Chapter – 5(Periodic Classification of Elements) (Class 10)

Questions:

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 :
Correct answer is c. The atoms lose their electrons more easily.
The atoms lose their electrons more easily is a wrong statement because as we move from left to right across the periods of the periodic table, the non-metallic character increases. Therefore tendency to lose an electron 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 :
Magnesium IA the answer because My has the valency 2 which is same as the group

a. Na
b. Mg
c. Al

d. Si

Also Mg when combines chloride forms MgCl2.

Question :3 What 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 she'll as in its first shell?

Answer :

a. Neon has two shells which are completely filled.
b. Magnesium has electronic configuration 2, 8, 2.
c. Silicon has a total of three shells, with four electrons in its valence shell.
d. Boron a total of two shells, with three electrons in its valence shell.
e. Carbon has twice as many electrons in its second she'll as in its first 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 :

a. All the elements which lie in the same column as that of boron belong to group 13. Therefore, they have three electrons in their respective valence shells. Except, boron which is a non-metal, all other elements in this group are metals.

b. All elements in the same column of the periodic table as fluorine have in common three electrons in their valence shell and they all are belong to group thirteen.

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? N(7), F(9), P(15), Ar(18).

Answer :

a. The element with electronic configuration (2+8+7) 17 is chlorine.
The no. of atomic number = no. of electrons
Therefore, atomic number is 17.

b. An atom with electronic configuration 2, 8, 7 would be chemically similar to F(9).

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 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:

a. Element A is a non-metal.
b. Element C is less reactive than Element A.
c. C is smaller in size than B.
d. A will form anion.

Question :7 Nitrogen and phosphorous belong to group 15 of the periodic table. Write the electronic configuration of these two elements. Which of these will be more electronegativity? Why?

Answer:

The electronic configuration of the element Nitrogen (N) is (2,5).
The electronic configuration of the element Phosphorus (P) is (2,8,5)
So, Nitrogen will be more electronegative than Phosphorus because its atom has a small size due to which the attraction of its nucleus for the incoming electron is more.

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

Answer :

The number of valence electrons decides an atom's position in the periodic table while the electronic configuration decides the number of valence electrons.

Question :9 In the Modern Periodic Table, calcium is surrounded by elements with atomic numbers 12, 19, 21 and 38. Which of these have physical and chemical properties resembling calcium?

Answer :

Calcium has an atomic number of 20, and thus has an electronic configuration of 2, 8, 8, 2. Thus, calcium has 2 valence electrons. The electronic configuration of the element having atomic number 12 is 2, 8, 2. Thus, this element with 2 valence electrons resemble calcium the most.

Question :10 Compare and contrast the arrangement of elements in Mendeleev's Periodic Table and the Modern Periodic Table.

Answer:

Mendeleev's Periodic Table	Modern periodic table.
Elements are arranged in the increasing order of their atomic masses.	Elements are arranged in the increasing order of their atomic numbers.
There are 8 groups.	There are 18 groups.
Each groups are subdivided into sub groups 'a' and 'b'.	Groups are not subdivided into sub-groups.
Groups for Noble gas was not present as noble gases were not discovered by that time.	A separate group is meant for noble gases.
There was no place for isotopes.	This problem has been rectified as slots are determined according to atomic number.

In-text questions:

Que. 1 Use Mendeleev's Periodic Table to predict the formulae for the oxides of the following elements: K, C, Al, Si, Ba.

Answer:

The element K is in I group of Mendeleev's periodic table in which general formula is R2O. So formula of oxide of K is K2O

2. Element C is in group IV of Mendeleev's periodic table .General formula of oxide is R2O so formula of oxide is CO2

3. Similarly oxide of Al is Al2O3.

4. Formula of Si oxide is SiO2.

5. Oxide of Ba is BaO.

Que.2 Besides gallium, which other elements have since been discovered that were left by Mendeleev's in his Periodic Table?

Answer :

Germanium and Scandium are the element that are left by Mendeleev in his Periodic Table since its discovery.

Que.3 What were the criteria used by Mendeleev in creating his Periodic Table?

Answer :

Mendeleev concentrated on various compounds formed by the elements with Hydrogen and Oxygen. Among physical properties, he observed the relationship between the atomic masses of various elements while creating his periodic table.

Que. 4 Why do you think the noble gases are placed I'm a separate group?

Ans.

Noble gases are placed in a separate group because of their inert nature and low concentration in our atmosphere. They are kept in a separate group called Zero group so that they don't disturb the existing order.

Que.5 How could the Modern Periodic Table remove various anomalies of Mendeleev's Periodic Table?

Answer:

1. In the Modern Periodic Table atomic number of an elements is a more fundamental property than its atomic mass.
2. The anomalous position of hydrogen can be discussed after we see what are the basis on which the position of an elements in the Modern Periodic Table depends.

3. The elements present in any one group have the same number of valence electrons.
4. Atoms of different elements with the same number of occupied shells are placed in the same period.
5. In the Modern Periodic Table, a zig-zag line separated metals from non-metals.

Que.6 Name two elements you would expect to show chemical reactions similar to magnesium. What is the basis for your choice?

Ans.
Calcium and Beryllium are similar to Magnesium because all the three elements belong to the same group and have 2 valence electrons in their outer shell.

Que.7 Name

a. **Three elements that have a single electron in their outermost shells.**
b. **Two elements that have two electrons in their outermost shells.**
c. **Three elements with filled outermost shells.**

Ans.

a. Lithium, Sodium and potassium have a single electron in their outermost shells.
b. Magnesium and Calcium have two electrons in their outermost shells.
c. Neon, Argon, and Xenon filled outermost shells.

Que.8

a. **Lithium, sodium, potassium are all metals that react with water to liberate hydrogen gas. Is there any similarity in the atoms of these elements?**
b. **Helium is an interactive gas and neon is a gas of extremely low reactivity. What, if anything, do their atoms have in common?**

Ans.

They have one valence electron in their outermost shells and as a result of this, they are very unstable. So, they readily react with water to liberate hydrogen. They are also called alkali metals.
Their outermost shells are full leading to high stability. They react only in extreme circumstances and hence are called noble gases.

Que.9 In the Modern Periodic Table, which are the metals among the first ten elements?

Ans.
Lithium and Beryllium are the metals among the first ten elements in Modern Periodic Table.

Que.10. By considering their position in the Periodic Table, which one of the following elements would you expect to have maximum metallic characteristic? Ga, Ge, As, Se, Be.

Ans.
Among the elements listed in the question. Be and GA are expected to be most metallic. Out of Be, and Ga, is bigger in size and hence has greater tendency to lose electrons than Be. Therefore, Ga is more metallic than Be.