

Periodic Classification of Elements

Theory Questions

3 Marks:

- What is meant by periodicity in properties of elements with reference to the periodic table? [CBSE 2009]
 - Why do all the elements of the same group have similar properties?
 - How will the tendency to gain electrons change as we go from left to right across a period? Why?
- Atoms of eight elements *A, B, C, D, E, F, G* and *H* have the same number of electronic shells but different number of electrons in their outermost shell. It was found that element *A* and *G* combine to form an ionic compound. This compound is added in a small amount to almost all vegetable dishes during cooking. Oxides of elements *A* and *B* are basic in nature while those of *E* and *F* are acidic. The oxide of *D* is almost neutral. Based on the above information answer the following questions. [CBSE 2010]
 - To which group or period of the periodic table do the listed elements belong?
 - What would be the nature of compound formed by a combination of elements *B* and *F*?
 - Which two of these elements could definitely be metals?
 - Which one of the eight elements is most likely to be found in gaseous state at room temperature?
 - If the number of electrons in the outermost shell of elements *C* and *G* be 3 and 7 respectively, write the formula of the compound formed by the combination of *C* and *G*.
- Two elements '*P*' and '*Q*' belong to the same period of the modern periodic table and are in Group-1 and Group-2 respectively. Compare their following characteristics in tabular form: [CBSE 2015]
 - The number of electrons in their atoms
 - The sizes of their atoms
 - Their metallic characters
 - Their tendencies to lose electrons
 - The formula of their oxides
 - The formula of their chlorides.
- Taking the example of an element of atomic number 16, explain how the electronic configuration of the atom of an element relates to its position in the modern periodic table and how valency of an element is calculated on the basis of its atomic number. [CBSE 2015]
- An element '*X*' belongs to 3rd period and group 16 of the Modern Periodic Table. [CBSE 2016]
 - Determine the number of valence electrons and the valency of '*X*'.
 - Molecular formula of the compound when '*X*' reacts with the hydrogen and write its electron dot structure.
 - Name the element '*X*' and state whether it is metallic or non-metallic.
- An element '*X*' has mass number 35 and number of neutrons 18. Write atomic number and electronic configuration of '*X*'. Also write group number, period number and valency of '*X*' [CBSE 2016]
- Write the number of periods and groups in the Modern Periodic Table. How does the metallic character of elements vary on moving
 - From left to right in a period, and [CBSE 2017]
 - Down a group?Give a reason to justify your answer.
- Na, Mg* and *Al* are the elements of the 3rd period of the Modern Periodic Table having group number 1, 2 and 13 respectively. Which one of these elements has the [CBSE 2017]
 - Highest valency,

- B. Largest atomic radius, and
 C. Maximum chemical reactivity?

Justify your answer stating the reason for each

9. On the basis of Mendeleev's Periodic Table given below, answer the questions that follow the table : [CBSE 2008]

Group →	I	II	II	IV	V	VI	VII	VIII		
Oxide	R_2O ,	RO	R_2O_3	RO_2	R_2O_5	RO_3	R_2O_7	RO_4		
Hydride	RH	RH_2	RH_3	RH_4	RH_3	RH_2	RH			
Periods ↓	A	A	A	A	A	A	A	Transition series		
	B	B	B	B	B	B	B			
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 h8	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	Ca 40.08	Sc 44.96	Ti 47.90	V 50.94	Cr 50.20	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.71
Second series	Cu 63.54	Zn 65.37	Ga 69.72	Ge 72.59	As 74.92	Se 78.96	Br 79.909			
5 First series:	Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc 99	Ru 101.07	Rh 102.91	Pd 106.4
Second series	Ag 107.87	Cd 112.40	In 114.82	Sn 118.69	Sb 121.60	Te 127.60	I 126.90			
6 First series:	Cs 132.90	Ba 137.34	La 138.91	Hf 178.49	Ta 180.95	W 183.85		Os 190.2	Ir 192.2	Pt 195.09
Second series	Au 196.97	Hg 200.59	Tl 204.37	Pb 207.98	Bi 208.98					

- A. Name the element which is in
 i. 1st group and 3rd
 ii. VIIth group and 2nd period.
- B. Suggest the formula for the following:
 i. Oxide of nitrogen
 ii. 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? 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.

OR

Why do we classify elements?

- A. What were the two criteria used by Mendeleev in creating his Periodic Table?
 B. Why did Mendeleev leave some gaps in his Periodic Table?
 C. In Mendeleev's Periodic Table, why was there no mention of Noble gases like Helium, Neon and Argon?
 D. 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.