CHAPTER – 5

PERIODIC CLASSIFICATION OF ELEMENTS

HOTS: (High Order Thinking Skill) Questions with Answers

Q-1 X, Y and Z are the elements of a dobereiners triad. If the atomic mass of x is 7 and that of z is 39, what should be the atomic mass of y?

Q-2 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?

Q-3 The following is Newland's Octave Table. Observe it and answer the following questions:

sa(do)	re(re)	ga (mi)	ma (fa)	pa(so)	da (la)	ni(ti)
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co and Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce and La	Zr	-	-

i. Which of the element in 1st column has different properties from rest of the elements?

ii. Which of the elements resemble with each other in second column?

iii. Pick up odd element in second last column.

iv. Pick up elements which have similar properties in last column.

Q-4 In the Periodic Table given below, Lithium, carbon, oxygen and neon are placed in their correct positions and the positions of nine other elements are represented by letters. These letters are not the symbols for the elements?

1	2	13	14	15	16	17	18
Lithium			Carbon		Oxygen	L	Neon
X			E		G	Q	
Y						R	
Z						T	

By reference to the table, answer the following questions:

(a) Give the letter of the most reactive metal.

(b) Give the letter of the most reactive non-metal.

(c) Name the family of elements represented by L, Q, R, and T.

(d) Name one element in each case occurring in groups 2, 13 and 15

Q-5 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?

Q-6 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?

Q-7 The following table shows the position of six elements A, B, C, D, E and F in the periodic table.

Groups / Periods	1	2	3 to 12	13	14	15	16	17	18
2.	A					B			C
3.		D			E				F

Using the above table answer the following questions :
(a) Which element will form only covalent compunds?
(b) Which element is a metal with valency 2?
(c) Which element is a non-metal with valency of 3?
(d) Out of D and E, which one has a bigger atomic radius and why?
(e) Write a common name for the family of elements C and F.

Q-8 The diagram below shows part of the Periodic Table

1	2	3										4	5	6	7	0
Na															Cl	Ar

The position of three elements in the Periodic Table is shown:

i Write the atomic numbers of the elements.

ii Give the electronic distribution of the elements

iii Using these three elements as examples, describe the trend in chemical properties across the third period of the Periodic Table.

Q-9

Group	I	II	III	IV	V	VI	VII	VIII
Oxide Hydride	R_2O RH	RO RH_2	R_2O_3 RH_3	RO_2 RH_4	R_2O_5 RH_3	RO_3 RH_2	R_2O_7 RH	RO_4
Periods	A B	A B	A B	A B	A B	A B	A B	
1	H							
2	Li	Be	B	C	N	O	F	
3	Na	Mg	Al	Si	P	S	Cl	
4.First Series: Second Series:	K Cu	Ca Zn	Sc Ga	Ti Ge	V As	Cr Se	Mn Br	Fe Co Ni
5 First Series: Second Series	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te 127.90	Tc I 126.90	Ru Rh Pd
6 First Series: Second Series	Cs Au	Ba Hg	La Tl	Hf Pb	Ta Bi	W		Os Ir Pt

(a) Write the formula of hydride and oxide of silicon

(b) Name the elements which is in

(i) II group and 4th period

(ii) VI group and 3rd period.

(c) Name the elements in group I which do not resemble with alkali metals

(d) In group VI why does Te with atomic mass 127.60 comes before I with atomic mass 126.90

Q 10. A metal M forms an oxide having the formula M2O3. It belongs to 3rd period in the modern periodic table. Write the atomic number and valency of the metal.

Answers

Ans 1 $\frac{(7 + 39)}{2} = 46/2$ y = 23.

Ans 2 Six elements.

Ans 3: (a) Co & Ni
(b) Li, Na , K
(c) Mn
(d) O, S, Se

Ans 4 (a) Z , (b) L , (c) Halogen family, (d) Mg(group-2), Al (group-13), N (group-15)

Ans 5: X (Z=12): 2, 8, 2
Y (Z=16): 2, 8, 6
Both these elements are present in third period. An ionic bond is formed between X & Y as a result of transfer of two electrons from X to Y

Ans 6: X $(NO_3)_2$: XSO_4 $X_3(PO_4)_2$
X belong to second group . X forms ionic compound because by losing two electrons X achieve the electronic configuration of Noble gas element Neon.

Ans 7:
(a) E, (b) D, (c) B, (d) D, because the atomic size decreases along a period,
(e) Noble Gases.

Ans 8:
(a) Na = 11
Cl = 17
Ar = 18
(b) Na (2,8,1) Cl (2,8,7) Ar (2,8,8,)
(c) Metallic and reducing character decreases.

Ans.9 (a) SiO2, SiH_4
(b) (i) Ca,Zn
(ii) S
(c) H
(d) The sequence was inverted so that elements with similar properties could be grouped together

Ans 10. Atomic number = 13
Valency = 3

PRACTICE QUESTIONS

Q-1 State the modern periodic law

Q-2 which of the two elements

A=2,8,1 B= 2,8,8,1 is more electropositive

Q-3 How does the atomic size very in going from

A) Left to right in a period

B) Top to Bottom in a group

Q-4 An element has atomic number 13. In which group and period it should be placed?

Q-5 How many periods and groups are there in the long from of P.T?

Q-6 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 period table ?

Q-7 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.

Q-8 Explain Why-

1. All the elements of a group have similar chemical properties.
2. All the elements in a period have different chemical properties.

Q-9 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.

Q-10 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?

Q-11 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?