

Assignments in Science Class X (Term II)

5

Periodic Classification of Elements

IMPORTANT NOTES

1. Early chemists classified elements as metals and non-metals on the basis of a set of physical and chemical properties.
2. **Dobereiner** classified elements on the basis of “**Law of Triads**” which states that “atomic mass of the middle element of a triad is almost the arithmetic mean of the atomic mass of other two elements”.
3. **Newland** classified elements on the basis of “**Law of Octaves**” stated by him. According to this law : “When the elements are arranged in the order of increasing atomic mass, the properties of the eighth element (starting from a given element) are a repetition of the properties of the first element.”
4. **Mendeleev’s Periodic Law states** : “The physical and chemical properties of elements are the periodic function of their atomic masses”.
5. Mendeleev’s Periodic Table is a tabular chart, representing systematic arrangement of elements in groups and periods in the order of their increasing atomic masses.
6. In the original Mendeleev’s Periodic Table :
 - (i) There are eight vertical columns called groups. The groups from I to VII are subdivided into two groups, *i.e.*, subgroup ‘a’ and subgroup ‘b’. Thus, on the whole, there are 15 vertical columns.
 - (ii) The properties of elements in the same subgroup or main group are similar.
 - (iii) The horizontal rows in the periodic table are called periods.
 - (iv) In a period, the properties of elements gradually change from metallic to non-metallic character.
 - (v) There are few gaps in the periodic table. These gaps were left knowingly as these elements were not known at that time.
7. **H.G.J. Moseley** modified Mendeleev’s Periodic Law by changing atomic mass to atomic number, which is a more fundamental property of an element. It states : “The physical and chemical properties of elements are the periodic function of their atomic number”.
8. **Modern Periodic Law** : It states that the properties of elements are the periodic function of their atomic numbers.
9. **Long form of the Periodic Table** : In the long form of the periodic table, the elements are arranged in groups and periods on the basis of **electronic configuration of elements**.
10. **Characteristic of the Long form of the Periodic Table.**
 - (a) **Characteristics of the groups** :
 - (i) There are 18 groups in the long form of the periodic table.
 - (ii) Group 1 is on the extreme left hand side and group 18 on the extreme right hand side of the periodic table.
 - (iii) Groups 1, 2 and 13 to 17 contain **normal elements**. The normal elements are sometimes called *representative elements*. In these elements, all the *inner shells are completely filled with electrons*, except the *outermost shell which is incomplete*.
 - (iv) The elements in group 18 are known as *noble gases* or *inert gases*. They have 8 *electrons* in their *valence shell*, except *helium*, which has 2 electrons in the valence shell.
 - (v) **The elements in group 3 to group 12 are called transition elements**. In transition elements, the **outermost shell as well as the shell next to the outermost shell** (penultimate shell) **are incomplete**.
 - (b) **Characteristics of Periods** :
 - (i) There are seven periods in all, such that each period has consecutive (or continuous) atomic numbers.
 - (ii) The number of elements in a period correspond to the maximum number of electrons which can be accommodated in one shell.

(iii) The number of the period to which an element belongs is given by the number of the outermost shell (quantum number).

11. **Rare Earth or Lanthanides** : They are inner transition elements from atomic number 57 (Lanthanum) to atomic number 71 (Lutetium). They are kept outside of the periodic table to mark their peculiar properties.
12. **Actinides** : They are inner transition elements from atomic number 89 (Actinium) to atomic number 103 (Lawrencium). They are kept outside of the periodic table to mark their peculiar properties.
13. On moving from left to right in a period, the atomic size of elements decreases in groups 1, 2, 13, 14, 15, 16, 17 and then suddenly increases.

14. On moving from left to right in a period, the metallic character of elements gradually decreases and non-metallic character gradually increases, till in the 18th group it becomes noble gas.

15. All the elements in a group generally have same valency which is equal to the number of electrons in the valence shell.

16. The atomic size of elements increases as one moves down the group.

17. (a) While moving down in the group of metals (1, 2, 13), the metallic character of elements increases.

(b) While moving down in the group of non-metals (14, 15, 16 and 17) the electronegative character of nonmetals decreases.

ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

I. VERY SHORT ANSWER QUESTIONS

(1 Mark)

A. IMPORTANT QUESTIONS

1. Who propounded Law of Triads? Give one example of triads.
2. Why was there no zero group in the original Mendeleev's Periodic Table?
3. 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? Give one example of such a set of elements. [HOTS]
4. Elements have been arranged in the following sequence on the basis of their increasing atomic masses. [HOTS]
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?
5. An element with atomic number 11 is an alkali metal. Into which families would you place elements with atomic number 10 and 12?
6. In Mendelée'v'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. [HOTS]
7. "Hydrogen occupies a unique position in the Modern Periodic Table". Justify the statement. [HOTS]
8. Write the formulae of chlorides of Eka-silicon and Eka-aluminium, the elements predicted by Mendeleev. [HOTS]
9. If an element X is placed in group 14, what will be the formula and the nature of bonding of its chloride? [HOTS]
10. Compare the radii of two species X and Y. Give reasons for your answer. [HOTS]
(a) X has 12 protons and 12 electrons.
(b) Y has 12 protons and 10 electrons.
11. Arrange the following elements in increasing order of their atomic radii. [HOTS]
(a) Li, Be, F, N (b) Cl, At, Br, I
12. Identify the elements with the following property and arrange them in increasing order of their reactivity. [HOTS]
(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.

B. QUESTIONS FROM CBSE EXAMINATION PAPERS

- How and why does the atomic size vary as you go:
(i) from left to right along a period?
(ii) down a group? [2009, 2011 (T-II)]
- How will the tendency to gain electrons change as we go from left to right across a period? Why? [2009, 2011 (T-II)]
- Lithium, sodium and potassium form a Dobereiner's triad. The atomic masses of lithium and potassium are 7 and 39 respectively. Predict the atomic mass of sodium. [2009]
- Chlorine, bromine and iodine form a Dobereiner's triad. The atomic masses of chlorine and iodine are 35.5 and 126.9 respectively. Predict the atomic mass of bromine. [2009]
- Calcium, strontium and barium form a Dobereiner's triad. The atomic masses of calcium and barium are 40 and 137 respectively. Predict the atomic mass of strontium. [2009]
- State the first limitation of Mendeleev's Periodic Table. [2009]
- Why was the system of classification of elements into triads not found suitable? [2009]
- Why could no fixed position be given to hydrogen in Mendeleev's Periodic Table? [2009]
- What are 'groups' and 'periods' in the periodic table? [2009]
- Why did Mendeleev have gaps in his periodic table? [2009]
- Element M forms a chloride with the formula MCl_2 which is a solid with a high melting point. To which group of the periodic table does the element 'M' belong? [2008]

II. SHORT ANSWER QUESTION-I

(2 Marks)

A. IMPORTANT QUESTIONS

- Why was there a necessity for classification of elements? Give at least two reasons.
- State two achievements of Law of Octaves.
- 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. [HOTS]
- (i) What are transition elements?
(ii) Which amongst the following are transition elements?
K, Mn, Ca, Cr, Cu, Cs, Fe and Pt.
- Give the name and symbol for the element that occupies each of the following positions in the periodic table :
(i) Period 2, group 13
(ii) Period 1, group 1
(iii) Period 4, group 2
(iv) Period 3, group 17
- Silicon and phosphorus (atomic no. 14 and 15, respectively) belong to the same period of the long form of the periodic table. Write down their electronic configurations and state in which group these elements occur.
- How many periods are called short periods in the long form of the periodic table? Give their : (i) periodic numbers, (ii) number of elements in each period, (iii) name one element in each period.
- Amongst the elements given below, pick out the elements which are : (i) most electropositive, (ii) most electronegative and (iii) noble gas.
Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K and Ca.
- How is the atomic volume of sodium related to (i) magnesium and (ii) potassium?
- P (186 pm), Q (231 pm), R (152 pm)
P, Q and R are the elements, such that their atomic radii is shown in brackets. Furthermore, they have same number of electrons in their valence shell.
(i) Do these elements belong to the same group or same period?
(ii) Arrange the elements, such that the most metallic element comes first and the least metallic element comes last.
- Mendeleev predicted the existence of certain elements not known at that time and named two of them as Eka-silicon and Eka-aluminium.

- Name the elements which have taken the place of these elements.
- Mention the group and the period of these elements in the Modern Periodic Table.
- Classify these elements as metals, non-metals or metalloids.

- How many valence electrons are present in each one of them? **[HOTS]**

12. Identify and name the metals out of the following elements whose electronic configurations are given below: **[HOTS]**

- 2, 8, 2
- 2, 8, 1
- 2, 8, 7
- 2, 1

B. QUESTIONS FROM CBSE EXAMINATION PAPERS

1. State two main properties of elements on which Mendeleev's periodic classification was based. Why could no fixed position be assigned to hydrogen in his periodic table? **[2009, 2011 (T-II)]**

2. (a) What is meant by periodicity in properties of elements with reference to the periodic table?

- (b) Why do all elements of the same group have similar properties? **[2009, 2011 (T-II)]**

3. Two elements M and N belong to groups I and II respectively and are in the same period of the periodic table. How do the following properties of M and N vary? **[2009, 2011 (T-II)]**

- Sizes of their atoms
- Their metallic characters
- Their valencies in forming oxides
- Molecular formulae of their chlorides

4. The elements of the third period of the periodic table are given below: **[2008, 2011 (T-II)]**

Group →	I	II	III	IV	V	VI	VII
Period ↓ 3	Na	Mg	Al	Si	P	S	Cl

- (a) Which atom is bigger, Na or Mg? Why?

- (b) Identify the most (i) metallic (ii) non-metallic element, in period 3.

5. An element has electronic configuration 2, 8, 3. What is the atomic number of this element? To which (i) group and (ii) period this element belong? **[2011 (T-II)]**

6. State the positions of (i) isotopes of the same element and (ii) hydrogen in the Modern Periodic Table. **[2011 (T-II)]**

7. How does the tendency to gain electrons change as we go down the 16th group of periodic table? Why? **[2011 (T-II)]**

8. Give reasons for the following :

- Lithium atom is smaller than sodium atom.
- Chlorine (atomic Number 17) is more electronegative than sulphur (atomic Number 16). **[2011 (T-II)]**

9. (a) State Modern Periodic Law.

- (b) State the place of metalloids in the periodic table. **[2011 (T-II)]**

10. (a) State the Modern Periodic Law.

- (b) Name the element which has twice as many electrons in its second shell as in its first shell. Write its electronic configuration also. **[2011 (T-II)]**

11. (a) What is common in the elements belonging to the same period of periodic table?

- (b) Why are chlorine and bromine kept in the same group of the periodic table? **[2011 (T-II)]**

12. An element belongs to third period and second group of the periodic table.

- (a) State number of valence electrons in it.

- (b) Is it a metal or a nonmetal?

- (c) Name the element.

- (d) Write the formula of its oxide. **[2011 (T-II)]**

13. Account for the following :

- (a) Elements C, N, O and F are all placed in the second period of the periodic table.

- (b) Elements of group 17 are monovalent. **[2011 (T-II)]**

14. (a) How does atomic radius change as we move from left to right in a period?

- (b) The positions of three elements P, Q and R in the periodic table are shown below

Group 15	Group 16	Group 17
.....		
.....		Q
.....		
P		R

- Which one of the three elements is most non-metallic? **[2011 (T-II)]**

15. This question refers to the elements of the periodic table with atomic numbers 3 to 18.

- (a) Which of them are noble gases?
 (b) Which of them are halogens?
 (c) Which of them are alkali metals?
 (d) What is the electronic configuration of an element with atomic number 10?

[2011 (T-II)]

16. Account for the following :

- (a) Although hydrogen resembles halogens in properties yet it is placed in group I of the periodic table.
 (b) Elements of group-18 are called zerovalent.

[2011 (T-II)]

17. 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 nonmetal.
 (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?

[2011 (T-II)]

18. (a) State Modern Periodic Law.

- (b) Elements A, B, C and D have atomic number 1, 8, 11 and 19 respectively.

Choose the odd element and give reason for your answer.

[2011 (T-II)]

19. An element X has atomic number 19.

- (a) Write its electronic configuration.
 (b) To which group of the Modern Periodic Table does it belong?
 (c) State the nature of the compound formed by element X with chlorine.
 (d) Write the valency of element X.

[2011 (T-II)]

20. An element X has mass number 35 and number of neutrons 18.

- (a) Write the atomic number of X.
 (b) Give electronic configuration of X.
 (c) To which group and period does it belong?

[2011 (T-II)]

21. A part of the periodic table has been shown below :

Group	I	II	XVI	XVII	XVIII
	1				
Period	2	B	D	C	
	3			E	

On the basis of above table answer the following questions :

- (i) Which element will form cation?
 (ii) Which element will have the smallest atomic size?
 (iii) Which element will have chemical properties similar to magnesium (atomic number 12)?
 (iv) Write the common name of the group to which C and E belong.

[2011 (T-II)]

22. A metal 'X' forms an oxide having the formula XO. It belongs to third period in the Modern Periodic Table. Write the atomic number, valency, electronic configuration and name of the group to which the element belongs.

[2011 (T-II)]

23. Fluorine (atomic number 9) and chlorine (atomic number 17) are members of the periodic table.

- (i) Write their electronic configurations.
 (ii) Which one is more electronegative? Give one reason.

[2011 (T-II)]

24. Two elements 'X' (atomic number 7) and 'Y' (atomic number 15) belong to group 15 of the periodic table. Write the electronic configuration of these elements. Which of these will be more electronegative and why?

[2011 (T-II)]

25. State Mendeleev's Periodic Law. Write two achievements of Mendeleev's Periodic Table.

[2009]

26. The elements of the second period of the periodic table are given below:

Li Be B C N O F

- (a) Give reason to explain why atomic radii decreases from Li to F.
 (b) Identify the most (i) metallic (ii) non-metallic element.

[2008]

27. What physical and chemical properties of elements were used by Mendeleev in creating his periodic table? List two observations which posed a challenge to Mendeleev's Periodic Law.

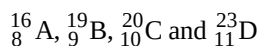
[2008]

III. SHORT ANSWER QUESTIONS–II

(3 Marks)

A. IMPORTANT QUESTIONS

- Lithium, sodium and potassium are put in the same group on the basis of similar properties.
 - What is the similarity in their properties?
 - If the atomic mass of lithium is 7 and potassium is 39, calculate the atomic mass of sodium.
- Explain, why the reducing power of an element decreases on moving from left to right in a period of the periodic table.
- By giving reasons, state which amongst the elements given below does not belong to the same period :



- Table shows three elements A, B and C along with their electronic configuration.

Elements	A	B	C
Electronic configuration	2, 7	2, 8, 7	2, 8

- Which elements belong to same period?
- Which element belongs to group 18?
- Which elements belong to same group?

- Which element amongst A and B, is less reactive?

- Amongst the elements P (atomic number 4), Q (atomic number 11) and R (atomic number 20), which two elements have similar chemical properties and why?
- Properties of the elements are given below. Where would you locate the following elements in the periodic table?
 - A soft metal stored under kerosene.
 - An element with variable (more than one) valency stored under water.
 - An element which is tetravalent and forms the basis of organic chemistry.
 - An element which is an inert gas with atomic number 2.
 - An element whose thin oxide layer is used to make other elements corrosion resistant by the process of “anodising”. **[HOTS]**
- Write the formula of the product formed when element A (atomic number 19) combines with element B (atomic number 17). Draw its electron dot structure. What is the nature of the bond formed? **[HOTS]**

B. QUESTIONS FROM CBSE EXAMINATION PAPERS

- An element X belongs to group 17 and third period of the periodic table.
 - Write electronic configuration of the element. What is its valency?
 - Predict its nature, whether it is a metal or nonmetal.
 - Give the formula of the compound formed when it combines with an element Y having valency three. **[2011 (T-II)]**
- Three elements A, B and C have atomic number 7, 8 and 9 respectively.
 - What would be their positions in the Modern Periodic Table (Mention group and period both)?
 - Arrange A, B and C in the decreasing order of their size.
 - Which one of the three elements is most reactive and why? **[2011 (T-II)]**

- Given below are four elements with their atomic numbers

Element	Atomic number
A	16
B	11
C	3
D	14

- Identify the elements which belong to the same group of the Modern Periodic Table.
 - Arrange the given elements in decreasing order of atomic size.
 - Write the formula of the oxide of B.
 - Which of the above elements is a metalloid? **[2011 (T-II)]**
- The elements of the second period along with their atomic number in parentheses are given below :
B (5), Be (4), O (8), N (7), Li (3), C (6), F (9)

- (i) Arrange them in the same order as they are in the periodic table.
 (ii) Which element has the (i) largest (ii) smallest atom?
- (b) Why does the atomic radius change as we move from left to right in a period?

[2011 (T-II)]

5. (a) How is the valency of an element determined from its position in the periodic table?
 (b) Magnesium has atomic number 12. To which (i) group (ii) period of the periodic table does it belong?
 (c) The valency of all the elements in a group is same. Why?
- [2011 (T-II)]
6. A part of modern periodic table is given below. Answer the following questions based on this table.

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar

- (a) Why do H, Li and Na show similar properties?
 (b) Atomic size of Mg is bigger than Be. Why?
 (c) Why are He, Ne and Ar called noble gases?
 (d) Write a common name of the family to which F and Cl belong.
 (e) Write the trend of nonmetallic character in the horizontal row from Na to Cl.
 (f) How does the atomic size vary as we move from Li to F in the second period of periodic table?
- [2011 (T-II)]
7. The position of four elements A, B, C and D in the periodic table are shown below.

Group I Group 17

_____	_____
_____	_____ B _____
_____ D _____	_____
_____	_____
_____	_____
_____ A _____	_____ C _____

- (a) Name most electronegative element.
 (b) Name most reactive metal.

- (c) State whether B is a metal or a nonmetal.
 (d) Which one of the given elements is expected to have largest atomic radius?
 (e) How many electrons are present in the outermost shell of elements B and C?
 (f) What will be the nature of the bond formed between D and B?
- [2011 (T-II)]

8. (a) Name an element you would expect to show chemical reactions similar to sodium. State the reason in support of your answer.
 (b) Write electronic configuration of the element belonging to 3rd period and 13th group of the periodic table. Predict whether it is a metal or a nonmetal. Give reason.
- [2011 (T-II)]

9. A part of the periodic table has been shown below :

Group →	1	2				13	14	15	16	17	18
Period ↓											
1											
2		A	C							E	G
3		B					D			F	

Answer the following questions on the basis of position of elements in the above table.

- (a) Which element is a noble gas? Give reason.
 (b) Which element is most electronegative? Give reason.
 (c) Write the electronic configuration of (i) B and (ii) E.
- [2011 (T-II)]

10. Table given below shows a part of the periodic table.

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar

Using this table explain, why

- (a) Li and Na are considered as active metals?
 (b) Atomic size of Mg is less than that of Na?
 (c) Fluorine is more reactive than chlorine?

[2011 (T-II)]

11. The position of three elements A, B and C in the periodic table are shown in table given on next page :

Group →	I	II	III	IV	V	VI	VII
Period ↓							
1	B						
2							A
3						C	

Giving reasons, explain the following :

- Element A is nonmetal.
- Atom of element C has a larger size than atom of element A.
- Element B has a valency of 1.

[2011 (T-II)]

12. State any three limitations of Mendeleev's classification. [2009]

13. (a) Which two criteria did Mendeleev use to classify the elements in his periodic table?

(b) State Mendeleev's Periodic Law. [2009]

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

Group →	I	II	III	IV	V	VI	VII	VIII
Period ↓								
1								
2			B					
3	A	C						

Giving reasons, explain the following :

- Element A is metal.
- Element C has a larger size than element B.
- Element B has a valency of 3. [2009]

IV. LONG ANSWER QUESTIONS

(5 Marks)

A. IMPORTANT QUESTIONS

- How could the Modern Periodic Table remove various anomalies of Mendeleev's Periodic Table?
- Answer the following questions regarding the long form of the periodic table.
 - What do you understand by the term period? How many total number of periods are there?
 - Which period is the shortest? Name the elements in this period.
 - How many periods are called short periods? Give their period numbers and name one element of each period.
 - How many periods are called long periods? How many elements are there in the long periods?
 - How many periods are called very long periods? Give their period numbers and state which amongst them is complete. How many elements are there in the very long complete period?
- Answer the following questions regarding element ${}_{15}^{31}\text{X}$:
 - What is its electronic configuration?
 - To which group does it belong?
 - To which period does it belong?
 - How many electrons are there in its valence shell?
 - What is its valency?
 - Is it a metal or a nonmetal?
 - What is the formula of its compound with sodium?

- Electropositive nature of the elements increases down the group and decreases across the period
 - Electronegativity of the elements decreases down the group and increases across the period
 - Atomic size increases down the group and decreases across a period (left to right).
 - Metallic character increases down the group and decreases across a period.

On the basis of the above trends of the periodic table, answer the following about the elements with atomic numbers 3 to 9.

- Name the most electropositive element among them.
 - Name the most electronegative element.
 - Name the element with smallest atomic size.
 - Name the element which is a metalloid.
 - Name the element which shows maximum valency. [HOTS]
- An element X which is a yellow solid at room temperature shows catenation and allotropy. X forms two oxides which are also formed during the thermal decomposition of ferrous sulphate crystals and are the major air pollutants.
 - Identify the element X.
 - Write the electronic configuration of X.
 - Write the balanced chemical equation for the thermal decomposition of ferrous sulphate crystals.

- (d) What would be the nature (acidic/ basic) of oxides formed?
- (e) Locate the position of the element in the Modern Periodic Table. **[HOTS]**
6. An element X of group 15 exists as a diatomic molecule and combines with hydrogen at 773 K in the presence of a catalyst to form a compound, ammonia, which has a characteristic pungent smell.
- (a) Identify the element X. How many valence electrons does it have?
- (b) Draw the electron dot structure of the diatomic molecule of X. What type of bond is formed in it?
- (c) Draw the electron dot structure for ammonia and what type of bond is formed in it? **[HOTS]**
7. An element placed in 2nd group and 3rd period of the periodic table, burns in the presence of oxygen to form a basic oxide. **[HOTS]**
- (a) Identify the element.
- (b) Write the electronic configuration.
- (c) Write a 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.
8. Atomic number of a few elements are given as 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 of each of these elements?
- (e) Determine the valency of these elements. **[HOTS]**

B. QUESTIONS FROM CBSE EXAMINATION PAPERS

1. (a) Why do we classify elements?
- (b) What were the two criteria used by Mendeleev in creating his periodic table?
- (c) Why did Mendeleev leave some gaps in his periodic table?
- (d) In Mendeleev's Periodic Table, why there was no mention of noble gases like helium, neon and argon?
- (e) Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same? Justify your answer. **[2008, 2011 (T-II)]**
2. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a compound.
- (a) In which group and period of modern periodic table the elements X and Y are present?
- (b) Classify X and Y as metal(s), nonmetal(s) or metalloid(s).
- (c) What will be the formula of oxide of element Y? Identify the nature of the bond between the two elements in the oxide formed.
- (d) Draw the electron dot structure of the cation and anion formed when X reacts with Y. **[2011 (T-I)]**
3. Atoms of seven elements A, B, C, D, E, F and G have different number of electronic shells but have the same number of electrons in their outermost shells. The elements A and C combine with chlorine to form an acid and common salt respectively. The oxide of element A is a liquid at room temperature and is a neutral substance, while the oxides of the remaining six elements are basic in nature. Based on the above information answer the following questions.
- (i) What could the element A be?
- (ii) Will elements A to G belong to the same period or same group of the periodic table?
- (iii) Write the formula of the compound formed by the reaction of element A with oxygen.
- (iv) Show the formation of the compound by a combination of element C with chlorine with the help of an electronic structure.
- (v) What would be the ratio of the number of combining atoms in a compound formed by the combination of element A with carbon?
- (vi) Which one of the given elements is likely to have the smallest atomic radius? **[2010]**

4. On the basis of Mendeleev's Periodic Table given below, answer the questions that follow.

Groups→	I		II		III		IV		V		VI		VII		VIII		
Oxide :	R ₂ O		RO		R ₂ O ₃		RO ₂		R ₂ O ₅		RO ₃		R ₂ O ₇		RO ₄		
Hydride :	RH		RH ₂		RH ₃		RH ₄		RH ₃		RH ₂		RH				
Periods ↓	A	B	A	B	A	B	A	B	A	B	A	B	A	B	Transition Series		
1	H 1.008																
2	Li 6.939		Be 9.012		B 10.81		C 12.011		N 14.007		O 15.999		F 18.998				
3	Na 22.99		Mg 24.31		Al 29.98		Si 28.09		P 30.974		S 32.06		Cl 35.453				
4	First series: K 39.102 Second series: Cu 63.54		Ca 40.08 Zn 65.37		Sc 44.96 Ga 69.72		Ti 47.90 Ge 72.59		V 50.94 As 74.92		Cr 50.20 Se 78.96		Mn 54.94 Br 79.909		Fe 55.85	Co 58.93	Ni 58.71
5	First series: Rb 85.47 Second series: Ag 107.87		Sr 87.62 Cd 112.40		Y 88.91 In 114.82		Zr 91.22 Sn 118.69		Nb 92.91 Sb 121.75		Mo 95.94 Te 127.60		Tc 99 I 126.90		Ru 101.07	Rh 102.91	Pd 106.4
6	First series: Cs 132.90 Second Series: Au 196.97		Ba 137.34 Hg 200.59		La 138.91 Tl 204.37		Hf 178.49 Pb 207.19		Ta 180.95 Bi 208.98		W 183.85				Os 190.2	Ir 192.2	Pt 195.09

(a) Name the element which is in :

- group I and 3rd period.
- group VII and 2nd period.

(b) Suggest the formula of the following:

- oxide of nitrogen
- hydride of oxygen.

(c) In group VIII of the periodic table, why does cobalt with atomic mass 58.93 appear before nickel having atomic mass

58.71?

(d) Besides gallium, which two other elements have since been discovered for which Mendeleev had left gaps in his periodic table?

(e) Using atomic masses of Li, Na and K, find the average atomic mass of Li and K, and compare it with the atomic mass of Na. State the conclusion drawn from this activity. [2008]

ASSIGNMENTS FOR FORMATIVE ASSESSMENT

A. Charts

- Make a multicoloured chart of the modern version of the periodic table of elements showing clearly the mass numbers and atomic numbers of the elements.
- Make a multicoloured chart of the long form of the periodic table, showing clearly, the metals, non-metals and metalloids.

- Make a chart of elements from lithium to bromine for normal elements arranged in groups and periods in the increasing order of their atomic number and showing the distribution of electrons around their nucleus.
- Make a multicoloured chart showing five elements of group no. 1, 2, 13, 14, 15, 16, 17 and 18, showing the distribution of electrons around their nucleus, as shown below for group 1.