

CHAPTER – 5

PERIODIC CLASSIFICATION OF ELEMENTS

In the beginning of 18th century Joseph Louis Proust stated that hydrogen atom is the building material and atoms of all other elements are simply due to the combination of number of hydrogen atoms. (It is to be noted that at his time the atomic weight of all elements were given as whole numbers and the atomic weight of hydrogen was taken as one.)

DOBEREINER'S TRIADS

A German chemist Johann Wolfgang Dobereiner (1829) noted that there were groups of elements with three elements known as *triads*. Elements in each group or a triad possess with similar chemical properties. Dobereiner discovered that “the relative atomic mass of the middle element in each triad was close to the average of the relative atomic masses of the other two elements”. This statement is called the *Dobereiner's law of Triads*.

Dobereiner's Triads.				
Group	Elements and their Atomic Mass			Arithmetic mean of Atomic mass
A	Lithium(Li)	Sodium(Na)	Potassium(K)	$\frac{7.0 + 39.0}{2} = 23.0$
	7.0	23.0	39.0	
B	Calcium (Ca)	Strontium(Sr)	Barium(Ba)	$\frac{40.0 + 137.0}{2} = 88.5$
	40.0	87.5	137.0	
C	Chlorine(Cl)	Bromine(Br)	Iodine(I)	$\frac{35.0 + 127.0}{2} = 81.0$
	35.0	80.0	127.0	
	55.8	58.9	58.6	

- In this table, atomic mass of sodium is equal to arithmetic mean of atomic masses of lithium and potassium. Similarly, atomic mass of strontium is equal to arithmetic mean of atomic masses of calcium and barium.

LIMITATION OF DOBEREINER'S TRIADS:

- All the then known elements could not be arranged in the form of triads.
- The law failed for very low mass or for very high mass elements. In case of F, Cl, Br, the atomic mass of Cl is not an arithmetic mean of atomic masses of F and Br.
- As the techniques improved for measuring atomic masses accurately, the law was unable to remain strictly valid.

NEWLANDS' LAW OF OCTAVES

Newlands law of octaves states that when elements are arranged in the ascending order of their atomic masses they fall into a pattern in which their properties repeat at regular intervals. Every eighth element starting from a given element resembles in its properties to that of the starting element.

LIMITATION OF NEWLANDS' OCTAVES:

- Newlands' Octaves could be valid upto calcium only; as beyond calcium, elements do not obey the rules of Octaves.
- Newlands' Octaves was valid for lighter elements only.
- It appears that Newlands did not expect the discovery of more elements than 56 which were discovered till his time.

- More than one element had to be placed in some of the groups; in order to place the elements having similar properties in one group. But in order to do so, he also put some dissimilar elements in same group.
- Iron; which has similar property as cobalt and nickel, was placed far from them.
- Cobalt and nickel were placed in the group with chlorine and fluorine in spite of having different properties.
- In spite of above limitations; Newlands was the first scientist who arranged the elements in order of their increasing relative atomic masses.

Newlands' Arranged Elements in Octaves:

H	F	Cl	Co/Ni	Br	Pd	I	Pt/Ir
Li	Na	K	Cu	Rb	Ag	Cs	Tl
G	Mg	Ca	Zn	Sr	Cd	Ba/V	Pb
Bo	Al	Cr	Y	Ce/La	U	Ta	Th
C	Si	Ti	In	Zn	Sn	W	Hg
N	P	Mn	As	Di/Mo	Sb	Nb	Bi
O	S	Fe	Se	Ro/Ru	Te	Au	Os

INTEXT QUESTIONS PAGE NO. 81

Q1. Did Dobereiner's triads also exist in the columns of Newlands' Octaves? Compare and find out.

Ans:

Yes. Lithium, sodium and potassium; beryllium; magnesium and calcium are two triads that also exist in the columns of Newland's octaves.

Q2. What were the limitations of Dobereiner's classification?

Ans:

Please see above notes

Q3. What were the limitations of Newlands' Law of Octaves?

Ans:

Please see above notes

MENDELEEV'S PERIODIC TABLE

Mendeleef arranged the elements known at that time in a chart in a systematic order in the increasing order of their atomic weights. He divided the chart into 8 vertical columns known as *groups*. Each group is divided into A, B sub groups. Each column contained elements of similar chemical properties.

The elements in the first column, for example, react with oxygen to form compounds with the general formula R_2O . For example, Li, Na and K when react with oxygen form compounds like Li_2O , Na_2O and K_2O respectively.

Elements of the second column react with oxygen to form compounds with the general formula RO . For example, Be, Mg and Ca when react with oxygen form BeO , MgO and CaO .

Mendeleef tried to explain the similarities of elements in the same group in terms of their common valency.

THE PERIODIC LAW:

Based on Mendeleeff's observations regarding the properties of elements in the periodic table, a law known as the *periodic law* of the properties of elements was proposed.

"The law states that the physical and chemical properties of the elements are a periodic function of their atomic weights."

SALIENT FEATURES AND ACHIEVEMENTS OF THE MENDELEEFF'S PERIODIC TABLE:

1. Groups and sub-groups: There are eight vertical columns in Mendeleeff's periodic table called as *groups*. They are represented by Roman numerals I to VIII. Elements present in a given vertical column (group) have similar properties. Each group is divided into two sub-group 'A' and 'B'. The elements within any sub-group resemble each other to great extent. For example, sub-group IA elements called 'alkali metals' (Li, Na, K, Rb, Cs, Fr) resemble each other very much.
2. Periods: The horizontal rows in Mendeleeff's periodic table are called *periods*. There are seven periods in the table, which are denoted by Arabic numerals 1 to 7. A period comprises the entire range of elements after which properties repeat themselves.
3. Predicting the properties of missing elements: Based on the arrangement of the elements in the table he predicted that some elements were missing and left blank spaces at the appropriate places in the table.

Mendeleef believed that some new elements would be discovered definitely. He predicted the properties of these new additional elements in advance purely depending on his table. His predicted properties were almost the same as the observed properties of those elements after their discovery.

He named those elements tentatively by adding the prefix '*eka*' (*eka is a Sanskrit numeral means one*) to the name of the element immediately above each empty space. The predicted the properties of elements namely eka-aluminium, eka-boron, eka-aluminium and eka-silicon were close to the observed properties of Scandium, Gallium and Germanium respectively which were discovered later.

<i>Properties of some elements as predicted and discovered latter</i>				
Property	Eka-aluminium (Predicted)	Gallium (Actual)	Eka-silicon (Predicted)	Germanium (Actual)
Atomic Mass	68	69.7	72	72.61
Density	5.9 g/cm ³	5.94 g/cm ³	5.5 g/cm ³	5.35 g/cm ³
Melting point	Low	30.2 ^o C(Low)	High	947 ^o C(High)
Formula of chloride	EaCl ₃	GaCl ₃	EsCl ₄	GeCl ₄
Formula of oxide	Ea ₂ O ₃	Ga ₂ O ₃	EsO ₂	GeO ₂

4. Correction of atomic mass: the correct placement of elements in Mendeleeff's periodic table helped in correcting the atomic masses of some elements like, Beryllium, Indium, Gold.
For example, At the time of Mendeleef, beryllium was given atomic weight 13.5.
Atomic weight = equivalent weight × valency

The equivalent weight of Be was found experimentally as 4.5 and its valency was understood as 3. Therefore atomic weight of beryllium was given as $4.5 \times 3 = 13.5$. With this atomic weight it had to be placed in a wrong group in the table. He said that its valency should be only 2 and then its atomic weight then would be $4.5 \times 2 = 9$. If atomic weight of 'Be' is 9 it would fit in the second group and its properties practically are similar to Mg, Ca etc., of the second group elements. He also helped in the calculation of the correct atomic weights of 'Indium' and 'Gold' in this manner.

5. Some anomalous series of elements like 'Te' and 'I' were observed in the table. The anomalous series contained element with more atomic weight like 'Te' (127.6 u) placed before the element with less atomic weight like 'I' (126.9 u). Mendeleeff accepted minor inversions in the order of increasing atomic weight when these inversions resulted in elements being placed in the correct groups.

It was the extraordinary thinking of Mendeleeff that made the chemists to accept the periodic table and recognise Mendeleeff more than anyone else as the originator of the periodic law.

LIMITATIONS OF MENDELEEFF'S PERIODIC TABLE:

1. *Position of hydrogen*: The position of hydrogen in the table is not certain because it can be placed in group IA as well as in group VIIA as it resembles both with alkali metals of IA group and halogens of VIIA group.
2. *Anomalous pair of elements*: Certain elements of highest atomic mass precede those with lower atomic mass.
For example, *tellurium* (atomic mass 127.6) precedes *iodine* (atomic mass 126.9).
Cobalt and *nickel*: *argon* and *potassium* which were placed in table by deviating the basis of classification (placement in ascending order of atomic masses).
For example, *potassium* (atomic mass 39) placed after *argon* (atomic mass 40).
Similar situation was found in pairs of *cobalt* and *nickel* and *tellurium*, *iodine*.
3. *Dissimilar elements placed together*: elements with dissimilar properties were placed in same group as sub-group A and sub-group B. For example, alkali metal like Li, Na, K etc., of IA group have little resemblance with coinage metals like Cu, Ag, Au of IB group.
4. *Some similar elements separated*: some similar elements like 'copper and mercury' and 'silicon and thalium' etc are placed in different groups of the periodic table.
5. *Position of isotopes*: isotopes of elements are placed in the same position in the table.

INTEXT QUESTIONS PAGE NO. 85

Q1. Use MendeléeV's Periodic Table to predict the formulae for the oxides of the following elements:

K, C, Al, Si, Ba.

Ans:

Oxygen is a member of group VIA in Mendeleef's Periodic Table. Its valency is 2. Similarly, the valencies of all the elements listed can be predicted from their respective groups. This can help in writing the formulae of their oxides.

- (i) **Potassium (K)** is a member of group IA. Its valency is 1. Therefore, the formula of its oxide is K_2O .
- (ii) **Carbon (C)** is a member of group IVA. Its valency is 4. Therefore, the formula of its oxide is C_2O_4 or CO_2 .
- (iii) **Aluminium (Al)** belongs to groups IIIA and its valency is 3. The formula of the oxide of the element is Al_2O_3 .
- (iv) **Silicon (Si)** is present in group IVA after carbon. Its valency is also 4. The formula of its oxide is Si_2O_4 or SiO_2 .
- (v) **Barium (Ba)** belongs to group IIA and the valency of the element is 2. The formula of the oxide of the element is Ba_2O_2 or BaO .

Q2. Besides gallium, which other elements have since been discovered that were left by Mendeléev in his Periodic Table? (any two)

Ans:

Scandium and germanium are the two elements that had been left by Mendeleef.

Q3. What were the criteria used by Mendeléev in creating his Periodic Table?

Ans:

The criteria used by Mendeleef were

- (i) Physical and chemical properties of the elements.
- (ii) Atomic masses in increasing order.

Q4. Why do you think the noble gases are placed in a separate group?

Ans:

Noble gases are also called inert gases because they have a complete octet and hence, are very stable. They do not react with other elements due to their stability. Since they all are unreactive, have complete octet and similar behaviour so they are placed in a separate group.

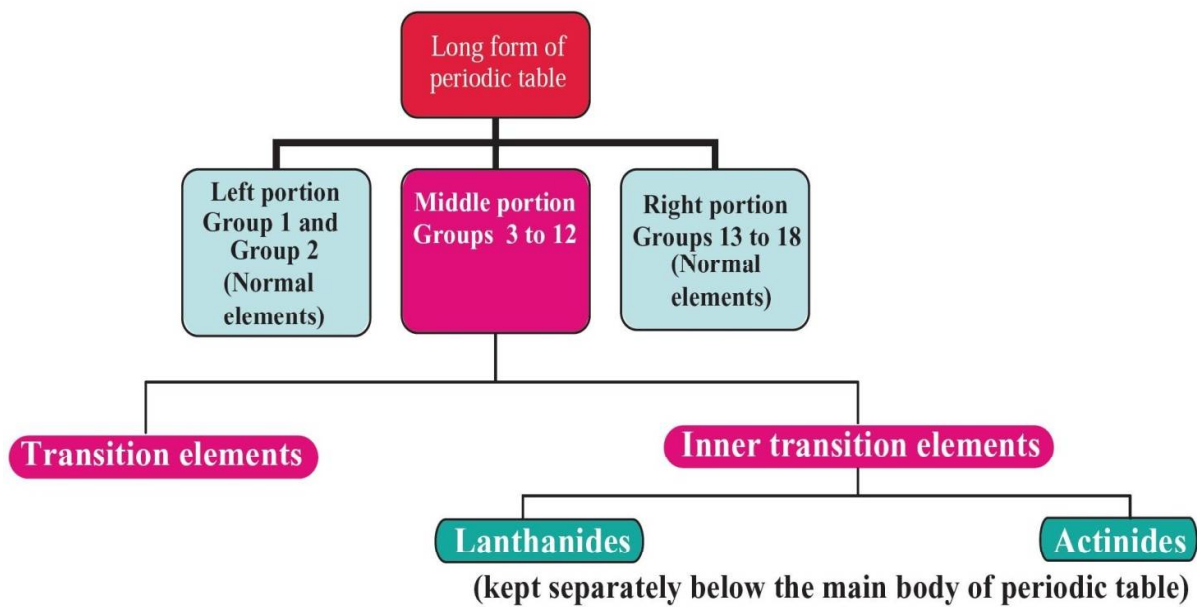
THE MODERN PERIODIC TABLE

Based on the modern periodic law, a number of forms of periodic table have been proposed from time to time but general plan of the table remained the same as proposed by Mendeleev. The table which is most commonly used and which is based upon the **electronic configuration of elements** is called the **long form of the periodic table**. This is called the **modern periodic table**.

Long form of the periodic table is a chart of elements in which the elements have been arranged in the increasing order of their atomic numbers. This table consists of **horizontal rows called periods and vertical columns called groups**.

- The modern periodic table has also been divided into four blocks known as s,p,d and f blocks.

Different portions of long form of periodic table



STUDY OF PERIODS

The **horizontal rows are called periods**. There are **seven** horizontal rows in the periodic table.

- **First period** (Atomic number 1 and 2): This is the shortest period. It contains only two elements (hydrogen and helium).
- **Second period** (Atomic number 3 to 10): This is a short period. It contains eight elements (lithium to neon).
- **Third period** (Atomic number 11 to 18): This is also a short period. It contains eight elements (sodium to argon).
- **Fourth period** (Atomic number 19 to 36): This is a long period. It contains eighteen elements (potassium to krypton). This includes 8 normal elements and 10 transition elements.
- **Fifth period** (Atomic number 37 to 54): This is also a long period. It contains 18 elements (rubidium to xenon). This includes 8 normal elements and 10 transition elements.
- **Sixth period** (Atomic number 55 to 86): This is the longest period. It contains 32 elements (caesium to radon). This includes 8 normal elements, 10 transition elements and 14 inner transition elements (lanthanides).
- **Seventh period**(Atomic number 87 to 118): As like the sixth period, this period also can accommodate 32 elements. Till now only 26 elements have been authenticated by IUPAC.

STUDY OF GROUPS

- Vertical columns in the periodic table starting from top to bottom are called groups. There are 18 groups in the periodic table.
- First group elements are called alkali metals.
- Second group elements are called alkaline earth metals.
- Groups three to twelve are called transition elements .
- Group 1, 2 and 13 - 18 are called normal elements or main group elements or representative elements .
- Group 16 elements are called chalcogen family (except polonium).
- Group 17 elements are called halogen family.
- Group 18 elements are called noble gases or inert gases.

- The lanthanides and actinides which form part of the group 3 are called inner transition elements.

Modern Periodic Table

The zigzag line separates the metals from the non-metals.

Metals

Metalloids

Non-metals

GROUP NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	H Hydrogen 1.0																	He Helium 4.0	
2	Li Lithium 6.9	Be Beryllium 9.0																Ne Neon 20.2	
3	Na Sodium 23.0	Mg Magnesium 24.3																Ar Argon 39.9	
4	K Potassium 39.1	Ca Calcium 40.1	Sc Scandium 45.0	Ti Titanium 47.8	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.9	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Ga Gallium 69.7	Ge Germanium 72.6	As Arsenic 74.9	Se Selenium 79.0	Br Bromine 79.9	Kr Krypton 83.8	
5	Rb Rubidium 85.5	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium (99)	Ru Ruthenium 101.1	Rh Rhodium 102.3	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3	
6	Cs Caesium 132.9	Ba Barium 137.3	La* Lanthanum 138.9	Hf Hafnium 178.5	Ta Tantalum 181.0	W Tungsten 183.9	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	Hg Mercury 200.6	Tl Thallium 204.4	Pb Lead 207.2	Bi Bismuth 209.0	Po Polonium (210)	At Astatine (210)	Rn Radon (222)	
7	Fr Francium (223)	Ra Radium (226)	Ac** Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (264)	Hs Hassium (265)	Mt Meitnerium (266)	Ds Darmstadtium (267)	Rg Roentgenium (268)	Uub Ununbium (269)	Uuq Ununquadium (270)	Uuh Ununhexium (271)					

58	Ce Cerium 140.1	Pr Praseodymium 140.9	Nd Neodymium 144.2	Pm Promethium (145)	Sm Samarium 150.4	Eu Europium 152.0	Gd Gadolinium 157.3	Tb Terbium 158.9	Dy Dysprosium 162.5	Ho Holmium 164.9	Er Erbium 167.3	Tm Thulium 168.9	Yb Ytterbium 173.0	Lu Lutetium 175.5
90	Th Thorium 232.0	Pa Protactinium (231)	U Uranium 238.1	Np Neptunium (237)	Pu Plutonium (242)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (245)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (261)

* Lanthanoides

** Actinoides

CHARACTERISTICS OF MODERN PERIODIC TABLE

CHARACTERISTICS OF PERIODS

In a period, the electrons are filled in the same valence shell of all elements.

As the electronic configuration changes along the period, the chemical properties of the elements also change.

Atomic size of the elements in a period decreases from left to the right.

In a period, the metallic character of the element decreases while their non-metallic character increases.

CHARACTERISTICS OF GROUPS

- The elements present in 2 and 18 groups differ in atomic number by 8,8,18,18,32.
- The elements present in 13 – 17 groups differ in atomic number by 8,18,18,32.
- The elements present in 4 – 12 groups differ in atomic number by 18,32,32.
- The elements present in a group have the same number of electrons in the valence shell of their atoms.
- The elements present in a group have the same valency.
- The elements present in a group have identical chemical properties.
- The physical properties of the elements in group such as melting point, boiling point, density vary
- gradually.
- Atomic radii of the elements present in a group increases downwards.

ADVANTAGES OF THE MODERN PERIODIC TABLE

- The table is based on a more fundamental property i.e., atomic number.
- It correlates the position of the element with its electronic configuration more clearly.
- The completion of each period is more logical. In a period as the atomic number increases, the energy shells are gradually filled up until an inert gas configuration is reached.
- It is easy to remember and reproduce.
- Each group is an independent group and the idea of sub-groups has been discarded.
- One position for all isotopes of an element is justified, since the isotopes have the same atomic number.
- The position of eighth group (in Mendeleev's table) is also justified in this table. All transition elements have been brought in the middle as the properties of transition elements are intermediate between left portion and right portion elements of the periodic table.
- The table completely separates metals from non-metals. The nonmetals are present in upper right corners of the periodic table.
- The positions of certain elements which were earlier misfit (interchanged) in the Mendeleev's periodic table are now justified because it is based on atomic number of the elements.
- Justification has been offered for placing lanthanides and actinides at the bottom of the periodic table.

DEFECTS IN THE MODERN PERIODIC TABLE

- Position of hydrogen is not fixed till now.
- Position of lanthanides and actinides has not been given inside the main body of periodic table.
- It does not reflect the exact distribution of electrons of some of transition and inner transition elements.

INTEXT QUESTIONS PAGE NO. 90

Q1. How could the Modern Periodic Table remove various anomalies of MendeléeV's Periodic Table?

Ans:

1. The fundamental basis for Modern Periodic Table is atomic number and not atomic mass and hence, it is more accurate.
2. Properties of elements could be well explained when they were arranged according to their increasing atomic number in the Modern Periodic Table.
3. A separate group for noble gases could be created when noble gases were discovered.
4. Hydrogen has been given a unique position in the Modern Periodic Table at the top left corner because of its unique properties.

Q2. Name two elements you would expect to show chemical reactions similar to magnesium. What is the basis for your choice?

Ans:

Magnesium (Mg) belongs to group 2 of Modern Periodic Table, known as alkaline earth metal family. The two other elements belonging to the same group are beryllium (Be) and calcium (Ca).

Calcium and magnesium; Beryllium and magnesium - This is because both of them have electronic configuration similar to Mg

Mg	<i>K</i>	<i>L</i>	<i>M</i>	
	2	8	2	
Ca	<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>
	2	8	8	2
Be	<i>K</i>	<i>L</i>		
	2	2		

These elements belong to the same group and hence, will show similar properties.

Q3. Name

- (a) three elements that have a single electron in their outermost shells.
- (b) two elements that have two electrons in their outermost shells.
- (c) three elements with filled outermost shells.

Ans:

- | | | | |
|-----|---------|------------|------------|
| (a) | Li | Na | K |
| | 2, 1 | 2, 8, 1 | 2, 8, 8, 1 |
| (b) | Mg | Ca | |
| | 2, 8, 2 | 2, 8, 8, 2 | |
| (c) | He | Ar | Ne |
| | 2 | 2, 8 | 2, 8, 8 |

Q3. Which element has

- (a) two shells, both of which are completely filled with electrons?
- (b) the electronic configuration 2, 8, 2?
- (c) a total of three shells, with four electrons in its valence shell?
- (d) a total of two shells, with three electrons in its valence shell?
- (e) twice as many electrons in its second shell as in its first shell?

Ans:

(a) Noble gases are the elements which have completely filled shells. The noble gas with two shells is Ne having atomic number 10 and electronic configuration 2, 8 both of which are completely filled.

(b) Electronic configuration 2, 8, 2 suggests that atomic number is 12 ($2 + 8 + 2$), magnesium (Mg) has atomic number 12.

(c) The element with three shells and four electrons in the valence shell will have electronic configuration 2, 8, 4. The atomic number of this element is 14 ($2 + 8 + 4$) so it will belong to group 14 hence, it is silicon (Si).

(d) Element with two shells with 3 electrons in the valence shell will exist in second period and will have the electronic configuration 2,3. The atomic number of this element will be 5 ($2 + 3$). So, it will be boron (B).

(e) The element has two shells. we know that first shell can have only 2 electrons, so according to the question there will be 4 electrons (double the number of electrons in first shell). The electronic configuration will be 2, 4, so the atomic number is 6. Hence, the element is carbon (C).

Q4. (a) What property do all elements in the same column of the Periodic Table as boron have in common?

(b) What property do all elements in the same column of the Periodic Table as fluorine have in common?

Ans:

(a) All elements of 13th group, in which boron is present, have 3 electrons in their valence shell (2, 8, 3).

(b) Fluorine belongs to 17th group. All elements of this group have 7 electrons in their valence shell (2, 8, 7). They all show a valency of ± 1 in their compounds.

Q5. An atom has electronic configuration 2, 8, 7.

(a) What is the atomic number of this element?

(b) To which of the following elements would it be chemically similar? (Atomic numbers are given in parentheses.) N(7) F(9) P(15) Ar(18)

Ans:

(a) Atomic number of atom = $2 + 8 + 7 = 17$

(b) It will be similar to fluorine which is also having 7 electrons in its valence shell [F (2, 7)].

Q6. The position of three elements A, B and C in the Periodic Table are shown below –

Group 16 Group 17

---	---
---	A
---	---
B	C

(a) State whether A is a metal or non-metal.

(b) State whether C is more reactive or less reactive than A.

(c) Will C be larger or smaller in size than B?

(d) Which type of ion, cation or anion, will be formed by element A?

Ans:

(a) Since, *A* belongs to group 1 valence electrons so it is a non-metal because it will gain electron to complete its octet.

(b) *C* lies below *A* and in the same group. As we move down in a group, the size increases and electronegative character decreases. With the increase in electronegative character, the electron adapting tendency and hence the reactivities decrease so, *C* is less reactive than *A*.

(c) *C* is smaller than *B* in size because as we move left to right in a period atomic size decreases.

(d) As discussed in part (a) that element *A* has a tendency to gain electron to complete its octet. It needs to take up one electron, so it will form anion (A^-).

Q7. Nitrogen (atomic number 7) and phosphorus (atomic number 15) belong to group 15 of the Periodic Table. Write the electronic configuration of these two elements. Which of these will be more electronegative? Why?

Ans:

(a) Electronic configuration of nitrogen and phosphorus:

	<i>K</i>	<i>L</i>	<i>M</i>
N	2,	5	
P	2,	8,	5

(b) N will be more electronegative than P as electronegativity decreases on going down a group in case of non-metals.

Q8. How does the electronic configuration of an atom relate to its position in the Modern Periodic Table?

Ans:

The number of valence electrons in an atom of an element tells us the group number. *e.g.*, Na has atomic number 11

Electronic configuration of Na(11) =

	<i>K</i>	<i>L</i>	<i>M</i>
	2	8	1

It has one electron in its last shell, thus it belongs to group I of the Periodic Table.

The number of shells in its electronic configuration tells the period number *e.g.*, Na shows 3 shells *K, L, M* so it belongs to 3rd period of the Periodic Table.

Q9. In the Modern Periodic Table, calcium (atomic number 20) is surrounded by elements with atomic numbers 12, 19, 21 and 38. Which of these have physical and chemical properties resembling calcium?

Ans:

At. no. of element	Electronic configuration				
	<i>K</i>	<i>L</i>	<i>M</i>	<i>N</i>	<i>O</i>
12	2	8	2		
19	2	8	8	1	
21	2	8	8	3	
38	2	8	18	8	2

From the electronic configuration written above we can see that element with atomic number 12 and 38 have 2 electrons in their last shell like calcium. So, they will resemble Ca in their physical and chemical properties.

Q10. Compare and contrast the arrangement of elements in Mendeléev’s Periodic Table and the Modern Periodic Table.

Ans:

Mendeleev’s periodic table	Modern periodic table
1. Elements are arranged in the increasing order of their atomic masses.	1. Elements are arranged in the increasing order of their atomic numbers.
2. There are a total of 7 groups (columns) and 6 periods (rows).	2. There are a total of 18 groups (columns) and 7 periods (rows).
3. Elements having similar properties were placed directly under one another.	3. Elements having the same valence shell are present in the same period while elements having the same number of valence electrons are present in the same group.
4. The position of hydrogen could not be explained.	4. Hydrogen is placed above alkali metals.
5. No distinguishing positions for metals and non-metals.	5. Metals are present at the left hand side of the periodic table whereas non-metals are present at the right hand side.



ASSIGNMENT QUESTIONS SET – 1
CHAPTER – 5
PERIODIC CLASSIFICATION OF ELEMENTS

1. The property of an element in the periodic table depends on its,_____.
 - i) atomic size
 - ii) atomic mass
 - iii) electronic configuration
 - iv) number of protons
2. An element has configuration 2, 8, 1. It belongs to,_____.
 - i). 1 group and 3rd period
 - ii). 3 group and 1st period
 - iii). 1 group and 8th period
 - iv). 17 group and 3rd period
3. The number of electrons in the valence shell is equal to its_____.
 - i). atomic mass
 - ii). group number
 - iii). period number
 - iv). atomic volume
4. The non-metallic element present in the third period other than sulphur and chlorine is
 - i). oxygen
 - ii). fluorine
 - iii). nitrogen
 - iv). phosphorus
5. At the end of each period the valence shell is_____.
 - i). incomplete
 - ii). half filled
 - iii). singly occupied
 - iv). completely filled
6. The family of elements having seven electrons in the outermost shell is_____.
 - i). alkali metals
 - ii). alkaline earth metals
 - iii). halogens
 - iv). noble gases
7. Which of the following factors does not affect the metallic character of an element?
 - i). Atomic size

- ii). Ionisation potential
 - iii). Electronegativity
 - iv). Atomic radius
8. The family of elements to which potassium belongs is_____.
- i). alkali metals
 - ii). alkaline earth metals
 - iii). halogens
 - iv). noble gases
9. The modern periodic table is given by _____
- i). Mendeleev
 - ii). Einstein
 - iii). Bohr
 - iv). Mosley
10. Elements belonging to groups 1 to 17 are called _____.
- i). noble gases
 - ii). normal elements
 - iii). transition elements
 - iv). inner transition elements
11. A liquid non-metal is_____.
- i). phosphorous
 - ii). mercury
 - iii). bromine
 - iv). nitrogen
12. The first alkali metal is _____.
- i). hydrogen
 - ii). lithium
 - iii). sodium
 - iv). francium
13. A purple coloured solid halogen is _____.
- i). chlorine
 - ii). bromine
 - iii). iodine
 - iv). astatine
14. Lanthanides and actinides are also called_____.
- i). normal elements

- ii). transition elements
 - iii). noble gases
 - iv). inner transition elements
15. The family of elements to which calcium belongs is_____.
- i). alkali metals
 - ii). alkaline earth metals
 - iii). halogens
 - iv). noble gases
16. The least reactive element in group 17 is_____.
- i). fluorine
 - ii). chlorine
 - iii). bromine
 - iv). iodine
17. The valency of chlorine with respect to oxygen is_____.
- i). 1
 - ii). 3
 - iii). 5
 - iv). 7
18. The number of shells in the elements of 3rd period is_____.
- i). 1
 - ii). 2
 - iii). 3
 - iv). 0
19. Four elements along a period have atomic number (11, 13, 16 and 17). The most metallic among these has an atomic number of_____.
- i). 11
 - ii). 12
 - iii). 16
 - iv). 17
20. Six elements A, B, C, D, E and F have the following atomic numbers (A = 12, B = 17, C = 18, D = 7, E = 9 and F = 11). Among these elements, the element, which belongs to the 3rd period and has the highest ionisation potential, is_____.
- i). A
 - ii). B
 - iii). C

- iv). F
21. A factor that affects the ionisation potential of an element is_____.
- i). atomic size
 - ii). electron affinity
 - iii). electro-negativity
 - iv). neutrons
22. The element, which has the highest electron affinity in the 3rd period is_____.
- i). Na
 - ii). Mg
 - iii). Si
 - iv). Cl
23. The element, which has zero electron affinity in the 3rd period is_____.
- i). Al
 - ii). P
 - iii). Ar
 - iv). S
24. The statement that is not true about electron affinity is
- i). It causes energy to be released
 - ii). It causes energy to be absorbed
 - iii). It is expressed in electron volts
 - iv). It involves formation of an anion
25. Down a group, the electron affinity_____.
- i). increases
 - ii). decreases
 - iii). remains same
 - iv). increases and then decreases
26. Name an element with five electrons in the outer shell.
27. Name an element which tends to lose two electrons.
28. Name an element that would tend to gain two electrons.
29. Name the group having a non metal liquid as well as non metal gas at room temperature.
30. Name the group having element with zero valency.
31. Name the metalloid present in group 14.
32. What is the name given to group of three similar elements by Dobereiner?
33. State "Newlands law of Octaves" for classification of elements.
34. Name the fundamental property used by Mendeleev as the basis of classification.

35. How many groups and periods are there in the Modern periodic table?
36. What was the prediction of Mendeleev regarding the gaps in his periodic table?
37. How is valence of an element determined?
38. What will be the valence of an element having atomic number 16?
39. How does valence vary in going down a group?
40. Why inert gases have zero valences?
41. What would be the valence of an atom containing 8 electrons in its outermost shell?
42. How does the electronegative character of elements vary along a period of the periodic table?
43. The present classification of elements is based on which fundamental property of elements?
44. Among first ten elements in the modern periodic table name the metals present.
45. Metals are on which side of Modern periodic table?
46. State Mendeleev's periodic law.
47. Name two elements, other than Gallium, whose existence was predicted by Mendeleev.
48. State Modern Periodic law.
49. Write the name given to the vertical columns in a periodic table.
50. What name is given to the horizontal rows in a periodic table?
51. Why does silicon is classified as Metalloid?
52. State two limitations of Newland's law of Octaves.
53. Name the scientist who proposed modern periodic law? On which fundamental property of elements it is based?
54. Why could no fixed position be given to hydrogen in Mendeleev's Periodic table?
55. What are metalloids? Give two examples.
56. In group 1 of periodic table three elements X, Y and Z have atomic radii 133 pm , 95pm and 65pm respectively giving a reason, arrange them in the increasing order of their atomic number in the group.
57. In modern periodic table, the isotopes of Chlorine Cl-35 and Cl-37 having different atomic masses will be kept in different slots or they would be assigned same position on the basis of their chemical properties? Give reason in support of your answer.
58. Nitrogen (At no. 7) and Phosphorus (At no. 15) belong to group 15 of the periodic table:-
 - (i) Write the electronic configuration of the two.
 - (ii) Predict whether they are metallic or nonmetallic in nature.
59. How and why does the atomic size vary as you go down a group?
60. Why was Dobereiner system of classification of elements into triads not found to be useful?

61. State three merits of Modern periodic table.
62. What are amphoteric oxides? Choose the amphoteric oxide from among the following oxides :- Na_2O , ZnO , Al_2O_3 , CO_2 , H_2O
63. Study the variation in the atomic radii of first group elements given below and arrange them in increasing order :-
- | | | | | | | |
|------------------|----|----|-----|-----|-----|-----|
| Group I element | Na | Li | Rb | Cs | K | |
| Atomic Radii P.M | | 86 | 152 | 244 | 262 | 231 |
64. An element X has the electronic configuration as 2, 8, 7 :-
- What is the atomic number of the element?
 - What will be the formula of its compound formed with Na?
 - What is the name given to the family of this element?
65. How do you calculate the valence of the element from its electronic configuration? What is the valence of Mg with atomic number 12 and sulphur with atomic number 16? How does the valence vary in going down in a group?
66. Atomic radii of the elements of the period II are as follows:-
- | | | | | | | | |
|----------------------|--|-----|----|----|----|----|-----|
| Period II elements : | | Be | B | O | N | C | Li |
| Atomic Radius : | | 111 | 88 | 66 | 74 | 77 | 152 |
- Arrange them in decreasing order of their atomic radii.
 - How does the atomic size vary on moving from left to right in a period? Explain why?
 - How will the tendency to lose electrons will vary on moving from left to right in this period II?
67. Oxygen (O, 8) and sulphur (S, 16) belong to group 16 of the periodic table:-
- Write the electronic configuration and valence of these two elements?
 - Which among these will be more electronegative? Why?
68. Two elements 'A' and 'B' belong to group 1 and 2 respectively in the same period. Compare them with respect to :-
- Number of valence electrons. (b) Valency
 - Metallic character (d) Size of atom
 - Formulae of their oxides.
69. What is periodicity?
70. Who showed for the first time that there is periodicity in properties of elements?
71. Are the properties of elements placed in a group same?
72. Give reason for the need of classification of elements.
73. Hydrogen can be placed in group 1 and group 7 of periodic table. Why?

74. Name two elements whose properties were correctly predicted by Mendeleev. Mention their present day name.
75. State Mendeleev's periodic law. Why did he leave gaps in his periodic table?
76. An element Z is of second group of the periodic table. Write the formula of its oxide.
77. Noble gases did not find a place in Newland's Octaves. Explain.
78. Give formula for the following:
- (i) bromide of element X of second group.
 - (ii) oxide of element Y of third group.
 - (iii) chloride of element Z of fourth group.
79. How many elements are present in (i) Second period (ii) Six period
80. Name (i) A Non metal solid at room temperature (ii) A Metal liquid at room temperature
81. Arrange the following elements in the decreasing order of metallic character.
- (i) Si, Be, Mg, Na, P
 - (ii) B, Al, Mg, K
82. How in modern periodic table position of elements in groups and periods is decided?
83. Why metallic character decreases across a period and increases down a group?
84. Among the elements of second period 'Li' to 'Ne' pick out the element.
- (i) with the largest atomic radius
 - (ii) that is the most reactive non metal
 - (iii) that is the most reactive metal
 - (iv) which is a metalloid.
85. Elements A, B, C, D, E have following electronic configurations-
- A: 2,3
 - B: 2,8,3
 - C: 2,8,5
 - D: 2,8,7
 - E: 2,8,8,2
- (i) Which of these belong to same group?
 - (ii) Which of these belong to same period?
-

ASSIGNMENT QUESTIONS SET – 2
CHAPTER – 5
PERIODIC CLASSIFICATION OF ELEMENTS

1. Upto which element, the Law of Octaves was found to be applicable
 - (a) Oxygen
 - (b) Calcium
 - (c) Cobalt
 - (d) Potassium
2. According to Mendeleev's Periodic Law, the elements were arranged in the periodic table in the order of
 - (a) increasing atomic number
 - (b) decreasing atomic number
 - (c) increasing atomic masses
 - (d) decreasing atomic masses
3. In Mendeleev 's Periodic Table, gaps were left for the elements to be discovered later. Which of the following elements found a place in the periodic table later
 - (a) Germanium
 - (b) Chlorine
 - (c) Oxygen
 - (d) Silicon
4. Which of the following statement (s) about the Modern Periodic Table are incorrect
 - (i) The elements in the Modern Periodic Table are arranged on the basis of their decreasing atomic number
 - (ii) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic masses
 - (iii) Isotopes are placed in adjoining group (s) in the Periodic Table
 - (iv) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic
 - (a) (i) only (b) (i), (ii) and (iii)
 - (c) (i), (ii) and (iv) (d) (iv) only
5. Which of the following statements about the Modern Periodic Table is correct:
 - (a) It has 18 horizontal rows known as Periods
 - (b) It has 7 vertical columns known as Periods
 - (c) It has 18 vertical columns known as Groups
 - (d) It has 7 horizontal rows known as Groups

6. Which of the given elements A, B, C, D and E with atomic number 2, 3, 7, 10 and 30 respectively belong to the same period?
- (a) A, B, C
 - (b) B, C, D
 - (c) A, D, E
 - (d) B, D, E
7. The elements A, B, C, D and E have atomic number 9, 11, 17, 12 and 13 respectively. Which pair of elements belong to the same group?
- (a) A and B
 - (b) B and D
 - (c) A and C
 - (d) D and E
8. Where would you locate the element with electronic configuration 2,8 in the Modern Periodic Table?
- (a) Group 8
 - (b) Group 2
 - (c) Group 18
 - (d) Group 10
9. An element which is an essential constituent of all organic compounds belongs to
- (a) group 1
 - (b) group 14
 - (c) group 15
 - (d) group 16
10. Which of the following is the outermost shell for elements of period 2?
- (a) K shell
 - (b) L shell
 - (c) M shell
 - (d) N shell
11. Which one of the following elements exhibit maximum number of valence electrons?
- (a) Na
 - (b) Al
 - (c) Si
 - (d) P
12. Which of the following gives the correct increasing order of the atomic radii of O, F and N ?
- (a) O, F, N
 - (b) N, F, O
 - (c) O, N, F
 - (d) F, O, N

13. Which among the following elements has the largest atomic radii?
- (a) Na
 - (b) Mg
 - (c) K
 - (d) Ca
14. Which of the following elements would lose an electron easily?
- (a) Mg
 - (b) Na
 - (c) K
 - (d) Ca
15. Which of the following elements does not lose an electron easily?
- (a) Na
 - (b) F
 - (c) Mg
 - (d) Al
16. Which of the following are the characteristics of isotopes of an element?
- (i) Isotopes of an element have same atomic masses
 - (ii) Isotopes of an element have same atomic number
 - (iii) Isotopes of an element show same physical properties
 - (iv) Isotopes of an element show same chemical
- (a) (i), (iii) and (iv) (b) (ii), (iii) and (iv)
(c) (ii) and (iii) (d) (ii) and (iv)
17. Arrange the following elements in the order of their decreasing metallic character
Na, Si, Cl, Mg, Al
- (a) $\text{Cl} > \text{Si} > \text{Al} > \text{Mg} > \text{Na}$
 - (b) $\text{Na} > \text{Mg} > \text{Al} > \text{Si} > \text{Cl}$
 - (c) $\text{Na} > \text{Al} > \text{Mg} > \text{Cl} > \text{Si}$
 - (d) $\text{Al} > \text{Na} > \text{Si} > \text{Ca} > \text{Mg}$
18. Arrange the following elements in the order of their increasing nonmetallic character
Li, O, C, Be, F
- (a) $\text{F} < \text{O} < \text{C} < \text{Be} < \text{Li}$
 - (b) $\text{Li} < \text{Be} < \text{C} < \text{O} < \text{F}$
 - (c) $\text{F} < \text{O} < \text{C} < \text{Be} < \text{Li}$
 - (d) $\text{F} < \text{O} < \text{Be} < \text{C} < \text{Li}$
19. What type of oxide would Eka- aluminium form?
- (a) EO_3
 - (b) E_3O_2
 - (c) E_2O_3
 - (d) EO

20. Three elements B, Si and Ge are
- (a) metals
 - (b) non-metals
 - (c) metalloids
 - (d) metal, non-metal and metalloid respectively
21. Which of the following elements will form an acidic oxide?
- (a) An element with atomic number 7
 - (b) An element with atomic number 3
 - (c) An element with atomic number 12
 - (d) An element with atomic number 19
22. The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. To which of the following categories does the element belong?
- (a) Metal
 - (b) Metalloid
 - (c) Non-metal
 - (d) Left-hand side element
23. Which one of the following does not increase while moving down the group of the periodic table?
- (a) Atomic radius
 - (b) Metallic character
 - (c) Valence
 - (d) Number of shells in an element
24. On moving from left to right in a period in the periodic table, the size of the atom.
- (a) increases
 - (b) decreases
 - (c) does not change appreciably
 - (d) first decreases and then increases
25. Which of the following set of elements is written in order of their increasing metallic character?
- (a) Be Mg Ca
 - (b) Na Li K
 - (c) Mg Al Si
 - (d) C O N
26. The three elements A, B and C with similar properties have atomic masses X, Y and Z respectively. The mass of Y is approximately equal to the average mass of X and Z. What is such an arrangement of elements called as? Give one example of such a set of elements.
27. Elements have been arranged in the following sequence on the basis of their increasing atomic masses.
- F, Na, Mg, Al, Si, P, S, Cl, Ar, K
- (a) Pick two sets of elements which have similar properties.
 - (b) The given sequence represents which law of classification of elements?

28. Can the following groups of elements be classified as Dobereiner's triad ?
(a) Na, Si, Cl (b) Be, Mg, Ca
Atomic mass of Be 9; Na 23; Mg 24; Si 28; Cl 35; Ca 40
Explain by giving reason.
29. In Mendeleev 's Periodic Table the elements were arranged in the increasing order of their atomic masses. However, cobalt with atomic mass of 58.93 amu was placed before nickel having an atomic mass of 58.71 amu. Give reason for the same.
30. "Hydrogen occupies a unique position in Modern Periodic Table". Justify the statement.
31. Write the formulae of chlorides of Eka-silicon and Eka-aluminium, the elements predicted by Mendeleev.
32. Three elements A, B and C have 3, 4 and 2 electrons respectively in their outermost shell. Give the group number to which they belong in the Modern Periodic Table. Also, give their valencies.
33. If an element X is placed in group 14, what will be the formula and the nature of bonding of its chloride?
34. Compare the radii of two species X and Y. Give reasons for your answer.
(a) X has 12 protons and 12 electrons
(b) Y has 12 protons and 10 electrons
35. Arrange the following elements in increasing order of their atomic radii.
(a) Li, Be, F, N (b) Cl, At, Br I
36. Identify and name the metals out of the following elements whose electronic configurations are given below.
(a) 2, 8, 2 (b) 2, 8, 1
(c) 2, 8, 7 (d) 2, 1
37. Write the formula of the product formed when the element A (atomic number 19) combines with the element B (atomic number 17). Draw its electronic dot structure. What is the nature of the bond formed?
38. Arrange the following elements in the increasing order of their metallic character
Mg, Ca, K, Ge, Ga
39. Identify the elements with the following property and arrange them in increasing order of their reactivity
(a) An element which is a soft and reactive metal
(b) The metal which is an important constituent of limestone
(c) The metal which exists in liquid state at room temperature

40. Properties of the elements are given below. Where would you locate the following elements in the periodic table?
- (a) A soft metal stored under kerosene
 - (b) An element with variable (more than one) valency stored under water.
 - (c) An element which is tetravalent and forms the basis of organic chemistry
 - (d) An element which is an inert gas with atomic number 2
 - (e) An element whose thin oxide layer is used to make other elements corrosion resistant by the process of “anodising”
41. An element is placed in 2nd Group and 3rd Period of the Periodic Table, burns in presence of oxygen to form a basic oxide.
- (a) Identify the element
 - (b) Write the electronic configuration
 - (c) Write the balanced equation when it burns in the presence of air
 - (d) Write a balanced equation when this oxide is dissolved in water
 - (e) Draw the electron dot structure for the formation of this oxide
42. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a divalent halide.
- (a) Where in the periodic table are elements X and Y placed?
 - (b) Classify X and Y as metal (s), non-metal (s) or metalloid (s)
 - (c) What will be the nature of oxide of element Y? Identify the nature of bonding in the compound formed
 - (d) Draw the electron dot structure of the divalent halide
43. Atomic number of a few elements are given below 10, 20, 7, 14
- (a) Identify the elements
 - (b) Identify the Group number of these elements in the Periodic Table
 - (c) Identify the Periods of these elements in the Periodic Table
 - (d) What would be the electronic configuration for each of these elements?
 - (e) Determine the valency of these elements
44. In which form matter is present around us?
45. At present, how many elements are known to us?
46. The earliest attempt in classifying elements resulted in the formation of two groups of elements. What are they?
47. Who made the first attempt of classifying elements?
48. On what basis Dobereiner classified elements?
49. Dobereiner classified elements into how many groups?

50. What name was given to Dobereiner groups?
51. What is the total number of elements in Dobereiner groups?
52. How did John Newlands classify elements?
53. Name the first element of Newland's octaves.
54. Name the last element of Newland's octaves.
55. What is your observation from Newland's octaves?
56. What is Newland's Law of octaves?
57. Besides atomic masses, on what other basis were the elements arranged in the Mendleev's periodic table?
58. Which chemical property of an element was treated as one of the basic property for classifying elements and why?
59. What name is given to vertical columns in Mendleev's periodic table?
60. What name is given to horizontal rows in Mendleev's periodic table?
61. While developing the Periodic table, at few places Mendleev inverted the sequence of some elements i.e. he placed an element with slightly greater atomic mass before the element of lower atomic mass. Why did he do so?
62. Though the atomic mass of cobalt (58.9) is greater than nickel (58.7) yet Co is placed before Ni in Mendleev's periodic table. Why?
63. Which elements did not exist at the time of Mendleev's periodic classification? What name was given to these elements?
64. In what way hydrogen resembles alkali metals?
65. In what way hydrogen resembles halogens?
66. Why hydrogen cannot be given a fixed position in periodic table?
67. What is the first limitation of Mendleev's periodic table?
68. How isotopes of all the elements posed a challenge to Mendleev's periodic table?
69. Who proposed that atomic number is the more fundamental property for classifying elements?
70. In Modern periodic table, How do elements belonging to the same group resemble each other? Write two points.
71. Different elements have same number of shells, in group or in period?
72. First period of the Modern periodic table contains only two elements. Justify.
73. How many elements are present in second group of the periodic table? Justify.
74. "The valence electrons determine the kind and number of bonds formed by an element". Justify.

75. An element belongs to the first group and third period of the periodic table. What conclusion can you draw from its position ?
76. A metal M forms an oxide having the formula M_2O_3 . It belongs to the third period and thirteenth group of the Modern periodic table. Write the atomic number and valency of the element.
77. What were the two major shortcomings of Mendeleev's periodic table? How have these been removed in the modern periodic table?
78. Two elements X and Y have atomic numbers 12 and 16 respectively. Write the electronic configuration for these elements. To which period of the modern periodic table do these two elements belong? What type of bond will be formed between them and Why?
79. What were the two achievements of Mendeleev's periodic table? What was the basis of classification of elements in it?
80. Atomic radius decreases in moving from left to right in a period. Why?
81. Atomic radius increases down the group. Why?
82. In the modern periodic table a zig-zag line separates metals from non-metals. What are these elements called and why?
83. X, Y and Z are the elements of a Dobereiner's triad. If the atomic mass of X is 7 and that of Z is 39, what should be the atomic mass of Y?
84. A and B are the two elements having similar properties which obey Newlands law of octaves. How many elements are there in between A and B?
85. Why Na is greater in atomic size than Na^+ ?
86. Why does ionization energy generally decrease going down a group or family?
87. An element X (2,8,2) combines separately with NO_3^- and $(SO_4)_2^-$, $(PO_4)_3^-$ radicals. Write the formulae of the three compounds so formed. To which group of the periodic table does the element 'X' belong? Will it form covalent or ionic compound? Why?
88. A metal M forms an oxide having the formula M_2O_3 . It belongs to 3rd period in the modern periodic table. Write the atomic number and valency of the metal.
89. Which of the two elements A=2,8,1 B = 2,8,8,1 is more electropositive?
90. How does the atomic size vary in going from A) Left to right in a period B) Top to Bottom in a group
91. An element has atomic number 13. In which group and period it should be placed?
92. How many periods and groups are there in the long form of P.T?
93. Why does the size of the atoms progressively become smaller when we move from sodium (Na) to chlorine (Cl) in the third period of the periodic table ?
94. Give symbols for A. A metal of group 2. B. A metal of group 13. C. Two non metals of group 16. D. Most reactive non- metal of group 17.

95. Explain Why-

- (a) All the elements of a group have similar chemical properties.
- (b) All the elements in a period have different chemical properties.

96. The atomic number of an element X is 17. Predict –

- A. Its valency.
- B. Nature of the elements.
- C. Whether it is metal or non – metal.
- D. Name of the element.
- E. Relative size with respect to other members of its group.

97. The three elements predicted by mendeleev from the gaps in his periodic table were known as eka- boron, eka- aluminum, eka- silicon. What names were given to these elements when they were discovered later on?

98. The atomic numbers of Nitrogen, Oxygen and fluorine are 7, 8, and 9 respectively. Write the electronic configuration of each element and answer the following:

- (a) Out of N, O and F which is most electronegative and which one is least electronegative?
- (b) What is the number of valence electrons of F?
- (c) What is the valency of each of N, O and F?



Wish You All the Best For Your Future