



# Periodic Classification of Elements

## In the Chapter

- Elements are mainly classified on the basis of similarities in their properties.
- Döbereiner classified the elements into triads and Newlands gave the Law of Octaves.
- Mendeléev even predicted the existence of some yet to be discovered elements on the basis of gaps in his Periodic Table.
- Mendeléev put the elements in increasing order of their atomic masses and according to their chemical properties.
- Anomalies in arrangement of elements based on increasing atomic mass could be removed when the elements were arranged in order of increasing atomic number, a fundamental property of the element discovered by Moseley.
- Elements in the Modern Periodic Table are arranged in 18 vertical columns known as groups and 7 horizontal rows known as periods.
- Elements thus arranged show periodicity of properties including atomic size, valency or combining capacity and metallic and non-metallic features.
- Periodic classification is the systematic study of the properties of the elements.
- Periodic Table. It is a table or chart in which the various elements are arranged in such a manner that elements having similar properties fall in the same vertical column whereas dissimilar elements are separated.
- Modern Periodic law. Physical and chemical properties of elements are the periodic functions of their atomic numbers.
- Modern Periodic Table or Long Form of Periodic Table is a table obtained by arranging the elements in order of increasing atomic number of the elements such that the elements having similar properties occur in the same vertical column (called group).
- Periodicity is the repetition of the similar properties of the elements placed in a group and separated by definite gaps of atomic numbers (8, 8, 18, 18, 32).
- Groups are the vertical columns in the periodic table. There are eighteen groups in the Modern Periodic Table. These are group 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18.
- Periods are the horizontal rows in the periodic table. There are seven periods in the Modern Periodic Table.

# Table : Modern Periodic Table

The zigzag line separates the metals from the non-metals.

Metals

## Metalloids

## Non-metals

[illegible]

\* Lanthanoides

## \*\* Actinoides

## Intext Exercises

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- 1. Did Döbereiner's triads also exist in the columns of Newlands' Octaves? Compare and find out.**

**Ans.** Yes, Dobereiner's triads also exist in the columns of Newlands' Octaves. For instance, the elements of Group (N, P, A, S) is a triad of Dobereiner which also exist in the columns of Newlands' Octaves.

- 2. What were the limitations of Döbereiner's classification?**

**Ans.** (i) Dobereiner could identify only three triads from the elements known at that time.  
(ii) Dobereiner could not classify all the elements known at that time.

- 3. What were the limitations of Newlands' Law of Octaves?**

**Ans.** (i) Newland's Law of Octaves was applicable only upto calcium. After calcium the eighth element did not possess properties similar to that of the first.  
(ii) It was assumed by Newlands that only 56 elements existed in nature and no more elements would be discovered in the future.  
(iii) Newlands' Octaves contain only few elements with similar properties.

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

**Ans.**  $K \rightarrow K_2O$                        $C \rightarrow CO_2$   
 $Al \rightarrow Al_2O_3$                        $Si \rightarrow SiO_2$   
 $Ba \rightarrow BaO$

- 2. Besides gallium, which other elements have since been discovered that were left by Mendelée in his Periodic Table? (any two)**

**Ans.** (i) Scandium, (ii) Germanium.

- 3. What were the criteria used by Mendelée in creating his Periodic Table?**

**Ans.** (i) He placed the elements in the periodic table on the bases of their increasing atomic masses.  
(ii) Second criteria was the similarity in the chemical properties.

- 4. Why do you think the noble gases are placed in a separate group?**

**Ans.** Noble gases are put in separate group because :  
(i) These gases are discovered very late because they are very inert.  
(ii) These gases could be put in a new group without disturbing the existing order.

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- 1. How could the Modern Periodic Table remove various anomalies of Mendelée's Periodic Table?**

**Ans.** (i) In Modern Periodic Table, the place of hydrogen is justified because it is electropositive and so it is placed in first group with metals.  
(ii) In Modern Periodic Table, the elements are arranged on the basis of atomic number. So, the place of isotopes is also justified as the atomic number remain same of all the isotopes.  
(iii) The order of heavy and light elements is also corrected in the Modern Periodic Table.  
(iv) The position of inert gases is also justified.

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

**Ans.** Calcium (Ca) and Barium (Ba)  
These two have the same valence electrons as magnesium has.

- 3. 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 (Li), Sodium (Na), Potassium (K).

(b) Magnesium (Mg), Calcium (Ca), Barium (Ba)

(c) Helium (He), Neon (Ne), Argon (Ar).

**4. (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 unreactive gas and neon is a gas of extremely low reactivity. What, if anything, do their atoms have in common?**

**Ans.** (a) All these three elements have same number of electrons in their outermost shell and have same valency.

(b) Helium and neon both have their outermost shell filled.

**5. In the Modern Periodic Table, which are the metals among the first ten elements?**

**Ans.** Lithium, beryllium, boron.

**6. 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.** Be has the Maximum metallic characteristics because all other elements are situated at the right hand side in periodic table than Be. Due to the position their metallic characteristics decrease as we move from left to right.

### Exercise

**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.**

**Ans.** (c) The atoms lose their electrons more easily.

**2. Element X forms a chloride with the formula  $\text{XCl}_2$ , 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**

**Ans.** (b) Mg

**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?**

**Ans.** (a) Neon (Ne) (b) Magnesium (Mg)

(c) Silicon (Si) (d) Boron (B)

(e) Carbon (C)

**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?**

**Ans.** (a) Both the elements are metals and show the following common properties :

(i) Both show malleability.

(ii) Both are good conductor of electricity.

(b) Both the elements are non-metal and show following common properties :

(i) Both are bad conductor of electricity.

(ii) Both are brittle.

**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)

**Ans.** (a) The atomic number of element is 17.

(b) It belongs chemically to F (9).

**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?

**Ans.** (a) C is non-metal.

(b) C is less reactive than A.

(c) The size of C is smaller than B.

(d) A forms anion because C is non-metal and non-metals form anion (Negative Ion).

**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?**

**Ans.** Atomic number of nitrogen is 7.

Electronic configuration : 2, 5.

Atomic number of phosphorus is 15.

Electronic configuration : 2, 8, 5

Phosphorus will be more electronegative because nitrogen and phosphorus both are non-metals. Phosphorus is situated in the lower side than nitrogen. In non-metals, as we go top to bottom the electronegativity is increased.

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

**Ans.** The electronic configuration is related to the position of elements in periodic table. The number of electrons in outermost shell show the number of group and the number of shells show the number of periods.

**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?**

**Ans.** Calcium atomic number is 20.

Electronic configuration is 2, 8, 8, 2

Calcium surrounded by elements.

(i) Atomic number – 12

Configuration – 2, 8, 2

(ii) Atomic number – 19

Configuration – 2, 8, 8, 1

(iii) Atomic number – 21

Configuration – 2, 8, 8, 3

(iv) Atomic number – 38

Configuration – 2, 8, 18, 8, 2

So, the elements having atomic number 12 and 38 resemble to the properties of calcium.

**10. Compare and contrast the arrangement of elements in Mendeléeev's Periodic Table and the Modern Periodic Table.**

**Ans.** (i) Mendeléeev's Periodic Table is based on atomic mass while Modern Periodic Table is based on

atomic number.

(ii) In Modern Periodic Table all the anomalies of Mendeleev's Periodic Table are removed.

(iii) There are 8 groups in Mendeleev's Periodic Table while there are 18 groups of Modern Periodic Table.

(iv) In Mendeleev's table there is no place of inert gases while in Modern Periodic Table they are classified.

### Additional Questions

**1. Amongst magnesium and sulphur which has larger atomic size and why?**

**Ans.** Magnesium has larger atomic size than sulphur. In sulphur the nuclear charge is greater than magnesium and also they belong to the same period. Thus the greater nuclear charge of sulphur is able to pull inwards the valence electrons more effectively decreasing the size of sulphur atom than magnesium.

**2. How do you think the tendency to lose electrons will change in a group?**

**Ans.** Down the group the effective nuclear charge experienced by valence electrons is decreasing because the outermost electrons are farther away from the nucleus. Therefore, these can be lost easily. Hence metallic character (tendency to lose electrons) increases down a group.

**3. What is the trend of atomic size (radius) in moving down a group?**

**Ans.** On going down in a group of the Periodic Table, the atomic size increases because a new shell of electrons is added to the atoms at every step. There is increase in distance between the outermost shell electrons and the nucleus of the atoms.

**4. What is the trend of atomic size (radius) in moving from left to right in a period?**

**Ans.** On moving from left to right along a period, the size of atoms decreases because on moving from left to right, the atomic number of elements increases which means that the number of protons and electrons in the atoms increases. Due to large positive charge on the nucleus, the electrons are pulled in more close to the nucleus and the size of the atom decreases.

**5. This question refers to the elements of periodic table with atomic number 3 to 18.**

(i) Which of them are noble gases?

(ii) Which of them are halogens?

(iii) Which of them are alkali metals?

(iv) Which are the elements with valency 4?

**Ans.** (i) Elements with atomic numbers 10 and 18 are noble gases.

(ii) Elements with atomic numbers 9 and 17 are halogens.

(iii) Elements with atomic numbers 3 and 11 are alkali metals.

(iv) Elements with atomic numbers 6 and 14 have valency 4.

**6. Explain why atomic number is more important than atomic mass in determining chemical properties.**

**Ans.** Chemical reactions depend upon the type of bonding in the reactants which, in turn, depends upon the number of electrons in the outermost shell. The number of electrons in the outermost shell is given by atomic number. Therefore, atomic number is more important than atomic mass in determining chemical properties.

**7. Amongst lithium and potassium which is larger in size and why?**

**Ans.** Potassium is larger in size than lithium. But lithium and potassium belong to group 1. On moving down the group, the nuclear charge and number of shells increases but the number of valence electrons remain same. The valence electrons become far away from the nucleus, thus, increasing the atomic size of potassium.

**8. How does the valency vary:**

- (a) On moving down the group ?
- (b) On moving across the period ?

**Ans.** (a) On moving down the group, the valency of elements remains same in a particular group.

- (b) On moving across the period from left to right, the valency first increases from 1 to 4 and then decreases from 4 to zero.

**9. Give reasons for the following :**

- (a) Elements in any group have similar properties.
- (b) Group 17 elements form anions with valency - 1

**Ans.** (a) Elements in any group have similar properties because they have the same number of valence electrons.

- (b) Group 17 elements have 7 valence electrons. So, they will accept 1 electron to form a negatively charged ion. The negative charged ion is called an anion.

One electron should be gained by one atom of the element to achieve the nearest noble gas configuration. Hence Group 17 elements form anions with valency — 1.

**10. State for reason for the following :**

- (a) Tendency to lose electrons decreases along a period.
- (b) Group 1 elements form cations with valency 1.

**Ans.** (a) As we move left to right in a period of the periodic table, the nuclear charge increase because of gradual increase in the number of protons. Due to the increase in nuclear charge, the valency electrons are pulled the more strongly by the nucleus and it becomes more and more difficult for the atoms to lose electrons.

- (b) Group 1 elements have 1 valence electron. Group 1 elements can lose its 1 valency electron to achieve the nearest noble gas electronic configuration. So group 1 elements form cations with valency one by losing its one valency electrons.

**11. Give reasons for the following :**

- (a) Sodium is more reactive than Lithium even though both belong to the same group of the periodic table.
- (b) Inert gases have zero valency.

**Ans.** (a) Down every group, the size of the atom increases. Therefore, the release of the atom increases. Therefore the release of the electrons from the valence shell of the atom becomes easier. Since the reactivity of element becomes easier and since the reactivity of element is directly related to the release of the electrons from the valency shell of its atom, the reactivity of the metals increases down a group. Hence sodium is more reactive than lithium.

- (b) Inert gases have zero valency because these elements have completely filled outermost shells.

**12. How does the electronic configuration of an atom of an element relate to its position in the modern periodic table? Explain with one example.**

**Ans.** The elements in the modern periodic table are related according to the electronic configuration of its atoms. Electrons in the outermost shell show the group number and total number of shells of an atom shows the period of the element to which it belongs. For example, electron configuration of Na is 2, 8, 1. It means 1 electron is present in outermost shell, so it belongs to first group and total number of shells are 3, it belongs to 3rd period.

**13. On the basis of electronic configuration, how will you identify the first and the last element of a period ?**

**Ans.** (i) If the number of electrons in the last shell of the element is 1, then this element is the first element of that period.

- (ii) If the number of electrons in the last shell of element is 8, then this element is the last

element of that period.

- 14. How does the valency of elements vary (i) in going down a group and (ii) in going from left to right in a period of the periodic table ?**

**Ans.** (i) All the elements in a group have the same valency.  
(ii) On moving from left to right in a period of the periodic table increases from 1 to 4 and then decreases to zero.

- 15. How does the metallic character of elements change along period of the periodic table from the left to the right and why ?**

**Ans.** On moving from left to right in a period, the metallic character of elements decreases. As we move from left to right in a period of the periodic table, the nuclear charge increases due to gradual increase in the number of protons. Due to the increase in nuclear charge, the valency electrons are pulled in more strongly by the nucleus and it becomes more and more difficult for the atoms to loss electrons. Thus, on moving from left to right electrons decreases i.e. the metallic character of elements decreases.

- 16. How does the size of atoms of elements vary down a group in the periodic table ? Why is it so ?**

**Ans.** On going in a group of the periodic table, the size of atoms increases. When we move from top to bottom in a group, a new shell of electrons is added to the atoms at every step. In this way, the number of electrons shells in the atoms inceases gradually due to which the size of atoms also increases.

- 17. The atomic number of three elements A, B and C are given below :**

| Element | Atomic Number |
|---------|---------------|
| A       | 5             |
| B       | 7             |
| C       | 10            |

- (a) Which of these elements belongs to group 18?  
(b) Which of these elements belongs to group 15?  
(c) Which of these elements belongs to group 13?  
(d) To which period of the periodic table do these elements belong?

**Ans.** (a) Element C, (b) Element B, (c) Element A, (d) Period 2

- 18. An element 'X' belongs to 3rd period and group 2nd of the periodic table. State:**

- (a) the number of valence elections in the atom of this element.  
(b) valency of the element.  
(c) whether it is a metal or a non-metal.  
(d) the formula of chloride of element 'X'

**Ans.** (a) 2, (b) 2, (c) Metal, (d)  $\text{XC1}_2$ .

- 19. The electronic configuration of an element 'X' is**

|   |   |   |
|---|---|---|
| K | L | M |
| 2 | 8 | 6 |

- (a) To which group of the periodic table does it belong?  
(b) To which period of the periodic table does it belong?  
(c) How many valency electrons are present in the element 'X' ?  
(d) What is the valency of element 'X' ?

**Ans.** (a) Group 16, (b) Period 2, (c) 6, (d)  $8-6 = 2$

- 20. (a) What is meant by periodicity in properties of elements with reference to the periodic table?**

(b) Why do all the elements of the same group have similar properties?

(c) How will the tendency to gain electrons change as we go from left to right across a period? Why ?

- Ans.** (a) The arrangement of element according to their physical and chemical properties in a systematic way is called the periodicity.  
(b) All the elements of the group have similar properties because they have similar electronic configurations.  
(c) The tendency to gain electrons increases from 1 to 8 as we go from left to right across a period. This is because the electronic configurations of element in a period change in such a way that the number of electrons in the outermost shell of their atoms increases from 1 to 8.

**21. How many triads were identified by Dobereiner?**

**Ans.** Three.

**22. Give one characteristic of Dobereiner's triads.**

**Ans.** The atomic mass of the middle element is the average of atomic masses of the other two elements.

**23. What is Newland's law of octaves ?**

**Ans.** It states that when the elements are arranged in the increasing order of their atomic weights, every eighth element has properties similar to the first element.

**24. Define modern periodic law.**

**Ans.** It states that the properties of the elements are the periodic functions of their atomic numbers.

**25. What is the nature of oxide of group 1 elements.**

**Ans.** They are basic in nature.

**26. Define periodic law. Why was it necessary to change the basis of classification from atomic masses to atomic numbers ?**

**Ans.** Periodic Law : The properties of elements are a periodic function of their atomic numbers. It was necessary to change the basis of classification from atomic masses to atomic numbers because atomic number and not atomic mass is the fundamental property of an element.

**27. What was wrong with Dobereiner's classification of elements ?**

**Ans.** Dobereiner classified the elements in group of three in such a way that the atomic mass of the middle element was the mean of the first and the third elements. But he could not find many triads of elements. Therefore, the classification was rejected.

**28. How does atomic radius vary down a group and along a period ?**

**Ans. Variation in a group :** The atomic radius generally increases from top to bottom in a group due to the addition of a new shell.

**Variation along a period :** The atomic radius decreases on moving from left to right due to the increase in nuclear charge.

**29. What are noble gas elements ? Why are they so called ?**

**Ans.** Noble gas elements are the elements present in group 18 of the periodic table which is also called zero group. It means that the valency of the elements is zero. Actually, whereas the first member helium has two electrons in its only shell, the atoms of the remaining elements (Neon, Argon, Krypton, Xenon and Radon) have eight electrons in their outermost shells. They do not have any tendency to combine with atoms of other elements. Hence, they show zero valency. These are also called noble gases because they do not take part in chemical combination.

**30. Why do the elements present in a group show similar chemical properties?**

**Ans.** The properties of the elements, particularly the chemical properties are related to valence shell electronic distribution. The elements with the same valence shell electronic distribution have the similar chemical properties. For example, the members of alkaline earth metal family (Group 2) have two electrons in the valence shell of their atoms. They therefore, show similar chemical properties.



**31. In Mendeleev's Periodic Table the elements were arranged in the increasing order of their atomic masses. However, cobalt with atomic mass of 58.93 amu was placed before nickel having an atomic mass of 58.71 amu. Give reason for the same.**

**Ans.** Element with similar properties can be grouped together.

**32. The three element A, B and C with similar properties have atomic masses X, Y and Z respectively. The mass of Y is approximately equal to the average mass of X and Z. What is such an arrangement of elements called as ? Give one example of such a set of elements.**

**Ans.** The arrangement of these elements is known as Dobereiner triad. Example : Lithium, Sodium and Potassium.

**33. "Hydrogen occupies a unique position in Modern Periodic Table". Justify the statement.**

**Ans.** Hydrogen resembles alkali metals as well as halogens.

**34. If an element X is placed in group 14, what will be the formula and the nature of bonding of its chloride ?**

**Ans.**  $\text{XC}_{14}$

Covalent bonding

**35. Arrange the following elements in increasing order of their atomic radii**

(a) Li, Be, F, N

(b) Cl, At, Br, I

**Ans.** (a)  $\text{F} < \text{N} < \text{Be} < \text{Li}$

(b)  $\text{Cl} < \text{Br} < \text{I} < \text{At}$

**36. Identify and name the metals out of the following elements whose electronic configurations are given below.**

(a) 2, 8, 2

(b) 2, 8, 1

(c) 2, 8, 7

(d) 2, 1

**Ans.** Metals are (a), (b) and (d)

(a) is magnesium, (b) is sodium and (d) is Lithium.

**37. Identify the elements with the following property and arrange them in increasing order of their reactivity.**

(a) An element which is soft and reactive metal.

(b) The metal which is an important constituent of limestone.

(c) The metal which exists in liquid state at room temperature.

**Ans.** (a) Na or K

(b) Ca

(c)  $\text{Hg} < \text{Ca} < \text{Na} < \text{K}$

### Multiple Choice Questions

**1. Upto which element the Law of Octaves was found to be applicable?**

(a) Oxygen

(b) Calcium

(c) Cobalt

(d) Potassium

**Ans.** (b) Calcium

**2. According to Mendeleev's Periodic Law, the elements were arranged in the periodic table in the order of**

(a) increasing atomic number

(b) decreasing atomic number

(c) increasing atomic masses

(d) decreasing atomic masses



**Ans.** (c) increasing atomic masses

**3. In Mendeleev's Periodic Table gaps were left for the elements to be discovered later. Which of the following elements found a place in the periodic table later?**

- (a) Germanium                      (b) Chlorine  
(c) Oxygen                         (d) Silicon

**Ans.** (a) Germanium

**4. Which of the following statements about the Modern Periodic Table is correct?**

- (a) It has 18 horizontal rows known as Periods.  
(b) It has 7 vertical columns known as Periods.  
(c) It has 18 vertical columns known as Groups.  
(d) It has 7 horizontal rows known as Groups.

**Ans.** (c) It has 18 vertical columns known as Groups.

**5. Which of the given elements A,B,C,D and E with atomic number 2, 3, 7, 10 and 30, respectively belong to the same period?**

- (a) A, B, C                         (b) B, C, D  
(c) A, D, E                        (d) B, D, E

**Ans.** (b) B, C, D

**6. Which among the following elements has the largest atomic radii ?**

- (a) Na                                (b) Mg  
(c) K                                 (d) Ca

**Ans.** (c) K

**7. Which of the following elements would loss an election easily?**

- (a) Mg                                (b) Na  
(c) K                                 (d) Ca

**Ans.** (c) K

**8. Which of the following elements does not loss an election easily ?**

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

**Ans.** (b) F

**9. Three elements B, Si and Ge are**

- (a) metals                         (b) non-metals  
(c) metalloids  
(d) metal, non-metal and metalloid respectively

**Ans.** (c) metalloids

**10. Which of the following elements will form an acidic oxide ?**

- (a) An element with atomic number 7  
(b) An element with atomic number 3  
(c) An element with atomic number 12  
(d) An element with atomic number 19

**Ans.** (a) An element with atomic number 7

**11. The element with atomic number 14 is hard and form acidic oxide and a covalent halide. To which of the following categories does the element belong?**

- (a) Metal                            (b) Metalliod  
(c) Non-metal  
(d) Left-hand side element

**Ans.** (b) Metalloid

**12. Which one of the following does not increase while moving down the group of the periodic table?**

- (a) Atomic radius
- (b) Metallic character
- (c) Valence
- (d) Number of shells in an element

**Ans.** (c) Valence

**13. On moving from left to right in a period in the periodic table, the size of the atom**

- (a) increases
- (b) decreases
- (c) does not change appreciably
- (d) first decreases and then increases

**Ans.** (b) decreases

**14. Which of the following is the outermost shell of elements of periods 3 ?**

- (a) K-shell
- (b) L-shell
- (c) M-shell
- (d) N-shell.

**Ans.** (c) M-shell

**15. Which of the given elements A, B, C, D and E with atomic numbers 3, 4, 10, 12 and 25, respectively belong to the same period ?**

- (a) B, C and D
- (b) A, B and C
- (c) A, C and D
- (d) A, B and D.

**Ans.** (b) A, B and C

**16. Where would you locate the element with electronic configuration 2, 7 in the Modern Periodic Table ?**

- (a) Group 8
- (b) Group 2
- (c) Group 17
- (d) Group 10.

**Ans.** (c) Group 17

**17. Which of the following elements has least number of valence electrons ?**

- (a) Na
- (b) Al
- (c) Si
- (d) P.

**Ans.** (a) Na

**18. Which of the following elements would lose an electron easily ?**

- (a) Li
- (b) Na
- (c) Ca
- (d) K

**Ans.** (d) K.

**19. Which of the following elements does not lose electron easily ?**

- (a) Na
- (b) F
- (c) Ne
- (d) Mg

**Ans.** (c) Ne

**20. Which among the following elements has the largest atomic radii ?**

- (a) Li
- (b) Na
- (c) K
- (d) Ca

**Ans.** (c) K

**21. The elements N, P, O are :**

- (a) Metals
- (b) Non-metals
- (c) Metalloids
- (d) Metal, non-metal and metalloid, respectively

**Ans.** (b) Non-metals

**22. On moving from top to bottom in a group in the periodic table, the size of the atom:**

- (a) increases
- (b) decreases
- (c) does not change appreciably
- (d) first increases and then decreases

**Ans.** (a) increases

**23. As we move from left to right along a period of Modern Periodic Table, atomic radius :**

- (a) first increases and then decreases
- (b) first decreases and then increases
- (c) decreases
- (d) increases

**Ans.** (c) decreases

**24. An element having atomic number 13 is placed in group :**

- (a) 13
- (b) 3
- (c) 2
- (d) 5

**Ans.** (a) 13

**25. Modern periodic table has groups :**

- (a) 7
- (b) 18
- (c) 10
- (d) 14

**Ans.** (b) 18

**26. Which is correct regarding the element having electronic configuration. 2, 8, 8, 1?**

- (a) It belongs to group 1
- (b) It has a valency of 2
- (c) It is in the third period
- (d) None

**Ans.** (a) It belongs to group 1

**27. Which is a metalloid ?**

- (a) Ba
- (b) Be
- (c) As
- (d) Br

**Ans.** (c) As

**28. Today the number of known elements is :**

- (a) 63
- (b) 104
- (c) 101
- (d) More than 110

**Ans.** (d) More than 110.

**29. The number of elements classified by Mendeleev were :**

- (a) 53
- (b) 63
- (c) 73
- (d) 93

**Ans.** (b) 63

**30. Which is not a halogen?**

- (a) Cl
- (b) Br
- (c) Ar
- (d) I

**Ans.** (c) Ar

**31. The inert gas among the following is :**

- (a) Ar
- (b) K
- (c) Ca
- (d) Cl

**Ans.** (a) Ar

**32. The alkaline earth metal is :**

- (a) K
- (b) Cl
- (c) Ar
- (d) Ca

**Ans.** (d) Ca.

**33. The alkali metal is :**

- (a) Ca
- (b) K
- (c) Cl
- (d) Ar

**Ans.** (b) K

**34. Elements of the same vertical group of the periodic table have :**

- (a) Same atomic size
- (b) Same electronic arrangement
- (c) Same number of electrons in outermost shell of their atoms
- (d) Same number of atoms.

**Ans.** (c) Same number of electrons in outermost shell of their atoms

**35. Which of the following statements is correct ?**

- (a) Atomic size decreases down a group
- (b) Radius of the cation is more than that of atom
- (c) Atomic size decreases along a period
- (d) Radius of anion is less than that of the atom.

**Ans.** (c) Atomic size decreases along a period

**36. The element having small size is :**

- (a) Nitrogen
- (b) Oxygen
- (c) Chlorine
- (d) Fluorine.

**Ans.** (d) Fluorine.

**37. The element with atomic number 11 resembles with the element having atomic number :**

- (a) 10
- (b) 19
- (c) 24
- (d) 35.

**Ans.** (b) 19

**38. Number of elements present in the third period of the periodic table is :**

- (a) 3
- (b) 8
- (c) 18
- (d) 32.

**Ans.** (b) 8