CHAPTER-2
PERIODIC TABLE

merits of Mendeleev's periodic table.

Arranged in the order of increasing atomic mass.
Systematic classification
prediction of new elements
correction of atomic mass

demerits of Mendeleev's periodic table

not able to give a position for hydrogen
position of lanthanides and actinides
arranged the elements in the increasing order of atomic mass instead of atomic numbers.

Modern periodic law

The chemical and physical properties of elements are periodic functions of their atomic numbers.

In the periodic table, the horizontal rows are called periods and the vertical columns are called groups.

How many periods are there? 7

.....

Write the total number of groups. 18

.....

Which period has the least number of elements? 1

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Name of the element	Symbol	Atomic number	Electron configuration
Lithium	Li	3	2,1
Sodium	Na	11	2,8,1
Potassium	K	19	2,8,8,1
Rubedium	Rb	37	2,8,18,8,1
Caesium	Cs	55	2,8,18,18,8,1
Francium	Fr	87	2,8,18,32,18,8,1

Group number	Name of family
1	Alkali metals
2	Alkaline earth metals
From 3 to 12	Transition elements
13	Boron family
14	Carbon family
15	Nitrogen family
16	Oxygen family
17	Halogens
18	Noble gases

Metalloids are also present in these groups. Elements exhibiting the properties of both metals and non-metals are known as metalloids. e.g. silicon (Si), germanium (Ge), arsenic (As), antimony (Sb) etc.

Characteristics of main group elements

- **They show similarity in properties in a group.**
- **They include different types of elements such as metals, non-metals and metalloids.**
- **They represent elements belonging to different physical states.**

Name of element	Symbol	Atomic number	Electron configuration	Number of electrons in the outermost shell	Group number
Lithium	Li	3	2, 1	1	1
Sodium	Na	11	2,8,1		
Potassium	K	19	2, 8, 8, 1		
Beryllium	Be	4	2,2	-	2
Magnesium	Mg	12	2,8,2 -		
Calcium	Ca	20	2, 8, 8, 2	2	

Name of element	Symbol	Atomic number	Electron configuration	No. of the outermost electrons	Group number
Boron	B	5	2, 3	3	13
Carbon	C	6	2,4 -	4 -	14 -
Nitrogen	N	7	2,5 -	5 -	15 -
Oxygen	O	8	2,6 -	6 -	16 -
Fluorine	F	9	2,7 -	7 -	17 -

The number of shells in the atoms of elements is their period number.

Usually, 18th group elements do not take part in chemical reactions because of the stable arrangement of electrons.

Name of element	Symbol	Atomic number	Electron configuration	No. of shells	Period number
Hydrogen	H	1	1	1	1
Helium	He	2	2	1	1
Lithium	Li	3	2,1	2	2
Beryllium	Be	4	2, 2	2	2
Sodium	Na	11	2,8,1	3	3
Magnesium	Mg	12	2,8,2	3	3
Potassium	K	19	2, 8, 8, 1	4	4
Calcium	Ca	20	2, 8, 8, 2	4	4

Name of element	Symbol	Atomic number	Electron configuration	Group number
Helium	He	2	2	18
Neon	Ne	10	2,8	18
Argon	Ar	18	2,8,8	18
Krypton	Kr	36	2, 8, 18, 8	18

The elements from group 3 upto group 12 are known as the transition elements.

In d-block ,electrons are being added to the penultimate shell.

- Elements included in groups 3 to 12 are transition elements.
- Filling of electron takes place in the penultimate shell.
- Generally, they exhibit similarity in chemical properties in groups as well as periods.
- They are metals.
- They generally form coloured compounds.

Lanthanoids and actinoids are known as inner transition elements.

The size of an atom depends mainly on two factors.
- **Nuclear charge**
- **Number of shells**

as we move down the group,atomic size increases due to increse in shells.from left to right,atomic size decreases,due to increase in the nuclear charge.

Moving down the group, the size of an atom increases. The size of an atom decreases on moving from left to right along a period.

The symbols of a few elements are given. Write the electron configurations of these elements and find the period and group to which they belong.

a) $^{23}_{11}Na$ b) $^{27}_{13}Al$ c) $^{35}_{17}Cl$ d) $^{16}_{8}O$ e) $^{20}_{10}Ne$ f) $^{12}_{6}C$

a) 2,8,1	3	1
b) 2,8,3	3	13
c) 2,8,7	3	17
d) 2,6	2	16
e) 2,8	2	18
f) 2,4	2	14

The electron configuration of element X is 2, 8, 8, 1. (Symbol is not real.)

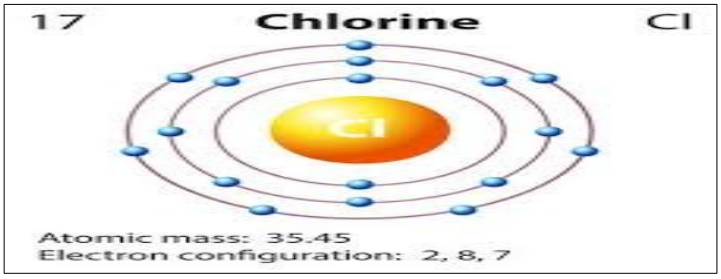
a. Find the atomic number of X.
b. To which group does it belong?
c. What is its period number?
d. To which family does it belong?
e. Write the electron configuration of the noble gas which comes just before X.

a)19 b)1 c)4 d)alkali e)2,8,8

There are 3 shells in an atom of element P. There are 7 electrons in its outermost shell. (Symbol is not real.)

a. Write the electron configuration of element P.
b. What is its atomic number?
c. To which period does it belong?
d. To which group does it belong?
e. Draw the model of this atom.

a)2,8,7 b)17 c)3 d)17 e)



The element M belongs to the 3rd period and group 1. (Symbol is not real)

a. Write the electron configuration of this element.
b. Write its name and symbol.
c. To which family does this element belong?
d. Write the electron configuration of the element belonging to the same period and group 13.

a)2,8,1 b)sodium,Na c)alkali d)2,8,3

Electron configurations of elements P, Q, R and S are given. (Symbols are not real)

P – 2, 7 Q – 2, 8

R – 2, 8, 1 S – 2, 8, 7

a. Which of these elements belong to the same period?
b. Which of these elements belong to the same group?
c. Identify the noble gas among these.
d. Find the group number and period number of element S.

a)P&Q, R&S b)P & S c)Q d) 17,3

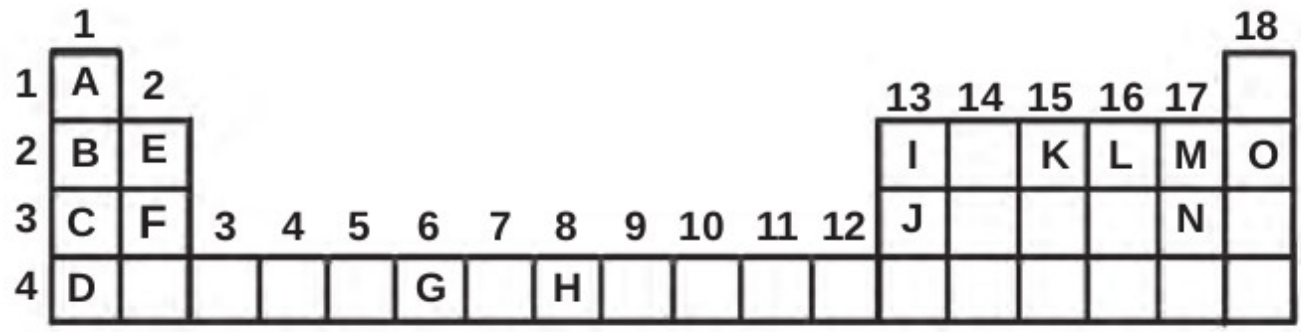
Electron configurations of a few elements are given.

A – 2, 1 B – 2, 8, 1 C – 2, 8, 7

(Symbols are not real)

a. Which of these elements has bigger atom, A or B?
b. Which atom is bigger, B or C?

a)B b)B



a. Which of these elements belong to the halogen family?

b. Which are the transition elements?

c. Write the elements of group 1 in the decreasing order of their atomic size.

d. Which element has smaller atom, B or I?

e. Write the elements of period 3 in the increasing order of their atomic size.

f. Which of these are alkaline earth metals?

g. Which element has 8 electrons in its outermost shell?

h. Find the real symbols of the given elements with the help of the periodic table.

a)M,N b)G,H c)D>C>B>A d)I e)N<J<F<C f)E,F g)O

h)A-Li,/ B-Na,/ C-K,/ D-Rb /E-Be, /F-Mg, /G-Cr, /H-Fe,/ I-B,/ J-Al K-N,/ L-O,/ M-F, /N-Cl, /O-Ne.

An element belonging to the 2nd period has 2 electrons in the outermost shell of its atom.

a. Write the electron configuration of this element.

b. Write the electron configuration of the noble gas belonging to the same period.

c. What is its group number?

d. Write the electron configuration of an element in the same group and in the third period.

a)2,2 b)2,8 c)2 d)2,8,2

Element	Mass number	Number of neutrons
A	9	5
B	35	18
C	39	20
D	40	22

(Hint : Symbols are not real)

a. Find the atomic number of these elements.

b. Write their electron configurations.

c. Which among these is a noble gas?

d. To which family does the element B belong?

e. To which period and group does the element C belong?

f. Which of these elements belong to the same period?

a) A=5 B=18 C=20 D=22 b)