Periodic Classification of Elements: Exercise Questions

Q.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.

Sol. (c) The atoms lose their electrons more easily

Q.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) AI (d) Si

Sol. (b) Mg

Q.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?

Sol. (a) Two shells, both of which are completely filled with electrons: Neon (Ne)
(b) The electronic configuration 2, 8, 2: Magnesium (Mg)
(c) A total of three shells, with four electrons in its valence shell: Silicon (Si)- electrons-14: 2, 8, 4
(d) A total of two shells, with three electrons in its valence shell: Boron (B) – Electrons - 5: 2, 3
(e) twice as many electrons in its second shell as in its first shell: Carbon(C) - Electrons - 6: 2, 4

Q.4 Answer the following:

(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?

Sol.
(a) All the elements in the same column of the periodic table as boron have in common. They belong to group 13 and they have 3 electrons in their valence electrons. In this group, boron is exceptional. It is metalloid while all other elements in the same column of the Periodic Table are metals.
(b) All elements belong to same column as fluorine, are non-metals and all of them have valence electrons equal to seven. So, these elements accept one electron to complete their octet and become stable.

Q.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)

Sol. (a) **The atomic number of this element** is17.

(b) **The elements would chemically similar** are F (9) Fluorine Because Fluorine has same number of valence electrons equal to seven)

Q.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?

Sol. (a) Element A is Non-metal.
(b) C element is less reactive than A element.
(c) C element is smaller in size than B element.
(d) Element A will form anion.

Q.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?

Sol. Electronic configuration of the compounds:
Nitrogen (atomic number - 7): 2, 5
Phosphorus (atomic number - 15): 2, 8, 5 as we know that electronegativity decreases with moving from top to bottom in a group of modern periodic table. Thus, nitrogen will be more electronegative than phosphorous.

Q.8 How does the electronic configuration of an atom relate to its position in the Modern Periodic Table?

Sol. Electronic configuration of an atom gives the number of valence electrons and number of shell present in the element. We can know about the group number from the number of valence electrons. Number of shell present in an element is equal to period number. Thus, we can find the position of the element in modern periodic table from the electronic configuration.

Q.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?

Sol. The electronic configuration of the given elements are:
Atomic number 12 = 2, 8, 2
Atomic number 19 = 2, 8, 8, 1
Atomic number 20 = 2, 8, 8, 2
Atomic number 21 = 2, 8, 9, 2
Atomic number 38 = 2, 8, 18, 8, 2
Elements with atomic numbers 12 i.e. Magnesium (Mg) and 38 i.e. Strontium (Sr) have the similar chemical and physical properties of calcium (Ca).

Q.10 Compare and contrast the arrangement of elements in Mendeléev's Periodic Table and the Modern Periodic Table.

Sol. Comparison between Mendeleev's Periodic Table and Modern Periodic Table:

Mendeleev's Periodic Table	Modern Periodic Table
1. In Mendeleev's table, Elements was arranged increasing order of atomic masses.	1. In modern periodic table, elements are arranged according to increasing order of atomic number.
2. This table has 8 groups.	2. This table has 18 groups.
3. In this table, each group further divide into sub group.	3. In this table, there is no sub group.
4. Group for Nobel gases are absent in this periodic table as Nobel gases were not discovered by that time.	4. A separate group 18 for Nobel gases is present in this periodic table.