Chapter 5: Periodic Classification of Elements

1. How many periods and groups are present in the periodic table?

a) 7 periods and 18 groups

b) 8 periods and 7 groups

c) 7 periods and 7 groups

d) 8 periods and 8 groups

Answer: (a) 7 periods and 18 groups

Explanation: Modern periodic table consists of 7 horizontal rows known as periods and 18 vertical columns named as groups.

2. Which of the following forms the basis of the modern periodic table?

a) Atomic mass

b) Atomic number

c) Number of nucleons

d) All of these

Answer: (b) Atomic number

Explanation: Modern periodic table is based on the atomic numbers of elements as according to the modern periodic law the properties of elements are a periodic function of their atomic numbers.

3. What happens to the electropositive character of elements on moving from left to right in a periodic table?

a) Increase

b) Decreases

c) First increases than decreases

d) First decreases than increases

Answer: (b) Decreases

Explanation: Electropositive character of an element is its ability to lose electrons and form positive ions. Now, as on moving from left to right in a period of periodic table, the nuclear charge increases due to the gradual increase in number of protons, so the valence electrons are pulled more strongly by the nucleus. Thus, it becomes more and more difficult for the atoms to lose electrons causing a decrease in the electropositive character of elements on moving from left to right in a periodic table.

4. The electronic configuration of an element M is 2, 8, 4. In modern periodic table, the element M is placed in

a) 4th group

b) 2nd group

c) 14th group

d) 18th group

Answer: (c) 14th group

Explanation: In the periodic table, elements having 4 valence electrons are placed in group 14.

5. Which of the following is the correct order of the atomic radii of the elements oxygen, fluorine and nitrogen?

a) O < F < N

b) N < F < O

c) O < N < F

d) F < O < N

Answer: (d) F < O < N

Explanation: Oxygen (8), fluorine (9) and nitrogen (7) belong to the same period of the periodic table, in the order nitrogen, oxygen and fluorine. Now in a period, on moving from left to right the atomic radius of the elements decreases. Therefore, the atomic radius of nitrogen is the largest.

6. What is the other name for group 18th elements?

a) Noble gases

b) Alkali metals

c) Alkali earth metals

d) Halogens

Answer: (a) Noble gases

Explanation: Group 18th elements are named as noble gases as they are very stable due to having the maximum number of valence electrons their outermost shell can hold, hence they rarely react with other elements.

7. Which of the following is the most reactive element of the group 17?

a) Oxygen

b) Sodium

c) Fluorine

d) Magnesium

Answer: (c) Fluorine

Explanation: As we move down in a group, the size of the atoms of elements goes on increasing. So, fluorine being on the top position in the halogen's group, is the smallest element and has the maximum tendency to gain an electron to complete its octet. Thus fluorine is the most reactive element of the group 17.

8. 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: (b) Mg

Explanation: Group 2 alkaline earth metal atoms have two valence electrons each. They can donate their two valence electrons to two other chlorine atoms to form the solid compounds of the form XCl_2.

This XCl_2 compound being ionic in nature, has a very strong electrostatic forces of attraction between 2 chloride atoms and 1 metal atom. Thus a large amount of heat is required to break these strong bonds, causing the compound to have very high melting and boiling points.

9. Which group elements are called transition metals?

a) Group number 1 to 2

b) Group number 13 to 18

c) Group number 3 to 12

d) Group number 1 to 8

Answer: (c) Group number 3 to 12

Explanation: The elements occurring in the group 3 to 12 are named as transition metals because they are metallic elements that form a transition between the main group elements, which occur in groups 1 and 2 on the left side, and groups 13–18 on the right side of the periodic table.

10. Which of the following elements has 2 shells and both are completely filled?

a) Helium

b) Neon

c) Calcium

d) Boron

Answer: (b) Neon

Explanation: Neon with the atomic number 10, has the electronic configuration as:

Hence, both its K and L shells are completely filled.

11. Which of the following is the atomic number of an element that forms basic oxide?

a) 18

b) 17

c) 19

d) 15

Answer: (c) 19

Explanation: The elements which can donate their valence electrons to other atoms are the metallic elements which form basic oxides as they give hydroxides in their aqueous solutions.

12. The elements A, B and C belong to group 2, 14 and 16 respectively, of the periodic table. Which of the two elements will form covalent bonds?

a) A and B

b) B and C

c) C and A

d) None of these

Answer: (b) B and C

Explanation: The covalent bond is formed by the sharing of electrons between two atoms. As the element B (which belongs to group 14) has 4 valence electrons which it can share with two elements of C type (from group 16) electrons to complete the octet of each included atom:

13. Which of the following does not decrease while moving down the group of the periodic table?

a) Atomic radius

b) Metallic character

c) Number of shells in the atom

d) Valence electrons

Answer: (d) Valence electrons

Explanation: Number of valence electrons in a group remain the same.

14. An element X belongs to the 3rd period and 1st group of the periodic table. What is the number of valence electrons in its atom?

a) 1

b) 3

c) 6

d) 8

Answer: (a) 1

Explanation: As the element belongs to the 1st group of the periodic table, so the number of valence electrons in its atom is one.

15. An element M is in group 13th of the periodic table, the formula for its oxide is

a) MO

b) M_2O_3

c) M_3O_2

d) None of these

Answer: (b) M_2O_3

Explanation: As the element M belongs to group 13th of the periodic table so it has 3 valence electrons, i.e., it can have +3 oxidation state while oxygen atom (with 2 valency) has −2 oxidation state. So the formula for the corresponding oxide is M_2O_3.