

Science

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(Chapter – 5) (Periodic Classification of Elements)

(Class – X)

Exercises

Question 1:

Which of the following statements is not a correct statement about the trends when going from left to right across the periods of periodic Table.

- (a) The elements become less metallic in nature.
- (b) The number of valence electrons increases.
- (c) The atoms lose their electrons more easily.
- (d) The oxides become more acidic.

Answer 1:

(c) The atoms lose their electrons more easily.

(On moving from left to right across the periods of the periodic table, the non-metallic character increases. Hence, the tendency to lose electrons decreases.)

Question 2:

Element X forms a chloride with the formula XCl_2 , which is a solid with a high melting point. X would most likely be in the same group of the Periodic Table as

- (a) Na
- (b) Mg
- (c) Al
- (d) Si

Answer 2:

(a) X would most likely be in the same group of the Periodic Table as magnesium (Mg).

Question 3:

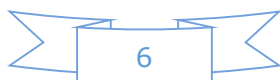
Which element has

- (a) two shells, both of which are completely filled with electrons?
- (b) the electronic configuration 2, 8, 2?
- (c) a total of three shells, with four electrons in its valence shell?
- (d) a total of two shells, with three electrons in its valence shell?
- (e) twice as many electrons in its second shell as in its first shell?

Answer 3:

(a) Neon has two shells, both of which are completely filled with electrons (2 electrons in K shell and 8 electrons in L shell).

(b) Magnesium has the electronic configuration 2, 8, 2.



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- (c) Silicon has a total of three shells, with four electrons in its valence shell (2 electrons in K shell, 8 electrons in L shell and 4 electrons in M shell).
- (d) Boron has a total of two shells, with three electrons in its valence shell (2 electrons in K shell and 3 electrons in L shell).
- (e) Carbon has twice as many electrons in its second shell as in its first shell (2 electrons in K shell and 4 electrons in L shell).

Question 4:

- (a) What property do all elements in the same column of the Periodic Table as boron have in common?
- (b) What property do all elements in the same column of the Periodic Table as fluorine have in common?

Answer 4:

- (a) All the elements in the same column as boron have the same number of valence electrons (3). Hence, they all have valency equal to 3.
- (b) All the elements in the same column as fluorine have the same number of valence electrons (7). Hence, they all have valency equal to 1.

Question 5:

An atom has electronic configuration 2, 8, 7.

- (a) What is the atomic number of this element?
- (b) To which of the following elements would it be chemically similar? (Atomic numbers are given in parentheses.)
N(7) F(9) P(15) Ar(18)

Answer 5:

- (a) The atomic number of this element is 17.
- (b) It would be chemically similar to F(9) with configuration as 2, 7.



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Question 6:

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 non-metal.
- (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?

Answer 6:

- (a) A is a non-metal.
- (b) C is less reactive than A, as reactivity decreases down the group in halogens.
- (c) C will be smaller in size than B as moving across a period, the nuclear charge increases and therefore, electrons come closer to the nucleus.
- (d) A will form an anion as it accepts an electron to complete its octet.

Question 7:

Nitrogen (atomic number 7) and phosphorus (atomic number 15) belong to group 15 of the Periodic Table. Write the electronic configuration of these two elements. Which of these will be more electronegative? Why?

Answer 7:

Element	K	L	M
Nitrogen	2	5	
Phosphorus	2	8	5

Nitrogen is more electronegative than phosphorus. On moving down a group, the number of shell increases. Therefore, the valence electrons move away from the nucleus and the effective nuclear charge decreases. This causes the decrease in the tendency to attract electron and hence electronegativity decreases.



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Question 8:

How does the electronic configuration of an atom relate to its position in the Modern Periodic Table?

Answer 8:

In the modern periodic table, atoms with similar electronic configurations are placed in the same column. In a group, the number of valence electrons remains the same. Elements across a period show an increase in the number of valence electrons.

Question 9:

In the Modern Periodic Table, calcium (atomic number 20) is surrounded by elements with atomic numbers 12, 19, 21, and 38. Which of these have physical and chemical properties resembling calcium?

Answer 9:

The element with atomic number 12 has same chemical properties as that of calcium. This is because both of them have same number of valence electrons (2).

Question 10:

Compare and contrast the arrangement of elements in Mendeleev's periodic Table and the Modern Periodic Table.

Answer 10:

	Mendeleev's periodic table		Modern periodic table
1.	Elements are arranged in the increasing order of their atomic masses.	1.	Elements are arranged in the increasing order of their atomic numbers.
2.	There are a total of 7 groups (columns) and 6 periods (rows).	2.	There are a total of 18 groups (columns) and 7 periods (rows).
3.	Elements having similar properties were placed directly under one another.	3.	Elements having the same valence shell are present in the same period while elements having the same number of valence electrons are present in the same group.
4.	The position of hydrogen could not be explained.	4.	Hydrogen is placed above alkali metals.
5.	No distinguishing positions for metals and non-metals.	5.	Metals are present at the left hand side of the periodic table whereas non-metals are present at the right hand side.

