

Chapter 05: PERIODIC CLASSIFICATION OF ELEMENTS

C05

1. How was the earliest classification done?

The earliest attempt to classify the elements were as metals and non-metals.

2. State Dobereiner's law of triads.

When the three elements in a triad is written in the order of increasing atomic masses, the atomic mass of the middle element was roughly the average of the atomic masses of the other two elements.

3. Explain Dobereiner's triads with an example.

Take the triads consisting of lithium (Li), sodium (Na) and potassium (K) with atomic masses 6.9, 23.0 and 39.0. Average atomic mass of Li and K is $6.9+39.0=45.9/2=22.95$. The atomic mass of Na is 23.0

4. Identify the group which forms Dobereiner triads.

Group A elements	Atomic mass	Group B elements	Atomic mass	Group C elements	Atomic mass
N	14.0	Ca	40.1	Cl	35.5
P	31.0	Sr	87.6	Br	79.9
As	74.9	Ba	137.3	I	126.9

Group B and Group C forms triads.

5. What is the drawback of Dobereiner's triads?

Dobereiner could identify only three triads from the elements known at that time.

6. Name the triads which Dobereiner was able to identify.

(Li, Na, K), (Ca, Sr, Ba), (Cl, Br, I)

7. What were the limitations of Döbereiner's classification?

- All the then known elements could not be arranged in the form of triads.
- The law failed for very low mass or for very high mass elements. In case of F, Cl, Br, the atomic mass of Cl is not an arithmetic mean of atomic masses of F and Br.
- As the techniques improved for measuring atomic masses accurately, the law was unable to remain strictly valid.

8. State Newland law of octaves.

Every eighth element had properties similar to that of the first.

9. Mention the limitations of Newland law of octaves.

- Newland law of octaves was applicable only upto calcium as after calcium every eighth element did not possess properties similar to that of the first.
- Newland assumed that only 56 elements existed in nature. Several new elements were discovered, whose properties did not fit into the Law of Octaves.

c) In order to fit elements into his Table, Newlands adjusted two elements in the same slot, but also put some unlike elements under the same note.

10. Write example of elements which were adjusted by Newland to fit elements in his table.

- a) Cobalt and nickel are in the same slot and these are placed in the same column as fluorine, chlorine and bromine which have very different properties than these elements.
- b) Iron, which resembles cobalt and nickel in properties, has been placed far away from these elements.

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

Yes. Lithium, sodium and potassium; Beryllium; magnesium and calcium are two triads that also exist in the columns of Newland's octaves.

12. Why did Mendeleev select hydrogen and oxygen as standard?

Mendeleev selected hydrogen and oxygen as they are very reactive and formed compounds with most elements.

13. What was the basic property for Mendeleev's classification?

The formulae of the hydrides and oxides formed by an element were treated as one of the basic properties of an element for its classification.

14. State Mendeleev periodic law.

The properties of elements are the periodic function of their atomic masses.

15. What are periods and groups in the periodic table?

Vertical columns are called groups and horizontal rows are called periods in the periodic table.

16. Give example to show that Mendeleev had to place slightly greater atomic mass before an element with slightly lower atomic mass.

Cobalt (atomic mass 58.9) was placed before nickel (atomic mass 58.7)

Aluminium (atomic mass 29.98) was placed before silicon (atomic mass 28.09)

V (atomic mass 50.94) was placed before chromium (atomic mass 50.20)

Te (atomic mass 127.60) was placed before iodine (atomic mass 126.90)

17. Why was the discovery of noble gases like helium, neon, argon delayed?

Noble gases like helium, neon and argon were discovered late because they are very inert and present in extremely low concentrations in our atmosphere.

18. Mention the achievements of Mendeleev's periodic table.

i) Some gaps were left for the undiscovered elements like gallium (Ga), Scandium (Sc) and Germanium (Ge).

(ii) Predict properties of elements on the basis of their positions in the periodic table.

(iii) Accommodate noble gases when they were discovered without disturbing the original arrangement.

19. Mention the limitations of Mendeleev's classification.

- Position of hydrogen: The position of hydrogen in the table is not certain because it can be placed in group IA as well as in group VIIA as it resembles both with alkali metals of IA group and halogens of VIIA group.
- Anomalous pair of elements: Certain elements of highest atomic mass precede those with lower atomic mass.
- Dissimilar elements placed together: elements with dissimilar properties were placed in same group as sub-group A and sub-group B. For example, alkali metal like Li, Na, K etc., of IA group have little resemblance with coinage metals like Cu, Ag, Au of IB group.
- Some similar elements separated: some similar elements like 'copper and mercury' and 'silicon and thalium' are placed in different groups of the periodic table.
- Position of isotopes: isotopes of elements are placed in the same position in the table.

20. Give example to show that electronic configuration of hydrogen resembles that of alkali metals.

Hydrogen combines with halogen, oxygen and sulphur to form compounds having similar formulae.

Compounds of H	Compounds of Na
HCl	NaCl
H ₂ O	Na ₂ O
H ₂ S	Na ₂ S

21. (Activity 5.1) Looking at its resemblance to alkali metals and the halogen family, try to assign hydrogen a correct position in MendeléeV's Periodic Table. To which group and period should hydrogen be assigned?

No fixed position can be given to hydrogen in the Mendeleev's periodic table.

22. (Activity 5.2) Consider the isotopes of chlorine, Cl-35 and Cl-37. Would you place them in different slots because their atomic masses are different? Or would you place them in the same position because their chemical properties are the same?

No, the more fundamental base of classification is atomic number and not atomic mass. Yes, both the isotopes are placed in same position because they have same chemical properties and same atomic number.

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

(i) Potassium (K) is a member of group IA. Its valency is 1. The formula of its oxide is K₂O.

(ii) Carbon (C) is a member of group IVA. Its valency is 4. The formula of its oxide is C₂O₄ or CO₂.

(iii) Aluminium (Al) belongs to groups IIIA and its valency is 3. The formula of the oxide of the element is Al₂O₃.

(iv) Silicon (Si) is present in group IVA after carbon. Its valency is also 4. The formula of its oxide is Si₂O₄ or SiO₂.

(v) Barium (Ba) belongs to group IIA and the valency of the element is 2. The formula of the oxide of the element is Ba_2O_2 or BaO.

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

Scandium and germanium

25. **What were the criteria used by MendeléeV in creating his Periodic Table?**

The criteria used by MendeléeV were:

- (i) Physical and chemical properties of the elements.
- (ii) Atomic masses in increasing order.

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

Noble gases are also called inert gases because they have a complete octet and are very stable. They do not react with other elements due to their stability. Since they all are unreactive, have complete octet and similar behaviour so they are placed in a separate group.

27. **State Modern periodic law.**

Properties of elements are a periodic function of their atomic number.

28. **(Activity 5.3) How were the positions of cobalt and nickel resolved in the Modern Periodic Table?**

Modern Periodic Table is based on the atomic number. Cobalt (27) is placed before Nickel (28) in Modern Periodic Table.

How were the positions of isotopes of various elements decided in the Modern Periodic Table?

The isotopes have same atomic number so they are placed in the same group in Modern Periodic Table

Is it possible to have an element with atomic number 1.5 placed between hydrogen and helium?

No, it is not possible because atomic number is a whole number.

Where do you think should hydrogen be placed in the Modern Periodic Table?

I think that the place of hydrogen in the Modern Periodic Table is correct.

29. **(Activity 5.4) Look at the group 1 of the Modern Periodic Table, and name the elements present in it.**

The elements in group 1 are: Hydrogen (H), Lithium (Li), Sodium (Na), Potassium (K), Rubidium (Rb), Cesium (Cs) and Francium (Fr).

Write down the electronic configuration of the first three elements of group 1.

(i) H (1) \rightarrow 1 (ii) Li(3) \rightarrow 2, 1 (iii) Na (11) \rightarrow 2, 8, 1

What similarity do you find in their electronic configurations?

All the elements have same number of valence electron, i.e. 1

How many valence electrons are present in these three elements?

One (1)

30. Why are fluorine (F) and chlorine (Cl) placed in the same group?

Fluorine and chlorine have seven electrons in the outermost shell. They have an identical outer shell electronic configuration.

31. (Activity 5.5) If you look at the long form of the Periodic Table, you will find that the elements Li, Be, B, C, N, O, F, and Ne are present in the second period.

Write down their electronic configuration.

Li (3) \rightarrow 2,1 Be (4) \rightarrow 2, 2 B (5) \rightarrow 2, 3 C (6) \rightarrow 2, 4
 N (7) \rightarrow 2, 5 O (8) \rightarrow 2, 6 F (9) \rightarrow 2, 7 Ne (10) \rightarrow 2, 8

Do these elements also contain the same number of valence electrons?

No

Do they contain the same number of shells?

Yes. The elements of same periods have same number of shells but not same number of valence electrons, which increases by 1

32. Na, Mg, Al, Si, P, S, Cl and Ar belong to the third period of the Modern Periodic Table. Write the electronic configuration of these elements

Na \rightarrow 2,8,1 Mg \rightarrow 2,8,2 Al \rightarrow 2,8,3 Si \rightarrow 2,8,4
 P \rightarrow 2,8,5 S \rightarrow 2,8,6 Cl \rightarrow 2,8,7 Ar \rightarrow 2,8,8

33. How many elements are there in the first, second, third and fourth periods?

First period 2, second period 8, third period 8, fourth period 18.

34. (Activity 5.6) How do you calculate the valency of an element from its electronic configuration?

Valency of metal: It is same as the number of valence electron i.e. 1, 2, and 3.

Valency of non-metal: Valency of non-metals can be calculated by subtracting number of valence electrons from 8 (i.e. 8- number of valence electrons).

For example:

$8 - 4 = 4$ $8 - 5 = 3$ $8 - 6 = 2$ $8 - 7 = 1$ $8 - 8 = 0$

What is the valency of magnesium with atomic number 12 and sulphur with atomic number 16?

Magnesium (12) \rightarrow 2, 8, 2 Sulphur (16) \rightarrow 2, 8, 6

The valency of Magnesium is same as valence electron, i.e. 2. The valency of Sulphur is $8 - 6 = 2$ because it is non-metal.

Similarly find out the valencies of the first twenty elements.

Sr No	Elements	Atomic No.	Configuration	Valency
1.	H	1	1	1
2.	He	2	2	0
3.	Li	3	2, 1	1
4.	Be	4	2, 2	2
5.	B	5	2, 3	3
6.	C	6	2, 4	8-4 = 4
7.	N	7	2, 5	8-5 = 3
8.	O	8	2, 6	8-6 = 2
9.	F	9	2, 7	8-7 = 1
10.	Ne	10	2, 8	8-8 = 0
11.	Na	11	2, 8, 1	1
12.	Mg	12	2, 8, 2	2
13.	Al	13	2, 8, 3	3
14.	Si	14	2, 8, 4	8-4 = 4
15.	P	15	2, 8, 5	8-5 = 3
16.	S	16	2, 8, 6	8-6 = 2
17.	Cl	17	2, 8, 7	8-7 = 1
18.	Ar	18	2, 8, 8	8-8 = 0
19.	K	19	2, 8, 8, 1	1
20.	Ca	20	2, 8, 8, 2	2

How does the valency vary in a period on going from left to right?

Valency first increases 1 to 4 then decreases from 4 to 0 (1, 2, 3, 4, 3, 2, 1, 0).

How does the valency vary in going down a group?

Valency remains the same because valence electrons do not change on going down in a group.

35. What is atomic size?

Atomic size or radius of an atom is the distance between the centre of the nucleus and the outermost shell of an isolated atom.

36. (Activity 5.8) Study the variation in the atomic radii of first group elements given below and arrange them in an increasing order.

Group 1 Elements	Na	Li	Rb	Cs	K
Atomic Radius (pm)	186	152	244	262	231

Group 1 Elements	Na	Li	K	Rb	Cs
Atomic Radius (pm)	186	152	231	244	244

Name the elements which have the smallest and the largest atoms.

Na (Sodium) has smallest atom. Ca (Calcium) has largest atom.

37. How does the atomic size vary across the period?

The atomic radius decreases in moving from left to right along a period.

38. Why does the atomic size decrease across the period?

Atomic size decreases due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.

39. How does the atomic size vary down the group?

The atomic size increases down the group.

40. Why does the atomic size increase down the group?

The atomic size increases down the group because new shells are being added as we go down the group. This increases the distance between the outermost electrons and the nucleus so that the atomic size increases in spite of the increase in nuclear charge.

41. Examine elements of the third period and classify them as metals and non-metals.

Element	Atomic No.	Configuration	Metal / non metal
Na	11	2,8,1	Metal
Mg	12	2,8,2	Metal
Al	13	2,8,3	Metal
Si	14	2,8,4	Non Metal
P	15	2,8,5	Non Metal
S	16	2,8,6	Non Metal
Cl	17	2,8,7	Non Metal
Ag	18	2,8,8	Non Metal

Elements having 1, 2, 3 valence electrons are metals while elements having 4,5,6,7,8 valence electrons are non-metals.

On which side of the Periodic Table do you find the metals?

On the left side.

On which side of the Periodic Table do you find the non-metals?

On the right side.

42. What are metalloids? Give example.

Elements that exhibit some properties of both metals and non-metals are called semi-metals or metalloids.

Ex: boron, silicon, germanium, arsenic, antimony, tellurium and polonium

43. Why is silicon classified as semi-metal or metalloid?

Silicon is classified as a semi-metal or metalloid because it exhibits some properties of both metals and non-metals.

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

The tendency of losing electrons increases in a group on going down.

How will this tendency change in a period?

The tendency of losing electrons decreases as we go left to right in a period.

45. How does metallic character vary across a period?

Metallic character decreases across a period.

46. How does metallic character vary down the group?

Metallic character increases down a group.

47. **(Activity 5.11) How would the tendency to gain electrons change as you go from left to right across a period?**

The tendency of gaining electrons increases as we go left to right in a period upto 17th group. It decreases in 18th group.

How would the tendency to gain electrons change as you go down a group?

The tendency of gaining the electrons decreases as we go down a group.

48. **How does the trends of the periodic table help predict the nature of oxides of elements?**

The trends of periodic table help us to predict the nature of oxides formed by the elements because it is known that the oxides of metals are basic and that of non-metals are acidic.

49. **How could the Modern Periodic Table remove various anomalies of Mendeléev's Periodic Table?**

(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.

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

Calcium (ca) and Barium (Ba), as these two elements belong to same group as magnesium and have same valence electrons as magnesium has.

51. **Name:**

(a) three elements that have a single electron in their outermost shells.

Lithium (li), Sodium (Na), Potassium (k)

(b) two elements that have two electrons in their outermost shells.

Magnesium (mg), Calcium (ca), Barium (Ba)

(c) three elements with filled outermost shells.

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

52. **(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?**

Lithium, sodium and potassium atoms have same number of electrons in their outermost shell and have same valency.

(b) Helium is an unreactive gas and neon is a gas of extremely low reactivity. What, if anything, do their atoms have in common?

Helium and neon both have their outermost shell filled.

- 53. In the Modern Periodic Table, which are the metals among the first ten elements?**
Lithium, Beryllium, Boron are the metals in Modern Periodic Table among the first ten elements.
- 54. 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**
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 decreases as we go from left to right.
- 55. Which element has:**
- (a) two shells, both of which are completely filled with electrons?**
Neon (Ne), Neon has two completely filled shells with 2 electrons in K shell and 8 electrons in L shell.
- (b) the electronic configuration 2, 8, 2?**
Magnesium (Mg)
- (c) a total of three shells, with four electrons in its valence shell?**
Silicon (Si). Silicon has a total of three shells. K shell has 2 electrons, L has 8 and M i.e. valence shell has 4 electrons.
- (d) a total of two shells, with three electrons in its valence shell?**
Boron (B). It has a two shells, with 3 electrons in its L i.e. valence shell and 2 electrons in K shell
- (e) twice as many electrons in its second shell as in its first shell?**
Carbon (C) has electronic configuration of 2 electrons in K shell and 4 electrons in L shell. Clearly, it has twice as many electrons in its second shell as in its first shell.
- 56. (a) What property do all elements in the same column of the Periodic Table as boron have in common?**
Both the elements are metals and show the following common properties:
(i) Both are good conductor of electricity. (ii) Both show malleability
- (b) What property do all elements in the same column of the Periodic Table as fluorine have in common?**
Both the elements are non-metal and show following common properties:
(i) Both are brittle (ii) Both are bad conductor of electricity.
- 57. An atom has electronic configuration 2, 8, 7. (Atomic numbers are given in parentheses.) N(7) F(9) P(15) Ar(18)**
- (a) What is the atomic number of this element?**
The atomic number of element is 17
- (b) To which of the following elements would it be chemically similar?**
It belongs chemically to F(9) because the electronic configuration of F is 2, 7 and having same valence electrons.

58. 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.

C is non-metal because it belongs to 17th group.

(b) State whether C is more reactive or less reactive than A.

C is less reactive than A because the reactivity of non-metal decreases from top to bottom.

(c) Will C be larger or smaller in size than B?

The size of C is smaller than B because B and C belong to the same period and the size decreases in a period on going left to right

(d) Which type of ion, cation or anion, will be formed by element A?

A forms anion because C is non-metals for anion (Negative Ion)

59. 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?

Atomic number of Nitrogen is 7 and electronic configuration is 2, 5.

Atomic number of Phosphorus is 15 and electronic configuration is 2, 8, 5.

Phosphorus will be more electronegative because phosphorus and nitrogen 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.

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

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

61. 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?

Atomic number of Calcium is 20 and its electronic configuration is 2, 8, 8, 2. To see the resemblance with Calcium, first we have to check the Electronic Configuration of respective elements.

Element with Atomic Number - 12	2, 8, 2
Element with Atomic Number - 19	2, 8, 8, 1
Element with Atomic Number - 21	2, 8, 8, 3
Element with Atomic Number - 38	2, 8, 18, 8, 2

From above, it is clear, elements with atomic number 12 and 38 has same electronic configuration of valence shell as that of Calcium, and therefore, will have physical and chemical properties resembling calcium

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

- (i) Mendeleev's Periodic Table is based on atomic mass while Modern Periodic Table is based on atomic number.
- (ii) In Mendeleev's table there is no place for inert gases, while in modern Periodic Table they are classified.
- (iii) In Modern Periodic Table all the anomalies of Mendeléev's Periodic Table are removed.
- (iv) There are 18 groups in Modern Periodic Table.

Fill in the blanks:

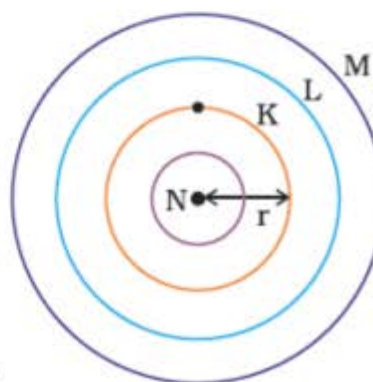
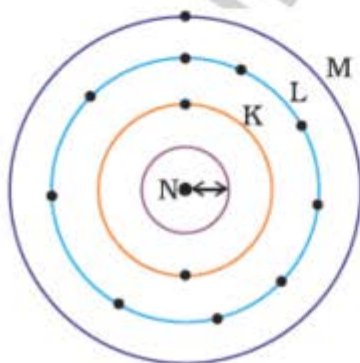
- 1) The number of element known at the time Dobereiner classified element was 56.
- 2) The number of element known at the time Mendeleev classified the elements was 63.
- 3) Mendeleev arranged on the basis of their fundamental property atomic mass.
- 4) Mendeleev called the vertical columns as groups.
- 5) Mendeleev called the horizontal rows as periods.

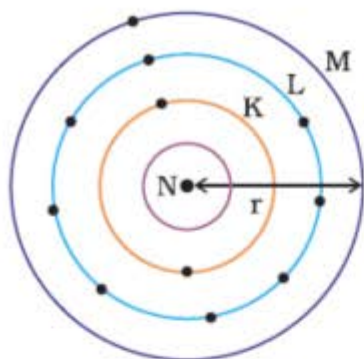
Multiple choice questions

- 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.
- 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
- 3) **Upto which element, the Law of Octaves was found to be applicable**
 - (a) Oxygen
 - (b) Calcium**
 - (c) Cobalt
 - (d) Potassium
- 4) **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
- 5) **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

- 6) Which of the following statement (s) about the Modern Periodic Table are incorrect
- (i) The elements in the Modern Periodic Table are arranged on the basis of their decreasing atomic number
 - (ii) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic masses
 - (iii) Isotopes are placed in adjoining group (s) in the Periodic Table
 - (iv) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic number
- (a) (i) only (b) (i), (ii) and (iii) (c) (i), (ii) and (iv) (d) (iv) only
- 7) 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
- 8) 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
- 9) The elements A, B, C, D and E have atomic number 9, 11, 17, 12 and 13 respectively. Which pair of elements belong to the same group?
- (a) A and B (b) B and D (c) A and C (d) D and E
- 10) Where would you locate the element with electronic configuration 2,8 in the Modern Periodic Table?
- (a) Group 8 (b) Group 2 (c) Group 18 (d) Group 10
- 11) An element which is an essential constituent of all organic compounds belongs to
- (a) group 1 (b) group 14 (c) group 15 (d) group 16
- 12) Which of the following is the outermost shell for elements of period 2?
- (a) K shell (b) L shell (c) M shell (d) N shell
- 13) Which one of the following elements exhibit maximum number of valence electrons?
- (a) Na (b) Al (c) Si (d) P
- 14) Which of the following gives the correct increasing order of the atomic radii of O, F and N ?
- (a) O, F, N (b) N, F, O (c) O, N, F (d) F, O, N
- 15) Which among the following elements has the largest atomic radii?
- (a) Na (b) Mg (c) K (d) Ca
- 16) Which of the following elements would lose an electron easily?
- (a) Mg (b) Na (c) K (d) Ca
- 17) Which of the following elements does not lose an electron easily?
- (a) Na (b) F (c) Mg (d) Al

- 18) Which of the following are the characteristics of isotopes of an element?
- (i) Isotopes of an element have same atomic masses
(ii) Isotopes of an element have same atomic number
(iii) Isotopes of an element show same physical properties
(iv) Isotopes of an element show same chemical properties
- (a) (i), (iii) and (iv) (b) (ii), (iii) and (iv)
(c) (ii) and (iii) (d) (ii) and (iv)
- 19) Arrange the following elements in the order of their decreasing metallic character Na, Si, Cl, Mg, Al
- (a) $\text{Cl} > \text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (b) $\text{Na} > \text{Mg} > \text{Al} > \text{Si} > \text{Cl}$
(c) $\text{Na} > \text{Al} > \text{Mg} > \text{Cl} > \text{Si}$ (d) $\text{Al} > \text{Na} > \text{Si} > \text{Ca} > \text{Mg}$
- 20) Arrange the following elements in the order of their increasing nonmetallic character Li, O, C, Be, F
- (a) $\text{F} < \text{O} < \text{C} < \text{Be} < \text{Li}$ (b) $\text{Li} < \text{Be} < \text{C} < \text{O} < \text{F}$
(c) $\text{F} < \text{O} < \text{C} < \text{Be} < \text{Li}$ (d) $\text{F} < \text{O} < \text{Be} < \text{C} < \text{Li}$
- 21) What type of oxide would Eka-aluminium form?
- (a) EO_3 (b) E_3O_2 (c) E_2O_3 (d) EO
- 22) Three elements B, Si and Ge are
- (a) metals (b) non-metals
(c) metalloids (d) metl, non-metal and metalloid respectively
- 23) 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
- 24) The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. To which of the following categories does the element belong?
- (a) Metal (b) Metalloid
(c) Non-metal (d) Left-hand side element
- 25) Which one of the following depict the correct representation of atomic radius(r) of an atom?

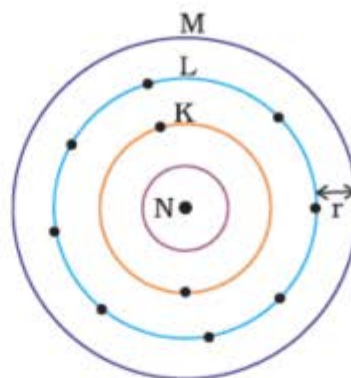




(iii)

(a) (i) and (ii)

(c) (iii) and (iv)



(iv)

(b) (ii) and (iii)

(d) (i) and (iv)

26) 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

27) 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

28) Which of the following set of elements is written in order of their increasing metallic character?

(a) Be Mg Ca

(b) Na Li K

(c) Mg Al Si

(d) C O N