

PART I

- ◆ Important Points to Remember
- ◆ Previous Year's Questions
- ◆ Important Questions
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Periodic Properties and Variations of Properties-Physical and Chemical

IMPORTANT POINTS TO REMEMBER

1. Several attempts were made to classify elements, to arrange them systematically on the basis of their **physical and chemical properties**.

2. **Dobereiner's Triads** : According to this, the elements were placed in a group of three called **triads**. The atomic weight of middle element is the arithmetic mean of the other two. For example

(i)	Elements	Ca	Sr	Ba	(ii)	Li	Na	K
	Atomic mass	40	88	137		7	23	39
Average atomic mass of Ist and IIIrd = $\frac{40+137}{2} = 88.5$					= $\frac{7+39}{2} = 23$			

This classification was discarded because many elements could not find their positions in the triad.

3. **Newland's Octave Law** : Like eight notes of an octave of music, the eighth element starting from one is a kind of repetition of the first element. However, this method of classification was discarded since it failed to accommodate heavier elements and there was no space left for the elements which were discovered later.

4. **Mendeleev's Periodic Table** : According to Mendeleev, the periodic properties of the elements are the **periodic functions of their atomic weights**. The arrangement of **Mendeleev** enabled him to place the elements in the vertical columns and horizontal rows which were called as groups and periods respectively.

5. The elements in the periodic table were arranged **in the increasing order of their atomic weights**.

6. Mendeleev's Periodic Table has the following **main defects** :

(a) Position of **Isotopes**.

(b) Position of **Hydrogen**.

(c) Position of **Lanthanides and Actinides, i.e., rare earth elements**.

7. The shortcomings of the Mendeleev's periodic table was overcome by Henry Moseley and he put forward the modern periodic table. In which the elements are arranged in the increasing order of their atomic number.

Modern Periodic Law : The physical and chemical properties of elements are the **periodic functions of their atomic numbers**.

8. The properties of the elements are repeated after the regular interval or the properties reoccur after the regular interval.
9. Later on Bohr worked on the Moseley's periodic table and Bury in the year 1921 gave the extended form of the periodic table known as the long form of the periodic table.
10. **Periodic Table** may be defined as the table in which the elements are arranged **in the increasing order of their atomic numbers**.

11. In the modern periodic table the vertical lines are called as **Groups**.

12. There are **eighteen** vertical columns in the periodic table. The order for the arrangement of the group is (from left to right) I A, II A, III B, IV B, V B, VI B, VII B, VIII (undivided), I B, II B, III A, IV A, V A, VI A, VII A and zero. But according to the latest recommendations of IUPAC the groups are numbered from 1 to 18.

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

Non-metals

Metalloids

Metals

GROUPS		PERIODS															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H Hydrogen 1.0	2 He Helium 4.0																
3 Li Lithium 6.9	4 Be Beryllium 9.0	11 Na Sodium 23.0	12 Mg Magnesium 24.3									5 B Boron 10.8	6 C Carbon 12.0	7 N Nitrogen 14.0	8 O Oxygen 16.0	9 F Fluorine 19.0	10 Ne Neon 20.2
19 K Potassium 39.1	20 Ca Calcium 40.1	21 Sc Scandium 45.0	22 Ti Titanium 47.8	23 V Vanadium 50.9	24 Cr Chromium 52.0	25 Mn Manganese 54.9	26 Fe Iron 55.8	27 Co Cobalt 58.9	28 Ni Nickel 58.7	29 Cu Copper 63.5	30 Zn Zinc 65.4	31 Ga Gallium 69.7	32 Ge Germanium 72.6	33 As Arsenic 74.9	34 Se Selenium 79.0	35 Br Bromine 79.9	36 Kr Krypton 83.3
37 Rb Rubidium 85.5	38 Sr Strontium 87.6	39 Y Yttrium 88.9	40 Zr Zirconium 91.2	41 Nb Niobium 92.9	42 Mo Molybdenum 95.9	43 Tc Technetium (98)	44 Ru Ruthenium 101.1	45 Rh Rhodium 102.3	46 Pd Palladium 106.4	47 Ag Silver 107.9	48 Cd Cadmium 112.4	49 In Indium 114.8	50 Sn Tin 118.7	51 Sb Antimony 121.8	52 Te Tellurium 127.6	53 I Iodine 126.9	54 Xe Xenon 131.3
55 Cs Caesium 132.9	56 Ba Barium 137.3	57* La Lanthanum 138.9	72 Hf Hafnium 178.5	73 Ta Tantalum 181.0	74 W Tungsten 183.9	75 Re Rhenium 186.2	76 Os Osmium 190.2	77 Ir Iridium 192.2	78 Pt Platinum 195.1	79 Au Gold 197.0	80 Hg Mercury 200.6	81 Tl Thallium 204.4	82 Pb Lead 207.2	83 Bi Bismuth 208.0	84 Po Polonium (210)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)	89** Ac Actinium (227)	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (264)	108 Hs Hassium (265)	109 Mt Meitnerium (266)	110 Ds Darmstadtium (267)	111 Rg Roentgenium (268)	112 Cn Copernicium (269)	113 Uut (270)	114 Uuq (271)	115 Uup (272)	116 Uuh (273)	117 Uus (274)	118 Uuo (276)

* Lanthanides

** Actinides

58 Ce Cerium 140.1	59 Pr Praseodymium 140.9	60 Nd Neodymium 144.2	61 Pm Promethium (145)	62 Sm Samarium 150.4	63 Eu Europium 152.0	64 Gd Gadolinium 157.3	65 Tb Terbium 158.9	66 Dy Dysprosium 162.5	67 Ho Holmium 164.9	68 Er Erbium 167.3	69 Tm Thulium 168.9	70 Yb Ytterbium 173.0	71 Lu Lutetium 175.5
90 Th Thorium 232.0	91 Pa Protactinium (231)	92 U Uranium (238.1)	93 Np Neptunium (237)	94 Pu Plutonium (242)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (254)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)

13. The elements of group 1, 2, 13, 14, 15, 16 and 17 are called as **normal elements** or **representative elements**. These elements have incomplete outermost shell.
14. The elements of group 3, 4, 5, 6, 7, 8, 9, 11 and 12 are known as **transition elements**.
15. The elements of group 18 or **zero group** are called as **inert gases** or **noble gases** or **rare gases** as they have stable configuration following the octet rule.
16. Group 1 elements are called as **Alkali metals**.
17. Group 2 elements are called as **Alkaline earth metals**.
18. Group 17 elements are called as **Halogens**. (Salt producers).
19. Elements of group 18 are called as **Inert gases** or **Noble gases**.
20. The horizontal rows in the periodic table are called as **Periods**.
21. There are **seven** horizontal rows in the periodic table. The **number of shells** present in an atom determines its **period**. Elements in period 1 has **one** shell, elements in period 2 has **two shells**, elements in period 3 has **three shells** and so on. For example

Name of the element	Atomic number	K, L, M, N	Period
Hydrogen	1	1	1st period
Helium	2	2	1st period
Lithium	3	2, 1	2nd period
Sodium	11	2, 8, 1	3rd period
Potassium	19	2, 8, 8, 1	4th period

22. **First period** is the shortest period containing only two elements, i.e. Hydrogen and Helium.
23. **Second period** is a short period containing eight elements (Li, Be, B, C, N, O, F and Ne).
24. **Third period** is also a short period containing eight elements (Na, Mg, Al, Si, P, S, Cl and Ar).
25. **Fourth period** is a long period containing eighteen elements.
26. **Fifth period** is also a long period with **eighteen** elements.
27. **Sixth period** is a very long period containing **thirty two** elements.
28. **Seventh period** is an **incomplete period**.

Period	Number of Elements
1	2
2	8
3	8
4	18
5	18
6	32
7	Incomplete

29. In group **III B** and **sixth period**, the elements from atomic numbers 57 to 71 are present which are called as **Lanthanides**.
30. In group **III B** and **seventh period**, the elements from atomic numbers 89 to 103 are present which are called as **Actinides**.
31. The elements can be classified as :
 1. Representative or Normal elements :
 2. Transition elements
 3. Inert gases or noble gases

4. Inner transition elements-which includes lanthanides and actinides.

Type of Elements	Group
1. Representative elements or Normal elements	1, 2, 13, 14, 15, 16, 17
2. Transition elements	3, 4, 5, 6, 7, 8, 9, 10, 11, 12
3. Inert gases	18

32. The properties which reoccur after a regular interval in periodic table are called as **Periodic properties** and the phenomenon is called as **periodicity**.
33. The major cause for the periodicity is the reoccurrence of similar electronic configuration. In the particular group the valence electrons remains the same and thus the valency is also the same. Hence, the properties are same.
34. Electronic configuration of elements :

(a) Number of Shells

Group : As we move down the group the number of shells **increases**.

Example : Elements of Group 1 in the periodic table.

Name of Element	Atomic number	Electronic configuration			
		K	L	M	N
Hydrogen	1	1			
Lithium	3	2	1		
Sodium	11	2	8	1	
Potassium	19	2	8	8	1

Period : As we move across the period the number of shells **remain same**.

Example : Taking the elements of 2nd period.

Name of Element	Atomic number	Electronic configuration	
		K	L
Lithium	3	2	1
Beryllium	4	2	2
Boron	5	2	3
Carbon	6	2	4
Nitrogen	7	2	5
Oxygen	8	2	6
Fluorine	9	2	7
Neon	10	2	8

- (b) Valence electrons :** The electrons present in the outermost shell of an atom are called **valence electrons**.

Group : As we move down the group the number of valence electrons **remain the same**. Therefore the elements in same period have similar chemical properties.

Period : As we move across the period the number of valence electrons **increases**.

- (c) Valency :** The combining capacity of an element is called **valency**.

Group : As we move down the group the valency **remain same** as the number of **valence electrons** are same.

Period : As we move across the period the valency first **increases** and then **decreases** and finally becomes **zero** in case of **inert gases**.

Example : Elements of 3rd period.

Name of Element	Atomic number	Electronic configuration	Valency
Sodium	11	2, 8, 1	+1
Magnesium	12	2, 8, 2	+2
Aluminium	13	2, 8, 3	+3
Silicon	14	2, 8, 4	+4
Phosphorus	15	2, 8, 5	-3
Sulphur	16	2, 8, 6	-2
Chlorine	17	2, 8, 7	-1
Argon	18	2, 8, 8	0

35. According to the Modern Periodic Law the properties of an element depends upon :

- (a) Atomic size (b) Metallic character (c) Non-metallic character
(d) Ionisation energy (e) Electron affinity (f) Electronegativity

(a) Atomic size : It is taken as the distance between the nucleus and the outermost shell of an atom.

Group : As we move down the group atomic size **increases** as the number of shells **increases**.

Period : As we move across the period atomic size **decreases** as the nuclear charge **increases** but the number of shells **remain the same**.

(b) Metallic character : It is the tendency to **lose electrons easily**.

Group : As we move down the group metallic character **increases**.

Period : As we move across the period metallic character **decreases**.

(c) Non-metallic character : It is the tendency to **gain electrons**.

Group : As we move down the group non-metallic character **decreases**.

Period : As we move across the period non-metallic character **increases**.

(d) Ionisation energy : It is the energy **required** to **remove** an **electron** from the outermost shell of an atom in its isolated gaseous state.

Group : As we move down the group ionization energy **decreases**.

Period : As we move across the period ionization energy **increases**.

‣ **Inert Gases** have **maximum** ionization energy.

‣ **Metals** have **low** ionization energy.

(e) Electron affinity : It is the energy **released** on **adding** an **electron** to the outermost shell of an atom in its isolated gaseous state.

Group : As we move down the group electron affinity **decreases**.

Period : As we move across the period electron affinity **increases**.

‣ **Inert Gases** have **zero** electron affinity.

‣ **Non-metals** have **high** electron affinity.

‣ **Halogens** have **maximum** electron affinity in their respective periods.

(f) Electronegativity : It is the tendency on the part of an atom to **attract** the **shared pair** of **electrons** towards its side.

Group : As we move down the group electronegativity **decreases**.

Period : As we move across the period electronegativity **increases**.

36. The **acidic character** of oxides **increases** as we move across a period.

Example : Na_2O , MgO , Al_2O_3 , SiO_2 , P_2O_5 , SO_2 , Cl_2O_7

Basic Basic Amphoteric Acidic Acidic Acidic Acidic

37. The **basic character** of oxides **increases** as we move down the Group.

38. The common feature seen at the end of every period is the presence of an inert gas with the **complete octet** or a **stable configuration**.

39. The striking features of **alkali metals** are :

- (i) Highly electropositive in nature.
- (ii) Good reducing agents.
- (iii) Valency is +1.
- (iv) They have low ionization potential.
- (v) They form ionic chlorides.
- (vi) Good conductors of electricity
- (vii) They have largest atomic size in their period
- (viii) They react vigorously with dilute acids and cold water to liberate hydrogen. The reactivity decreases on moving down the group.

40. The striking features of **halogens** are :

- (i) Highly electronegative in nature.
- (ii) Good oxidizing agents.
- (iii) Valency is -1.
- (iv) They have high electron affinity.
- (v) They undergo ionic bond formation with metals.
- (vi) Poor conductors of electricity
- (vii) They have smallest size in their period.
- (viii) They do not react with dilute acids.

VARIATION OF PERIODIC PROPERTIES ACROSS THE GROUP AND THE PERIOD

Periodic property	Group	Period
1. Valency	Remain same	First increases and then decreases.
2. Atomic size	Increases	Decreases
3. Ionization energy	Decreases	Increases
4. Electron affinity	Decreases	Increases
5. Electronegativity	Decreases	Increases
6. Metallic character	Increases	Decreases
7. Non-metallic character	Decreases	Increases
8. Acidic character of oxides	Decreases	Increases
9. Basic character of oxides	Increases	Decreases.
10. Number of shells	Increases	Remain same
11. Number of valence electrons.	Remain same	Increases

PREVIOUS YEARS' QUESTIONS

2012

Q1. Choose the correct answer from the options given below :

(i) An element in period-3 whose electron affinity is zero.

- (A) Neon (B) Sulphur
- (C) Sodium (D) Argon

(ii) An alkaline earth metal.

- (A) Potassium (B) Calcium
- (C) Lead (D) Copper

Ans. (i) D (ii) B

Q2. Given reasons for the following :

(i) Ionisation potential of the element increases across a period.

(ii) Alkali metals are good reducing agents. [2]

Ans. (i) Nuclear charge increases.

(ii) Alkali metals have one electron in their valence shell and hence they easily lose or donate electron.

Q3. Name a metal present in period 3, group 1 of the periodic table. [1]

Ans. Sodium

2011

Q1. Why the oxidizing power of elements increases on moving left to right along a period in the periodic table? [1]

Ans. Electronegativity and the non-metallic character increases from left to right.

Q2. Fill in the blanks :

(i) Across a period, the ionization potential _____.

(ii) Down the group, electron affinity _____.

Ans. (i) Increases
(ii) Decreases

Q3. Choose the correct answer from the options given below :

In the periodic table, alkali metals are placed in the group.

(A) 1 (B) 11
(C) 17 (D) 18 [1]

Ans. (A)

Q4. Give the number of the group and the period, of the element having three shells with three electrons in valence shell. [1]

Ans. The element belongs to third period and group III A or 13.

2010

Q1. Select the correct answer from the choices A, B, C and D which are given.

Write only the letter corresponding to the correct answer.

The number of electrons present in the valence shell of a halogen is:

(A) 1 (B) 3
(C) 5 (D) 7 [1]

Ans. (D)

Q2. Match the column A with column B.

Column A	Column B
(i) Electronegativity across the period	Increases
(ii) Non-metallic character down the group	Decreases

Ans. (i) Increases (ii) Decreases

Q3. An element has an atomic number 16. State

- (i) the period to which it belongs.
- (ii) the number of valence electrons.
- (iii) whether it is a metal or non-metal.

[3]

Ans. (i) Third (ii) Six (iii) Non-metal (2, 8, 6)

Q4. Define the following terms :

- (i) Ionisation potential.
- (ii) Electron affinity.

[2]

Ans. (i) **Ionization potential :** It is the energy required to remove an electron from the outermost shell of an atom in its isolated gaseous state.
(ii) **Electron affinity :** It is the energy released on adding an electron to the outermost shell of an atom in its isolated gaseous state.

2009

Q1. Select the correct answer from choices A, B, C and D which are given.

Among the period 2 elements the one which has higher electron affinity is

A. Lithium B. Carbon
C. Fluorine D. Neon [1]

Ans. C. Fluorine

Q2. Consider the section of the periodic table given below:

Group numbers	I A	II A	III A	IV A	V A	VI A	VII A	zero
	1	2	13	14	15	16	17	18
	Li		D			O	J	Ne
	A	Mg	E	Si		H	K	
	B	C		F	G			L

Note : In this table B does not represent Boron.
C does not represent carbon.
F does not represent fluorine.
H does not represent hydrogen.
K does not represent potassium.

You must see the position of the element in the periodic table.

Some elements are given in their own symbol and position in the periodic table, while others are shown with a letter with reference to the table.

- (i) Which is the most electronegative ?
- (ii) How many valence electrons are present in G ? [2]

Ans. (i) J (ii) 5 electrons

2008

Q1. With reference to the variation of properties in the periodic table which of the following is generally true ?

- A. Atomic size increases from left to right across a period.
- B. Ionization potential increases from left to right across a period.

- C. Electron affinity increases going down a group.
D. Electronegativity increases going down a group. [1]

Ans. B

Q2. The following questions refer to the periodic table.

- (a) (i) Name the first and the last element of period 2.
(ii) What happens to the atomic size of elements moving from top to bottom of a group?
(iii) Which of the elements has the greatest electron affinity among the halogens?
(iv) What is the common feature of the electronic configurations of the elements in group 7? [5]
- (b) Supply the missing word from those in the brackets. (Do not write out the sentence).
(i) If an element has a low ionisation energy then it is likely to be ____ (metallic/non-metallic).
(ii) If an element has seven electrons in its outermost shell then it is likely to have the ____ (largest/smallest) atomic size among all the elements in the same period. [2]
- (c) (i) The metals of group 2 from top to bottom are : Be, Mg, Ca, Sr, Ba. Which of these metals will form ions most readily and why?
(ii) What property of an element is measured by electronegativity? [3]

Ans.(a) (i) First element – Lithium
Last element – Neon.

- (ii) On moving from top to bottom in a group the atomic size increases.
(iii) Chlorine.
(iv) They have seven electrons in their valence shell and they need one electron to complete their octet.

- (b) (i) Metallic
(ii) Smallest

- (c) (i) Barium forms ions most readily. As it has largest atomic size and minimum ionization energy.
(ii) The tendency of an atom to attract the shared pair of electrons.

2007

Q1. A group of elements in the Periodic Table are given below (Boron is the first member of the group and Thallium is the last) :

Boron	Aluminium
Gallium	Indium
Thallium	

Answer the following questions in relation to the above group of elements :-

- (i) Which element has the most metallic character?
(ii) Which element would be expected to have the highest electronegativity?
(iii) If the electronic configuration of Aluminium is 2, 8, 3, how many electrons are there in the outer shell of Thallium?
(iv) The atomic number of Boron is 5. Write the chemical formula of the compound formed when Boron reacts with Chlorine.
(v) Will the elements in the group to the right of this Boron group be more metallic or less metallic in character? Justify your answer. [5]

Ans. (i) Thallium (ii) Boron
(iii) Three (iv) BCl_3
(v) Less metallic

2006

Q1. The elements of one short period of the periodic table are given below in the order from left to right.

Li Be B C O F Ne

- (i) To which period these elements belong?
(ii) One element of this period is missing. Which is the missing element and where should it be placed?
(iii) Which one of the element in this period shows the property of catenation?
(iv) Place the three elements Fluorine, Beryllium and Nitrogen in the order of increasing electronegativity.
(v) Which one of the above elements belong to the halogen series? [5]

Ans. (i) Second period

- (ii) Nitrogen, It is placed between carbon and oxygen i.e., just after carbon and just before oxygen.

- (iii) Carbon
- (iv) Be, N, F
- (v) Fluorine

2005

Q1. Parts (i) to (v) refer to changes in the properties of elements on moving left to right across a period of the periodic table. For each property, choose the letter corresponding to the correct answer from the choices A, B, C and D.

(i) The non-metallic character of the elements.

- A. decreases
- B. increases
- C. remains the same
- D. depends on the period.

(ii) The electronegativity

- A. depends on the number of valence electrons.
- B. remains the same

C. decreases

D. increases

(iii) The ionization potential

- A. goes up and down
- B. decreases
- C. increases
- D. remains the same

(iv) The atomic size

- A. decreases
- B. increases
- C. remains the same
- D. sometimes increases sometimes decreases

(v) The electron affinity of the elements in group 1 to 7

- A. goes up and then down
- B. decreases and then increases
- C. increases
- D. decreases

[5]

Ans. (i) Increases (ii) Increases (iii) Increases
(iv) Decreases (v) Increases

IMPORTANT QUESTIONS

Q1. Define the following and give their trends in the periodic table :

- (a) Ionisation potential
- (b) Metallic character
- (c) Electron affinity
- (d) Electronegativity

Ans. (a) The energy required to remove an electron from the outermost shell of an atom in its gaseous, isolated state is called Ionization potential.

As we move down the group, ionization potential decreases.

As we move across the period, ionization potential increases.

(b) The tendency to lose electrons is called as metallic character.

Metallic character increases as we move down the group.

Metallic character decreases as we move across the period.

(c) The energy released when an electron is added to a neutral atom in its gaseous isolated state is called as electron affinity. Electron affinity decreases as we move down the group.

Electron affinity increases as we move across a period.

(d) The tendency on the part of an atom to attract the electron towards its side is called electronegativity. Electronegativity decreases as we move down the group. Electronegativity increases as we move from left to right in the periodic table.

Q2. (a) What are the elements of Group 1 called ?

(b) Name all the elements of Group 1.

(c) Name the radioactive element present in Group 1.

(d) What type of Chlorides are formed by the elements of Group 1 ?

(e) Arrange the elements of Group 1 in

(i) Increasing order of number of shells.

(ii) Increasing order of atomic size.

(iii) Decreasing order of ionization potential.

(iv) Increasing order of electron affinity.

Ans. (a) Alkali metals

(b) Hydrogen, Lithium, Sodium, Potassium, Rubidium, Caesium, Francium

(c) Francium

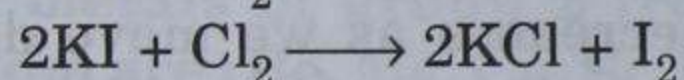
- (d) Ionic chlorides
- (e) (i) Li, Na, K, Rb, Cs, Fr.
(ii) Li, Na, K, Rb, Cs, Fr.
(iii) Li, Na, K, Rb, Cs, Fr.
(iv) Fr, Cs, Rb, K, Na, Li.

Q3. (a) What are the elements of Group 17 called?

- (b) Name all the elements of Group 17.
- (c) Name the Group 17 element which is solid.
- (d) Name the most electronegative element of Group 17.
- (e) Name a greenish yellow coloured gas present in Group 17 which is capable of displacing the other two halogens from their salt solutions. Give equation also.
- (f) Arrange the acids of Group 17 in the increasing order of their strength.
- (g) What are the acids of Group 17 elements called as Oxyacids or Hydracids?

Ans. (a) Halogens

- (b) Fluorine, Chlorine, Bromine, Iodine, Astatine.
- (c) Astatine.
- (d) Fluorine.
- (e) Chlorine.



(f) HF, HCl, HBr, HI.

(g) Hydracids.

Q4. Give reasons for the following :

- (a) Inert gases have zero valency.
- (b) The atomic size increases as we move down the Group.
- (c) Noble gases have zero electron affinity.
- (d) Ionization potential increases as we move across the Period.
- (e) Sodium chloride forms ionic bond.

Ans. (a) Inert gases have zero valency because their octet is complete. So, they neither lose nor gain electrons.

(b) The atomic size increases as we move down the group because the number of shells increases.

(c) Noble gases have zero electron affinity because their octet is complete and they have stable electronic configuration. Therefore, they cannot accept electrons.

(d) Ionization potential increases as we move across a period because the atomic size decreases.

(e) Sodium metal has low ionization potential. So, it easily loses electron whereas chlorine has high electron affinity. So, it easily gains electron and thus the bond is formed by the transference of electrons, i.e., ionic bond.

Q5. Name three elements present in the periodic table which do not undergo any chemical reaction to form compound. Name the group in which these elements are present and give reason for their such behaviour.

Ans. Elements are helium, neon, argon, krypton. These elements are commonly called as inert gases and are present in group 18 of the periodic table. These elements are unable to undergo any chemical reaction as they have eight electrons (except helium) in their outermost shell having stable electronic configuration following the octet rule.

Q6. The following questions are related with the certain properties of an element 'X' having atomic number 20.

- (a) Identify element 'X'.
- (b) Give its electronic configuration.
- (c) Is it a metal or non-metal?
- (d) How many valence electrons are present in element 'X'?
- (e) In which Group and Period element 'X' is present?
- (f) Is this element is greater in size than Mg or smaller?
- (g) What type of bonding will you expect between element 'X' and oxygen?

Ans. (a) Calcium

(e) Group 2, Period 4

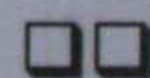
(b) 2, 8, 8, 2

(f) Greater

(c) Metal

(g) Ionic or electrovalent

(d) 2



Let's Recall

Fill Your Answer in the Space Given for Each Question.

Q1. Match the following :

Column-I	Column-II
(i) Electron affinity	(a) Tendency to loose electrons
(ii) Ionization energy	(b) Vertical columns
(iii) Metallic character	(c) Energy released
(iv) Non-metallic character	(d) Horizontal rows
(v) Group	(e) Tendency to gain electrons
(vi) Period	(f) Energy required

Ans. (i) ☐ (ii) ☐ (iii) ☐ (iv) ☐ (v) ☐ (vi) ☐

Q2. Fill in the blanks.

- (i) Atomic size _____ as we move across the period as _____ remain same but the _____ increases.
- (ii) Elements of Group 1 are called _____.
- (iii) There are _____ groups and _____ periods in the periodic table.
- (iv) Metals form _____ chlorides.
- (v) Metals have low _____ and non-metals have high _____.
- (vi) The properties of element which reoccur after a regular interval are called _____ properties.
- (vii) Non-metals have _____ electron affinity.
- (viii) Inert gases have _____ ionisation energy.
- (ix) The major cause of periodicity is the recurrence of similar _____.
- (x) Lanthanides are present in _____ group and _____ period.

Q3. State whether the following statements are True or False.

- (i) According to the Modern Periodic Law, the periodic properties of an element are the periodic functions of their atomic weight. ☐
- (ii) Alkaline earth metals are present in Group 2 of the Periodic table. ☐
- (iii) Oxygen is present in Group 15 and 3rd Period of the Periodic table. ☐
- (iv) Sulphur dioxide is more basic than sodium oxide. ☐
- (v) Sodium has greater atomic size than chlorine. ☐

Q4. Each question has four options, out of which only one option is correct. Dark the bubble for correct answer.

- (i) The most metallic element in its respective group is placed
 (a) at the top (b) at the bottom
 (c) in the middle (d) sometimes in the middle and sometimes at the top

Ans. (a) ☐ (b) ☐ (c) ☐ (d) ☐

(ii) The elements in the periodic table are placed in the increasing order of their
 (a) atomic weight (b) atomic number (c) Both (a) and (b) (d) None of these

Ans. (a) ☐ (b) ☐ (c) ☐ (d) ☐

(iii) The valency of Alkali metal is
 (a) + 2 (b) + 1 (c) - 1 (d) - 2

Ans. (a) ☐ (b) ☐ (c) ☐ (d) ☐

(iv) Aluminium oxide is

- (a) acidic oxide (b) neutral oxide (c) basic oxide (d) amphoteric oxide

Ans. (a) (b) (c) (d)

(v) The most electronegative element in its respective period is present in

- (a) Group 1 (b) Group 13 (c) Group 17 (d) Group 18

Ans. (a) (b) (c) (d)

(vi) The element having maximum atomic size in its respective group is present

- (a) at the bottom (b) at the top (c) in the middle (d) None of these

Ans. (a) (b) (c) (d)

(vii) Which is not correct with reference to the elements of group 18 ?

- (a) Zero electron affinity (b) Maximum ionization energy
(c) Complete octet (d) Valency is variable.

Ans. (a) (b) (c) (d)

(viii) With reference to hydrogen and chlorine which statement is correct ?

- (a) Hydrogen and chlorine have same electronegativity.
(b) Hydrogen is more electronegative than chlorine.
(c) Chlorine is more electronegative than hydrogen.
(d) None of the above.

Ans. (a) (b) (c) (d)

(ix) If an element has two electrons in its valence shell it is likely to be

- (a) non-metal (b) metal (c) metalloid (d) inert gas.

Ans. (a) (b) (c) (d)

(x) Representative elements have

- (a) complete penultimate shell (b) incomplete penultimate shell
(c) Both of the above. (d) None of the above

Ans. (a) (b) (c) (d)

Q5. Dodging

- (i) He, —, Ar, —, Xe, — (ii) Li, Na, —, Rb, —, — (iii) F, —, —, I
(iv) Ba, —, Ca, —, Be (v) B, —, N, —, F, —

ANSWERS

- | | | | | | |
|--|--------------------|--------------|-------------|--------------|--------|
| 1. (i) c | (ii) f | (iii) a | (iv) e | (v) b | (vi) d |
| 2. (i) decreases, number of shells, nuclear charge | (ii) alkali metals | | | | |
| (iii) eighteen, seven | (iv) ionic | | | | |
| (v) ionization energy, electron affinity | (vi) Periodic | | | | |
| (vii) High | (viii) Maximum | | | | |
| (ix) Electronic configuration | (x) III B, sixth | | | | |
| 3. (i) False | (ii) True | (iii) False | (iv) False | (v) True | |
| 4. (i) b | (ii) b | (iii) b | (iv) d | (v) c | |
| (vi) a | (vii) d | (viii) c | (ix) b | (x) a | |
| 5. (i) Ne, Kr, Rn | (ii) K, Cs, Fr | (iii) Cl, Br | (iv) Sr, Mg | (v) C, O, Ne | |

Time : 30 minutes

Marks : 25

- Q1.** Arrange the elements of second period in the increasing order of their atomic size. 1
- Q2.** Name the element having maximum ionization energy. 1
- Q3.** What is the electronic configuration of the element in the third period which gains one electron to change into anion. Identify the element also. 1
- Q4.** Within a group where would you expect to find the element with
(i) greatest metallic character (ii) largest atomic size 2
- Q5.** Fill in the blanks :
(i) The element below sodium in the same group would be expected to have electronegativity than sodium and the element above chlorine would be expected to have ionization potential than chlorine.
(ii) On moving down the group increases but the remains same. 2
- Q6.** An element 'A' is placed in Group 1 and 3rd Period of the periodic table. With reference to element 'A' answer the following questions. 4
(i) Identify element 'A'.
(ii) How many valence electrons are present in element 'A' ?
(iii) Is element 'A' oxidizing or reducing agent ?
(iv) What is the valency of element 'A' ?
- Q7.** Compare the properties of alkali metals and halogens with reference to 4
(i) Valency (ii) Valence electrons
(iii) Oxidizing or Reducing nature (iv) Electropositive or Electronegative behaviour
- Q8.** The following questions refer to the periodic table. 5
(i) Name the first and the last element in period 3.
(ii) What happens to atomic size of elements on moving across the period ?
(iii) What common feature in electronic configuration is seen at the end of period ?
(iv) Why the elements of same group have similar chemical properties ?
(v) F, Cl, Br, I are the members of group 17 of the periodic table. How many valence electrons are present in Fluorine and Iodine ?
- Q9.** The following questions are related to the first 36 elements present in the periodic table. 5
(i) Name three elements which need one electron to complete their octet.
(ii) Name three elements which lose one electron to complete their octet.
(iii) Name two elements which are chemically inert.