

PERIODIC CLASSIFICATION OF ELEMENTS

PRACTICE QUESTIONS

1. Arrange the following in descending atomic size Na, Mg, K.
2. Give the name and electronic configuration of second alkali metal?
3. What is the similarity in the electronic configuration of Mg, Ca and Sr?
4. Which is bigger in size Na, Na^+ .
5. Name three elements which behave as metalloids?
6. Alkali metals form positive ions why?
7. Why non-metals are called electro negative elements?
8. How were the positions of different isotopes decided in the modern periodic table?
9. Hydrogen is regarded as a rogue element in the periodic table. Discuss.
10. Explain Dobereiner's Law of triads along with an example
11. Calcium is an element with $Z = 20$
 - (a) Is it a metal or a non-metal?
 - (b) Will its size be more or smaller than that of potassium?
 - (c) Write the formula of its chloride
12. Answer these questions
 - (a) Name the elements present in the third period and classify them into metals and non-metals.
 - (b) On which side of the table do you find the metals?

(c) On which side of the table do you find the non-metals?

13. Table is a part of periodic table

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

Use this table and 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.

14. Write two major shortcomings of Mendeleev's periodic table? How have these been removed in the modern periodic table?

15. Define atomic radius of an element. How does it vary along the period and group?

SOLVED PAPER

Q. 1. What is periodicity?

Ans. Periodicity is the repetitive occurrence of properties after definite interval.

Q. 2. Who showed for the first time that there is periodicity in properties of elements?

Ans. It was Newland's classification that showed for the first time that there is periodicity in properties of elements.

Q. 3. Are the properties of elements placed in a group same?

Ans. Yes, the chemical properties of the elements placed in a group are same. There is slight variation (increase or decrease) in physical properties of the elements in the group.

Q. 4. Give reason for the need of classification of elements.

Ans. The continuous discovery of new elements and their compounds led to confusions. It became difficult to study, remember, and recall the properties of all the elements. Thus, the need to classify and place them in certain groups was felt.

Q. 5. Hydrogen can be placed in group 1 and group 7 of periodic table. Why?

Ans. Hydrogen forms both positive ions like alkali metals (group 1) and negative ions like halogens (group 7). Thus, it can be placed both in group 1 and group 7. In Mendeleev's Periodic table, the position of hydrogen was not clear.

Q. 6. Name two elements whose properties were correctly predicted by Mendeleev. Mention their present day name.

Ans. Two elements whose properties were correctly predicted by

Mendeleev are: Eka-aluminium – gallium

Eka-silicon - germanium

Q. 7. State Mendeleev's periodic law. Why did he leave gaps in his periodic table?

Ans. Mendeleev formulated a periodic law stating that the “properties of the elements are the periodic function of their atomic masses”.

He predicted that there were elements that were not discovered at that time. Therefore, when he

came across a position where no element fitted (known at that time), he left a gap to be filled later.

Q. 8. An element Z is of second group of the periodic table. Write the formula of

its oxide. Ans. The element is in second group. Thus, its valency is 2.

Oxygen has a valency of -2 in its oxides. Thus, the formula of element Z oxide is ZO .

Q. 9. Noble gases did not find a place in Newland's Octaves. Explain.

Ans. Newland's classification arranges the elements such that the properties of elements repeat after every eight element. After the discovery of noble gases, they became the ninth element (and not the eight), which had the similar property.

Q. 10. 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. Ans. (i) XBr_2 (ii) Y_2O_3 (iii) ZCl_4

Q. 1. How many elements are present in

(i) Second period (ii) Six period

Ans. (i) 8 elements (ii) 32 elements

Q. 2. Name (i) A Non metal solid at room temperature (ii) A Metal liquid at room temperature

Ans. (i) Iodine (ii) Mercury

Q. 3. Arrange the following elements in the decreasing order of metallic character.

**(i) Si, Be, Mg,
Na, P (ii) B, Al,
Mg, K**

Ans. (i) Na > Mg > Si > P > Be (ii) K > Mg > Al > B

Q. 4. How in modern periodic table position of elements in groups and periods is decided?

Ans. The elements are positioned in the periodic table such that the elements with same number of valence electrons are present in same group and element with the same number of occupied shells are placed in same period.

Q. 5. Why metallic character decreases across a period and increases down a group?

Ans. As the effective nuclear charge acting on the valence shell electrons increases across a period, the tendency to lose electrons will decrease. Down the group, the effective nuclear charge experienced by valence electrons decreases because the outermost electrons are moved farther away from the nucleus. Therefore, these can be lost easily. Hence metallic character decreases across a period and increases down a group.

Q. 6. 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.

Ans.(i) Lithium has largest atomic radius.

- (ii) Fluorine is the most reactive non metal.
- (iii) Lithium is the most reactive metal.
- (iv) Boron is a metalloid.

Q. 7. 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?

Ans.(i) Element A and B belong to same group. (ii) Element B, C and D belong to same period

- Q. 8.(i) Name an element with five electrons in the outer shell.**
- (ii) Name an element which tends to lose two electrons.**
- (iii) Name an element that would tend to gain two electrons.**
- (iv) Name the group having a non metal liquid as well as non metal gas at room temperature. (v) Name the group having element with zero valency.**
- (vi) Name the metalloid present in group 14.**

Ans.(i) Nitrogen is an element with five electrons in the outer shell.

- (ii) Magnesium is an element which tends to lose two electrons.
- (iii) Oxygen is an element that would tend to gain two electrons.
- (iv) Halogen Group

(v) Zero group (Group 18 – noble gases)

(vi) Silicon

Q. 9.Differentiate between metals and non metals?

Ans.

Metals	Non Metals
They are generally hard, solid and lustrous.	They are generally gaseous and non lustrous.
They are malleable i.e. can be beaten into sheets.	They are not malleable.
They are ductile i.e. can be drawn into wires.	They are not ductile.
They are not brittle.	They are brittle.
They are good conductors of heat and electricity.	They are bad conductors of heat and electricity.
They have generally high melting and boiling points.	They have generally low melting and boiling points.
Metallic character increase as we go down the group.	Non metallic character increase as we move from left to right along the period.

Q. 10.Define atomic radius of an element. How does it vary along the period and group?

Ans.The distance between the nucleus and the outermost orbit of the atom is called the atomic radius of the atom of an element.

Variation along the period: - The atomic radius decreases as we move left to right along the period. This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.

Variation along the group: - The atomic radius increases down the group. This is because new shells are being added as we go down the group. This increases the distance between the outermost electrons and the nucleus so that the atomic size increases in spite of the increase in nuclear charge.