Number	Symbol	Information conveyed
Principal quantum number	n	Main energy level
Azimuthal quantum number	l	Sub shell/ shape of orbital
Magnetic quantum number	m	Orientation of orbitals
Spin quantum number	s	Spin of the electron

You will learn more details about this in higher classes.

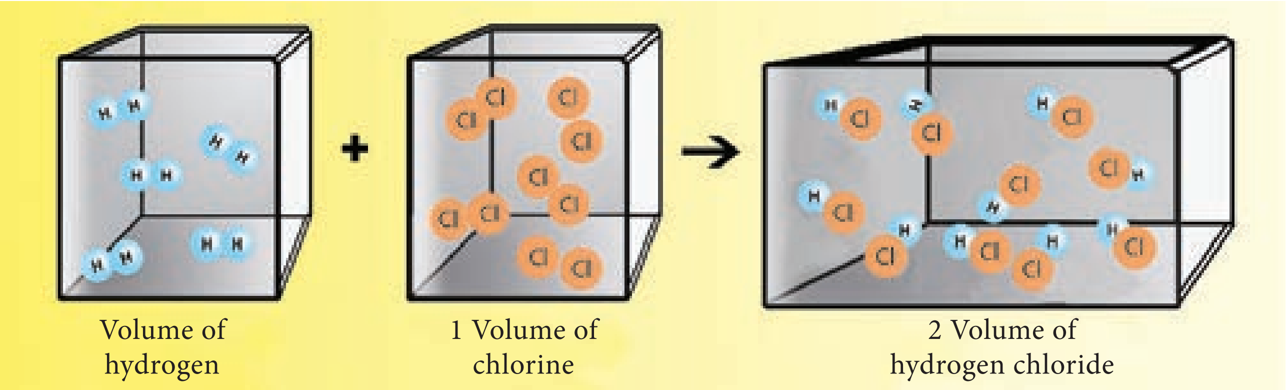


Figure 11.12 One volume of hydrogen react with one volume of chlorine to give two volumes of hydrogen chloride.

Points to Remember

- ❖ Rutherford's alpha-particle scattering experiment led to the discovery of the atomic nucleus.
- ❖ J.Chadwick discovered the presence of neutrons in the nucleus.
- ❖ Mass number of an element is the total number of protons and neutrons.
- ❖ Valence electrons are the electrons in the outermost orbit.
- ❖ Valency is the combining capacity of an atom.
- ❖ Isotopes are atoms of the same element, which have same atomic number but different mass numbers.
- ❖ Isobars are the atoms of the different element with same mass number but different atomic number.
- ❖ Isotones are the atoms of different elements having same number of neutron but different atomic number and mass number.

A-Z GLOSSARY

Atom	The smallest component of an element which takes part in a chemical reaction.
Electron	A stable subatomic particle with a charge of negative electricity, found in all atoms and acting as the primary carrier of electricity in solids.
Neutron	A subatomic particle of about the same mass as a proton but without an electric charge, present in all atomic nuclei except those of ordinary hydrogen.
Orbitals	Atomic orbitals are region of space around the nucleus of an atom where an electron is likely to be found.
Proton	A stable subatomic particle occurring in all atomic nuclei, with a positive electric charge equal in magnitude to that of an electron.
Quantum numbers	The numbers which designate and distinguish various atomic orbitals and electrons present in an atom.

TEXTBOOK EXERCISES

I. Choose the correct answer.

1. Among the following the odd pair is

   a) ${}^{18}_{8}O$, ${}^{19}_{9}F$ b) ${}^{40}_{18}Ar$, ${}^{14}_{7}N$

   c) ${}^{30}_{14}Si$, ${}^{31}_{15}P$ d) ${}^{40}_{20}Cr$, ${}^{39}_{19}K$

2. Change in the number of neutrons in an atom changes it to

   a) an ion. b) an isotope.
   c) an isobar. d) another element.

3. The term nucleons refer to
   a) protons and electrons
   b) only neutrons
   c) electrons and neutrons
   d) protons and neutrons

4. The number of protons, neutrons and electrons present respectively in ${}^{80}_{35}Br$ are
   a) 80, 80, 35
   b) 35, 55,80
   c) 35, 35, 80
   d) 35, 45, 35

5. The correct electronic configuration of potassium is
   a) 2,8,9 b) 2,8,1
   c) 2,8,8,1 d) 2,8,8,3

II. State true or false. If false, correct the statement.

1. In an atom, electrons revolve around the nucleus in fixed orbits.
2. Isotopes of an element have different atomic numbers.
3. Electrons have negligible mass and charge.
4. Smaller the size of the orbit, lower is the energy of the orbit.
5. The maximum number of electron in L Shell is 10.

III. Fill in the blanks.

1. Calcium and Argon are examples of a pair of ________________
2. Total number of electrons that can be accommodated in an orbit is given by ______________
3. _____________ isotope is used in the nuclear reactors.
4. The number of neutrons present in ${}^{7}_{3}Li$ is ___________
5. The valency of Argon is ___________

IV. Match the following.

a) Dalton	1. Hydrogen atom model
b) Chadwick	2. Discovery of nucleus
c) Rutherford	3. First atomic theory
d) Neils Bohr	4. Plum pudding model
	5. Discovery of neutrons

VI. Answer very briefly.

1. Name an element which has the same number of electrons in its first and second shell.
2. Write the electronic configuration of K and Cl
3. Write down the names of the particles represented by the following symbols and explain the meaning of superscript and subscript numbers attached.

$${}_{1}H^{1},\ {}_{0}n^{1},\ {}_{-1}e^{0}$$

4. For an atom 'X', K, L and M shells are completely filled. How many electrons will be present in it?
5. What is the same about the electron structures of:
   a. Lithium, Sodium and Potassium.
   b. Beryllium, Magnesium and Calcium.

VII. Answer briefly.

1. How was it shown that atom has empty space?
2. Why do ${}^{35}_{17}Cl$ and ${}^{37}_{17}Cl$ have the same chemical properties? In what respect do these atoms differ?
3. Draw the structure of oxygen and sulphur atoms.
4. Calculate the number of neutrons, protons and electrons: (i) atomic number 3 and mass number 7 (ii)atomic number 92 and mass number 238.
5. What are nucleons? How many nucleons are present in Phosphorous? Draw its structure.

V. Complete the following table.

Atomic Number	Mass Number	Number of Neutrons	Number of Protons	Number of Electrons	Name of the Element
9	-	10	-	-	-
16	-	16	-	-	-
-	24	-	-	12	Magnesium
-	2	-	1	-	-
-	1	0	1	1	-

VIII. Answer in detail.

1. What conclusions were made from the observations of Gold foil experiment?
2. Explain the postulates of Bohr's atomic model.
3. State the Gay Lussac's law of combining volumes. Explain with an illustration.

REFERENCE BOOKS

1. Atomic Structure Rebecca L. Johnson Twenty-First Century Books.
2. Atomic structure and Periodicity Jack Barrett. Royal Society of Chemistry.
3. Chemistry for Degree Students (B.Sc. Sem.-I, As per CBCS) R L Madan.

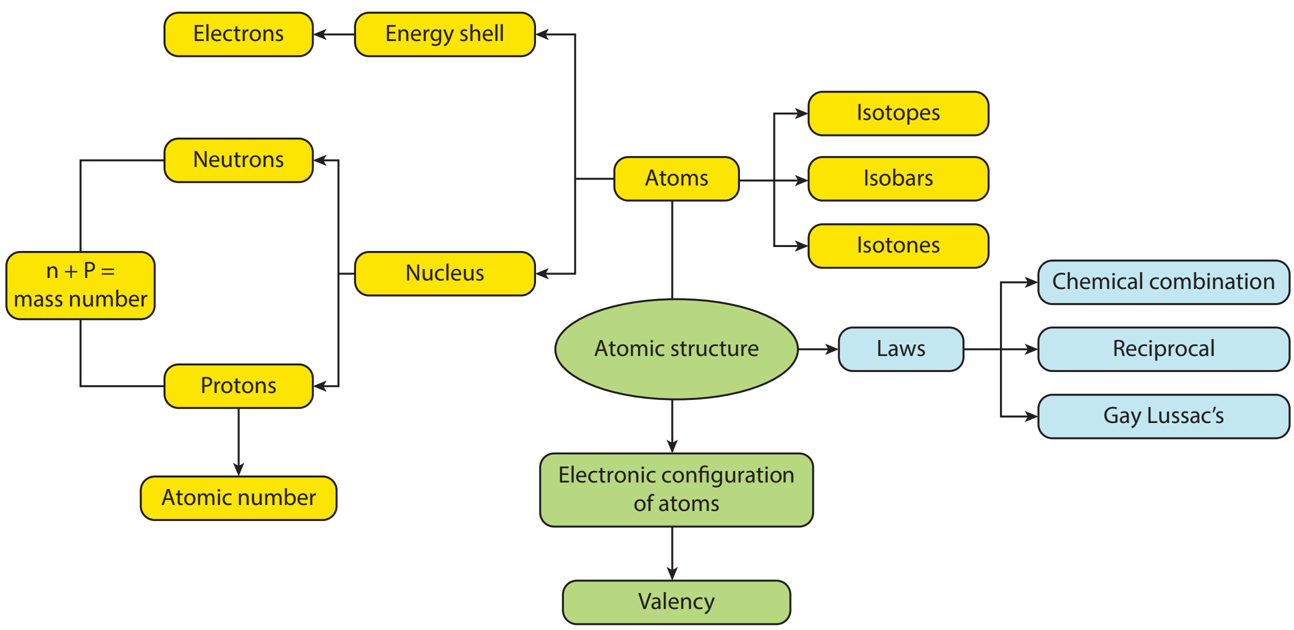
INTERNET RESOURCES

https://www.youtube.com/watch?v=t4xgvlNFQ3c

https://www.youtube.com/watch?v=P6DMEgE8CK8

https://www.youtube.com/watch?v=YURReI6OJsg

Concept Map



ICT CORNER

ATOMIC STRUCTURE

Atoms are building blocks. They are made of neutrons, protons and electrons.
This activity help the students to explore more about atoms and its components.

Step 1. Type the following URL in the browser or scan the QR code from your mobile. You can see on the screen. Click that.

Step 2. Select atom. Atomic orbit you can see with multiple options. Select protons, neutrons and electrons to their respective places. According to their numbers name of the elements appear on the periodic table. You can also find out whether the selected element is neutral or charged(ions)

Step 3. click"**symbol**"now. When you arrange electrons, neutrons and protons on the orbits you can see the name of the element, it's atomic number, atomic mass and number of electrons.

Step 4. Third option is games. It's an evaluation one to test your understanding

URL: https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html

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