

Chemistry Worksheet Class 10 on Chapter 5 Periodic Classification of Elements with Answers - Set 2

Q1. Newlands relation is also known as

- (a) Law of an octave
- (b) Atomic mass law
- (c) Both (a) and (b)
- (d) None of the above

Answer: (a) Newlands relation is also known as the Law of an octave.

Q2. The Law of an octave is valid up to which of the following element?

- (a) Calcium
- (b) Cobalt
- (c) Both (a) and (b)
- (d) None of the above

Answer: (a) The law of an octave is valid up to calcium.

Q3. Which of the following element was discovered after the discovery of Mendeleev's periodic table?

- (a) Helium
- (b) Germanium
- (c) Both (a) and (b)
- (d) None of the above

Answer: (b) Germanium was discovered after the discovery of Mendeleev's periodic table.

Q4. How many elements were uncovered during the discovery of Mendeleev's periodic table?

- (a) Sixty-one
- (b) Sixty-three
- (c) Both (a) and (b)
- (d) None of the above

Answer: (b) Sixty-three elements were uncovered during the discovery of Mendeleev's periodic table.

Q5. Which of the following element is known as eka-aluminium?

- (a) Germanium
- (b) Gallium
- (c) Indium
- (d) None of the above

Answer: (b) Gallium is known as eka-aluminium.

Q6. What is the basis for classifying elements of the modern periodic table?

Answer: In the modern periodic table, elements are arranged in the increasing order of their atomic numbers. It leads to the modern periodic law that the properties of elements are the periodic function of their atomic numbers.

Q7. A metal X belongs to the 1st group of the modern periodic table. What will be the valency of metal X?

Answer: Since metal X belongs to Group 1, its valence shell will have 1 electron. Thus the valency of the metal M belonging to the 1st group is 1.

Q8. Out of Lithium, Carbon and Nitrogen, which element will form the most basic oxide and which form the most acidic oxide?

Answer: Lithium, Carbon and Nitrogen all belong to the same period. They are present in the order: $Li < Be < B < C < N$. Moving along a period from left to right, the metallic character decreases and the non-metallic character increases. So Lithium has the most metallic character, and Nitrogen has the most non-metallic character. Since metal oxides are basic in nature, therefore, lithium oxide will be the most basic, and non-metal oxide is acidic in nature. Therefore Oxide of Nitrogen will be the most acidic.

Q9. Initially, it was believed that the atomic mass of beryllium was 13. But Mendeleev suggested that its atomic mass should be 9.

(i) Was Mendeleev's suggestion correct?

(ii) How had he reached this Conclusion?

Answer: (i) Yes, Mendeleev's suggestion was correct as we found experimentally that beryllium's atomic mass is 9.

(ii) He studied the formula of hydrides and oxides of beryllium and observed that they had similarities with those of magnesium oxides and hydrides. Thus he placed the beryllium above Magnesium and predicted its atomic mass as 9.

Q10. An element X belongs to the second period and group 15 of the periodic table. Find out

(i) The number of valence electrons in its atoms.

(ii) Valency of the elements.

Answer: (i) Since the element belongs to the 15' group, it must have five valence electrons in its atoms.

(ii) Since the element is in the 2nd period and belongs to the 15th group, it must be nitrogen Nitrogen with a valency of 3.

Q11. Identify the similarity in the atoms of pairs of elements given below:

(i) Na (Atomic number = 11) and

K (Atomic number = 19)

(ii) B (Atomic number = 5) and

C (Atomic number = 6)

Answer: (i) Both Na and K belongs to the same group (group I). Both contain the same number of electrons in their valence shells, i.e. one.

(ii) Both B and C belong to the same period (2nd period). Both contain the same number of shells, i.e. two.

Q12. How will the atomic size in a group and a period in the modern periodic table vary?

Answer: The atomic size increases on moving down the group. As we move down, the number of shells increases. Thus, the distance between the outermost electron and the nucleus increases, increasing atomic size.

The atomic size decreases on moving left to the right in the period. The effective nuclear charge increases as we move left to the right in the period. Thus, the distance between the outermost electron and the nucleus decreases, decreasing atomic size.

Q13. An atom of some element has electronic configuration 2, 8, 6.

(i) What is the atomic number of this element?

(ii) Name the element that shows chemical similarity with it.

Answer: (i) The electronic configuration tells about the number of electrons in different shells. Thus total electrons can be found by adding the electrons present in all shells, i.e. $2 + 8 + 6 = 16$. The number of electrons and protons is equal. Therefore, the atomic number is 16.

(ii) The element with atomic number (Z) = 16 is sulphur. The other element which shows chemical similarity with sulphur is oxygen.

Q14. The order of metallic character of elements A, B, C and D is $D > A > C > B$.

(i) What is the order of their electronegative character?

(ii) What is the nature of oxide of B if an oxide of A is amphoteric?

Answer: (i) As the metallic character decreases, the tendency to lose valence electrons decreases. In other words, the tendency to gain electrons increases, so their electronegative character increases in the order of $D < A < C < B$.

(ii) Since element B has the least metallic character, it will have the maximum non-metallic character in it. Non-metal oxides are acidic in nature. Therefore oxide of B will be acidic in nature.

Q15. Write the reason for the following (number in parenthesis is the atomic number of the substance)

(i) Lithium (3) and sodium (11) are considered active metals.

(ii) Fluorine (9) is more reactive than chlorine (17).

Answer: (i) Lithium and sodium contain only single electrons in their valence electrons which they can readily lose to react. Due to their high reactivity with water, they are considered active metals.

(ii) Fluorine lies above chlorine in the 17th group. It indicates that fluorine has a much higher electronegativity than chlorine, due to which it tends to gain electrons more easily.

That's why fluorine is more reactive than chlorine.

Q16. The elements of the second and third periods of the periodic table are given below.

Li	Be	B	C	N	O	F
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Na	Mg	Al	Si	P	S	Cl
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(i) Which atom is bigger, Lithium or Beryllium? Why?

(ii) Which one element out of those given above is the most metallic and why?

Answer: (i) Lithium is bigger than beryllium. It is because the atomic size decreases on moving left to the right along a period as the effective nuclear charge increases on moving from left to right, which tends to pull the electrons towards the nucleus.

(ii) Sodium is the most metallic element out of the given elements. It is because on moving along a period from left to right, the metallic character decreases and on moving down a group, the metallic character increases. Thus sodium is most metallic as it can quickly lose its valence electrons.

Q17. The atomic number of elements A, B, C, D and E are given below.

Element	A	B	C	D	E
Atomic Number	7	10	12	4	19

From the above table, answer the following questions.

(i) Which two elements are chemically similar?

(ii) Which element is an inert gas?

Answer: (i) C and D are the two chemically similar elements. Because the electronic configuration of C is 2, 8, 2 and that of D is 2, 2, both elements contain the same number of valence electrons.

(ii) Element B is an inert gas. We can conclude this by writing its electronic configuration as 2, 8. Both the shells are filled. Thus it is an inert gas.

Q18. What are valence electrons? Does the number of valence electrons increase or decrease on moving from left to right in a period.

Answer: The electrons present in the outermost shell of an atom are known as valence electrons. The number of valence electrons increases on moving from left to right in a period. It is because electrons are added in the same shell when moving from left to right.

Q19. How does the valency of elements vary in the period?

Answer: The valency of elements increases in the period and then decreases. For example, the trend of valency can be illustrated as follows.

Element	Li	Be	B	C	N	O	F
Valency	1	2	3	4	3	2	1

Q20. The atomic number of elements A, B and C are 11, 14 and 17, respectively.

(i) State the group to which these elements belong in the modern periodic table.

(ii) Write the formula of the compound formed when the elements B reacts with C.

Answer: (i) • The electronic configuration of element A is 2, 8, 1. The number of valence electrons is equivalent to 1. So, it belongs to the 1st group of the periodic table.

• The electronic configuration of element B is 2, 8, 4. It contains four valence electrons, so it belongs to the 14th group of the periodic table.

• The electronic configuration of element C is 2, 8, 7. It contains seven valence electrons, so it belongs to the 17th group of the periodic table.

(ii) The element B is Si and has a valency of 4. The element C is Chlorine, and it has a valency of 1. So the formula of the compound when B reacts with C is SiCl_4 .

