Class 10th Science

Chapter - 5

Periodic Classification of Elements

Textual Questions and Answers :

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Q.1. Did Dobereiner's triads also exist in the columns of Newlands Octaves ? Compare and find out.

Ans :- Dobereiner's triads are also found in Newland's octave . For example , Li , Na , k .

Q.2. What the limitations of Dobereiner's classification ?

Ans :- The limitation of Dobereiner's classification was that it failed to arrange all the taken known elements in the form of triads of elements having similar chemical properties . Dobereiner could identify only three triads from the elements known at that time . So , his classification of elements was not much successful .

Q.3. What were the limitations of Newland's law of octaves ?

Ans :- Newlands ' law of octaves for the classification of elements has the following limitations :

(i) Newlands ' law of octaves was applicable to the classification of elements up to calcium only . After

calcium every eight elements did not posses the properties similar to that of the first element . Thus Newlands ' law of octaves worked well with lighter elements only.

(ii) Newands ' assumed that only 56 elements existed in nature bet and no more elements would be discovered in the future . But later on , several new elements were discovered whose proportics did not fit into Newlands , law of octaves .

(ii) In order to fit elements into his table , Newlands put even two elements together in one slot and that too in the column of unlike elements having very different properties .

(iv) Iron element which resembles cobalt and nickel elements in properties was placed far away from these elements .

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Q.1. Use Mendeleev's periodic table to predict the formula for the oxides of the following elements :
K , C , Al , Si , Ba

Ans :- (i) The element K is in group 1 of Mendeleev's periodic table is which the general formula of the oxides of elements is $R_2 O$. So , the formula of oxide of K will be $K_2 O$.

(ii) The element C is in group IV of Mendeleev's periodic table in which the general formula of the oxides of elements is RO_2So , the formula of oxide of C will be CO_2.

(iii) The element Al is in group III of Mendeleev's periodic table in which the general formula of the oxides of elements is R_2O_3 . So the formula of oxide of Al will be Al_2O_3.

(iv) The element Si is in group IV of Mendelev's periodic table in which the general formula for the oxides of elements is RO_2 So , the formula of the oxide of Si will be SiO_2.

(v) The element Ba is in group II of Mendeleev's periodic table in which the general formula for the oxides of elements is RO . So , the formula of oxide of Ba will be BaO .

Q.2. Besides gallium , which other elements have since been discovered that were left by Mendeleev in this periodic table ? (any two)

Ans :- Scandium and Germanium .

Q.3. What were the criteria used by Mendeleev in creating his periodic table ?

Ans :- When mendeleev started his work 63 elements were known . He examined the relationship between the

atomic masses of the elements and their physical and chemical properties .

Among chemical properties , Mendeleev concentrated on the compounds formed by elements with oxygen and hydrogen . He selected hydrogen and oxygen as they are very reactive and formed compounds with most elements . The formula of the hydrides and oxides formed by an element were treated as one of the basic properties of an element for its classification . He then took 63 cards and on each card he wrote down the properties of one element .

He sorted out the elements with similar properties and pinned the cards together on a wall . He observed that most of the elements got a place in a periodic table and were arranged in the order of their increasing atomic masses . It was also observed that there occurs a periodic recurrence of elements with similar physical and chemical properties . On this basis Mendeleev formulated a periodic law . Which states that " The properties of elements are the periodic function of their atomic masses .

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

Ans :- Noble gases like helium , neon and argon are chemically inert and are present in atmosphere in extremely low concentrations . Thus owing to their similar inert behaviour and similar electronic

configuration . They are justified to be placed in a separate group .

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Q.1. How could the Modern Periodic Table remove various anomalies of Mendeleev's Periodic Table ?

Ans :- Since all the isotopes of an element have the same atomic number . They can be put at one place in the same group of the periodic table . For example , both the isotopes of chlorine . Cl - 35 and Cl -37 , have the same atomic number of 17. so both of them can be put at one place in the same group of the periodic table .

The atomic number of cobalt is 27 and that of nickel is 28 . Now , according to modern periodic law , the elements are arranged in the order of increasing atomic numbers . So , cobalt with lower atomic number (27) should come first and nickel with higher atomic number (28) should come later , even if their atomic masses are in the wrong order.

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

Ans :- Beryllium and Calcium . Both Beryllium and calcium have some electrons in outermost shell with calcium , i.e. in outermost shell they have two electrons each .

Q.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 , sodium , potassium.

(b) Magnesium , calcium .

(c) Helium , Neon , Argon .

Q.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 in a gas of extremely low reactivity . What if anything , do their atoms have in common ?

Ans :- (a) The atoms of lithium , sodium , potassium all have only one electron in their outer most shells .

(b) The atoms of helium and neon have their outer most shell completely filled .

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

Ans :- Li , Be and B are metals .

Q.6. By considering their position in he periodic table , which one of the following elements would you expect to have maximum metallic characteristic ?
Ga , Ge , As , Se , Be

Ans :- Be .

EXERCISES

Q.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 easily when going left to right is not correct .

Q.2. Element X forms a chloride with the formula XCl_2 which is 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.

Q.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) Ne (2, 8)

(b) Mg

(c) Si (2, 8, 4)

(d) B (2, 3)

(e) C (2, 4)

Q.4. (a) What property do all elements in the same column of the periodic table as born have in common ?

(b) What property do all elements in the same column of the periodic Table as fluorine have in common ?

Ans :- (a) They have the same valence and are metalloids.

(b) They form acidic oxides and have seven electrons in their outermost shells.

Q.5. An atom has electronic configuration 2, 8, 7.

(a) What is the atomic number of these elements ?

(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 the element = 2 + 8 + 7

= 17

(b) F (9) Because the noof electrons of the outermost shell of F is 7

Q.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 that 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) Element A is in group 17. Now , group 17 is on the right side or the periodic table where non - metals are placed . So, element A is a non - metal .

(b) In group 17 of halogens , the chemical reactivity decreases on going down in a group . Thus element C will be less reactive than element A.

(c) On going from left to right in a period , the size of atoms , decreases . So , the atom of C will be smaller in size than an atom of B.

(d) Element A of group 17 has 7 valence electrons . So, it will accept 1 electrons to form a negatively charged ion , A. The negatively charged ion is called anion . Thus , element A will form an anion .

Q.7. Nitrogen (atomic number 7) and phosphorus (atomic number 15) belong to group 15 of the Periodic Table . Write the electronic configuration A these two elements . Which of these will be more electronegative ? Why ?

Ans :- Electronic configuration of Nitrogen = 2,5

Electronic configuration of phosphorous = 2 , 8,5

Nitrogen will be more electronegative because outermost shell is nearer to nucleus .

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

Ans :- The position of an atom in the periodic table is related to the number of electrons in the outermost shell. In a given column of group , all elements have the same number of electrons in their outermost shells .

Q.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 :- The electronic configuration of calcium = 2, 8, 8, 2

The electronic configuration of atomic number 12 = 2 , 8, 2

The electronic configuration of atomic number 19 = 2 , 8, 8 , 1

The electronic configuration of atomic number 21 = 2 , 8, 8, 3

The electronic configuration of atomic number 38 = 2 , 8, 18 , 8, 2

Elements with atomic number 12 38 will have similar physical and chemical properties as calcium .

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

Ans :-

Mendeleev's Periodic Table	**Modern Periodic Table**
1. Mendeleev's periodic table is based on atomic masses of based on atomic number of elements .	1. Modern periodic table is based on atomic number of elements .

2. Mendeleev's periodic table does not explain the reason for the periodicity in the properties of elements.	2. Modern periodic table says that since the electronic configurations of elements are repeated at regular intervals therefore , the properties, of elements are also repeated at regular intervals.
3. There are nine vertical columns called groups .	3. There are eighteen vertical columns called groups.
4. Mendeliev's periodic table had a number of defects .	4. There are no defeats in the modern periodic table .

ADDITONAL QUESTIONS :

Very short answers type questions :

Q.1. (a) On what basis did Mendeleev arrange the elements in his periodic table ?

(b) On which basis are they arranged now ?

Ans :- (a) Atomic masses.

(b) Atomic numbers .

Q.2. State whether the following statements are true or false :

(a) Newlands divided the elements into horizontal rows of eight elements each .

(b) According to Mendelev's periodic law , the proporties of elements are a periodic function of their atomic numbers .

(c) The elements in a group have consecutive atomic numbers .

Ans :- (a) False.

(b) False.

(c) False.

Q.3. Name the scientist who said that the proporties of elements are a periodic functions of their atomic masses.

Ans :- Mendeleev.

Q.4. Name the scientists who gave the following laws in the early classification of elements :

(a) Law of octaves.

(b) Law of triads.

Ans :- (a) Newlands

(b) Dobereiner.

Q.5. Name two elements whose properties were predicted on the basis of their positions in Mendeleev's periodic table .

Ans :- Gallium , Scandium .

Q.6. Which group of elements could be placed in Mendeleev's periodic table later on , without disturbing the original order ? Give reason .

Ans :- Noble gas. They are chemically unreactive .

Q.7. (a) What is the number of valence electrons in the atoms of first element in a period ?

(b) What is the usual number of valence electrons in the atoms of the last element in a period ?

Ans :- (a) 1

(b) 8

Q.8. State whether the following statement is true or false : on going down in a group of the periodic table , the number of valence electrons increases .

Ans :- False .

Q.9. Name the element which is in :

(a) first group and third period.

(b) seventeenth group and second period .

Ans :- (a) Sodium.

(b) Fluorine.

Q.10. Arrange the following elements in increasing order of their atomic radii Li , Be , F , N

Ans :- F < N < Be Li

Q.11. Arrange the following elements in the increasing order of their metallic character :
Mg , Ca , k , Ga

Ans :- Ga < Mg < Ca < K

Q.12. Rewrite the following statements after correction , if necessary :

(i) Elements in the same period have equal valency.

(ii) The metallic character of elements in a period increases gradually on moving from left to right.

Ans :- Elements in the same group have equal valency.

(ii) The metallic character of elements in a period decreases gradually on moving from left to right .

Q.13. Define periods nand groups.

Ans :- A periodic table consists of horizontal rows of elements called periods and vertical column called groups .

Q.14. The three elements predicted by Mendellev from the gaps in his periodic table were known as eka - boron, eka - aluminium and eka - silicon . What names were given to these elements when they were discovered later on ?

Ans :- Scandium , Gallium , Germanium .

Q.15. X and Y are the two elements having similar properties which obey Newlands ' law of octaves . How many elements are there in - between X and Y ?

Ans :- Six elements .

Q.16. Fill in the blanks :

(a) The basis for modern periodic table is ---------.

(b) Group 1 elements are called ----------.

(c) Group 18 elements are called ----------.

(d) The horizontal rows in a periodic table are called----------.

(e) On moving from right to left in the second period the number of valence electrons ----------.

(f) The tendency to gain an electron ---------- on moving down in a group of the periodic table.

Ans :- (a) Atomic number.

(b) Alkali metals.

(c) Noble gases .

(d) Periods.

(e) Decreases.

Short Answer type Questions :

Q.1. The elements X , Y and Z belong to groups 2 , 14 and 16 respectively , of the periodic table .

(a) Which two elements will form covalent bond ?

(b) Which two elements will form an ionic bond ?

Ans :- Let us write down the above given data more clearly as follows :

Group 2	Group 14	Group 16
X	Y	Z

(a) We know that a covalent bond is formed between two non metal elements . Now , out of elements X , Y

and Z the element Y and element Z are non - metals . Thus , the elements Y and Z will form covalent bonds .

(b) An ionic bond is formed between a metal and a non- metal . Now , out of the above given elements , the elements X is a metal and elements Z in non - metal . Thus the elements X and Z will form an ionic bond .

Q.2. The electronic configuration of an element X is :

K	L	M
2	8	6

(i) What is the group number of element X in the periodic on table ?

(ii) What is the period number of element X in the periodic table ?

(iii) What is the number of valence electrons in an atom of X ?

(iv) What is the valency of X ?

(v) Is it a metal or a non - metal ?

Ans :- (i) From the above given electronic configuration we find the element X has 6 valence electrons . So the group number of element X in the periodic table is 6 + 10 = 16

(ii) Element X has 3 electron shells in its atom , so the period number of X is 3. That is X belongs to 3rd period of the periodic table .

(iii) Element X has 6 valence electrons .

(iv) Element X has 6 valence electrons so it needs 2 more electrons to complete its octet and become stable. Thus the valency of element X is 2 .

(v) The elements of group 16 are non - metals . So , X is a non - metal .

Q.3. (a) On which side of the periodic table will you find metals ?

(b) On which side of the periodic table will you find non metals ?

(c) What is the name of those elements which divide metals and non - metals in the periodic table ?

Ans :- (a) Left side.

(b) Right side.

(c) Metalloids.

Q.4. (a) Name three elements that have a single electron in their outermost shells .

(b) Name two elements that have two electrons in their Shouter most shells .

(c) Name three elements with completely filled outermost shells .

Ans :- (a) Lithium , sodium , Potassium .

(b) Magnesium , Calcium.

(c) Helium , Neon , m Argon .

Q.5 . 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 :- Electronic configuration of Nitrogen = 2, 5

Electronic configuration of phosphorous = 2, 8, 5

Nitrogen will be more electronegative because its atom has small size due to which the attraction of its nucleus for the incoming electron is more .

Q.6. An elements X belongs to group 2 and another element Y belongs to group 15 of the periodic table :

(a) What is the number of valence electrons in X ?

(b) What is the valency of X ?

(c) What is the number of valence electrons for Y ?

(d) What is the valency of Y ?

Ans :- (a) 2

(b) 2

(c) 5

(d) 3

Q.7. (a) What is the usual number of valency electrons and valency of group 18 elements of the periodic table ?

(b) What happens to the number of valence electrons in the atoms of elements as we go down in a group of the periodic table ?

Ans :- (a) Usual number of valence electrons is 8. The valency of group 18 elements of the periodic table is zero .

(b) The number of valence electrons remains the same.

Q.8. The atomic numbers of the three elements X , Y and Z are 2 , 6 and 10 respectively .

(i) Which two elements belong to the same group ?

(ii) Which two elements belong to the same period ?

Ans :- (i) X and Z

(ii) Y and Z

Q.9. An atom has the electron structure of 2 , 7 .

(a) What is the atomic number of this atom ?

(b) To , which of the following would it be chemically similar ? 7^{N} , 15^{P}, 17^{cl} , 18^{Ar}

(c) Why would you expect it to be similar ?

Ans :- (a) 9

(b) 17^{cl}

(c) Both have the same number of electrons in their atoms .

Q.10. In each of the following pairs , choose the atom having the bigger size ?

(a) Mg (at no . 12) or Cl (at no . 17)

(b) Na (at no . 11) or K (at no . 19)

Ans :- (a) Cl

(b) K

Q.11. The atomic numbers of three elements A , B and C are given below :

Element	Atomic number
A	5
B	7
C	10

(i) Which element belongs to group 18 ?

(ii) Which element belongs to group 15 ?

(iii) Which element belongs to group 13 ?

(iv) To which period / periods do these elements belong?

Ans :- (i) C

(ii) B

(iii) A

(iv) 2nd period.

Q.12. An element Y is in second period and group 16 of the periodic table :

(i) Is it a metal or non - metal ?

(ii) What is the number of valence electrons in its atom ?

(iii) What is its valency ?

(iv) What is the name of the element ?

(v) What will be the formula of the compound formed by Y with sodium ?

Ans :- (i) Non metal

(ii) 6

(iii) 2

(iv) Oxygen

(v) $Na_2 Y$

Q.13. Atoms of eight elements A , B , C , D , E , F , G and H have the same number of electron shells but different number of electrons in their outermost shells . It was found that elements A and G combine to form an ionic compound . This ionic compound is added in a small amount to almost all vegetables and dishes during cooking . Oxides of elements A and B are basic in nature while those of elements E and F are acidic . The oxide of element D is , however , almost neutral . Based on the above information , answer the following questions :

(a) To which group of period of the periodic table do these elements belong ?

(b) What would be the nature of compound formed by a combination of elements B and F ?

(c) Which two of these elements could definitely be metals ?

(d) Which one of the eight elements is most likely to be found in gaseous state at room temperature ?

(e) If the number of electrons in the outermost shell of elements C and G be 3 and 7 respectively , write the formula of the compound formed by the combination of C and G.

Ans :- (a) 3rd period

(b) Ionic compound

(c) A and B

(d) H

(e) CG_3

Q.14. A non metal X which is the largest constituent of air combines with hydrogen when heated in the presence of iron as catalyst to form a gas Y. When gas Y is treated with sulphuric acid , it forms a compound Z which is used as a chemical fertilizers .

(a) What are X , Y and Z ?

(b) To which group of periodic table does X belong ?

(c) Name the period of periodic table in which X is placed .

(d) Which element is placed just before X in the period?

(e) Which element is placed just after X in the period ?

Ans :- (a) X is nitrogen gas , N_2

Z is ammonia gas NH_3

Z is ammonium sulphate $(NH_4)_2SO_4$

(b) 15th group.

(c) 2nd period.

(d) carbon.

(e) oxygen.

Q.15. The atomic masses of three elements X , Y and Z having similar chemical properties are 7, 23 and 39 respectively .

(a) Calculate the average atomic mass of elements X and Z.

(b) How does the average atomic mass of elements X and Z compare with the atomic mass of element Y ?

(c) Which law of classification of elements is illustrated by this example ?

(d) What could the elements X , Y and Z be ?

(e) Give another example of set of elements which can be classified according to this law .

Ans :- (a) 23

(b) The average atomic mass of elements X and Z is equal to the atomic mass of element Y.

(c) Dobereiner's law of triads .

(d) X is lithium.

Y is sodium.

Z is potassium.

(e) Chlorine , Bromine , Iodine .

Q.16. Consider the following elements . Comments on om

Na , Ca , Al , K , Mg , Li

(a) Which of these elements belong to the same period of the periodic table ?

Ans :- Same period : Na, Mg, Al

Q.6. Which of these elements belong to the same group of the periodic table ?

Ans :- Same group Li , Na , k

Q.17. 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 valency shell ?

(e) Twice as many electrons in its second shell as its first shell ?

Ans :- (a) Neon (2, 8)

(b) Magnesium.

(c) Silicon (2, 8 , 4)

(d) Boron (2, 3)

(e) Carbon (2 , 4)

Q.18. Mendeleev predicted the existence of certain elements o not known at that time and named two of them as eka aluminium and eka - silicon.

(a) Name the element which has taken the place of

(i) Eka aluminium and

(ii) Eka silicon .

(b) Mention the period / periods of these elements in the modern periodic table .

(c) Write the group groups of these elements in the moderns periodic table .

(d) Classify these elements as metals , non - metals or metalloids .

(e) How many valence electrons are present in the atoms of each of these elements ?

Ans :- (a) (i) Gallium.

(ii) Germanium.

(b) 4th period.

(c) Gallium 13th group.

Germanium 14th group.

(d) Gallium - metal.

Germanium - metalloid.

(d) Gallium - 3

Germanium - 4

Q.19. A part of the early classification of elements has been given below :

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S

(a) Which law of classification of elements is illustrated by the above arrangement of elements ?

(b) Name the scientist who proposed such a classification on of elements .

(c) Why is such a classification of elements compared with a characteristic of musical scale ?

(d) State one limitation of this classification of elements.

Ans :- (a) Newlands ' law of octaves.

(b) Newlands.

(c) Because in this classification , the repetition in the properties of elements is just like the repetition of eight note in an octave of music .

(d) This could be applied only up to the element calcium and not beyond that.

Q.20. A metal X is in the first group of the periodic table. What will be the formula of its oxide ?

Ans :- X_2O

Q.21. An element A from group 14 of the periodic table combines with an element B from group 16.

(i) What type of chemical bond is formed ?

(ii) Give the formula of the compound formed .

Ans :- (i) Covalent bond.

(ii) AB_2

Q.22. An element X from group 2 of the periodic table reacts with an element from group 17 form a compound.

(a) What is the nature of the compound formed ?

(b) State whether the compound formed will conduct electricity or not.

(c) Give the formula of the compound formed.

(d) What is the valency of element X ?

(e) How many electrons are there in the outermost shell of an atom of element Y ?

Ans :- (a) Ionic compound.

(b) Yes.

(c) XY_2

(e) 2

(d) 7

Q.23. An element A has an atomic number of 6. Another element B has 17 electrons in its one neutral atom.

(a) In which groups of the periodic table would you except to find these elements ?

(b) What type of bond is formed between A and B ?

(c) Suggest a formula of the compound formed between A and B

Ans :- (a) A in group 14

B in group 17

(b) Covalent bond

(c) AB_4

Q.24. An element X is in group 2 of the periodic table :

(a) What will be the formula of its chloride ?

(b) What will be the formula of its oxide ?

Ans :- (a) XCl_2

(b) XO

Multiple Choice Questions :

Q.1. In Mendeleev's periodic table, gap was not left for one of the following elements. This element is :

(a) Gallium.

(b) Beryllium.

(c) Germanium.

(d) Scandium.

Ans :- (b) Beryllium.

Q.2. The Newlands law of octaves for the classification of elements was found to be applicable only up to the element :

(a) Potassium.

(b) Calcium.

(c) Cobalt.

(d) Phosphorus.

Ans :- (b) Calcium.

Q.3. According to Mendeleev's periodic law , the elements were arranged in the periodic table in the order of

(a) Decreasing atomic numbers.

(b) Increasing atomic numbers.

(c) Decreasing atomic masses.

(d) Increasing atomic masses .

Ans :- (d) Increasing atomic masses.

Q.4. The three elements having chemical symbols of Si , B and Ge are :

(a) Al metals.

(b) All non - metals.

(c) All metalloids.

(d) Si is metalloids , B is metal and Ge is non - metal .

Ans :- (c) All metalloids .

Q.5. In Mendeleev's periodic table , gaps were left for the elements to be discovered later on . An element which found a vacant place in the periodic table later on is :

(a) Be

(b) Si

(c) Ge

(d) Se

Ans :- (c) Ge.

Q.6. The three imaginary elements X , Y and Z represent a Dobernener's triad . If the atomic mass of element X is 14 and that of element Y is 46 , then the atomic mass of element Z will be

(a) 28

(b) 60

(c) 78

(d) 72

Ans :- (C) 78

Q.7. The atomic numbers of four elements ? P , Q , R and S are 6 , 8 , 14 and 16 respectively . Our of these , the element known as metalloid is :

(a) P

(b) Q

(c) R

(d) S

Ans :- (c) R

Q.8. Which of the following statement is correct in regard to Sign the classification of elements ?

(a) Elements in modern periodic table are arranged on the basis of increasing atomic masses .

(b) Elements in Mendeleev's periodic table are arranged on the basis of increasing atomic numbers .

(c) In modern periodic table , the element nickel of lower atomic mass is kept before the element cobalt of higher atomic mass.

(d) In modern periodic table , the isotopes of chlorine having different atomic masses are kept in the seme group .

Ans :- (d) In modern periodic table , the isotopes of chlorine having different atomic masses are kept in the seme group .

Q.9. Which of the following statement 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 .

Q.10. An element X forms an oxide X_2O_3. In which Mendeleev's periodic table is this element placed ?

(a) Group II

(b) Group III

(c) Group V

(d) Group VIII

Ans :- (b) Group III

Q.11. The modern periodic table was prepared by :

(a) Dobereiner.

(b) Newlands.

(c) Bohr

(d) Mendeleev.

Ans :- (c) Bohr.

Q.12. The atomic particle whose number in the atoms of an element always remains the same and which forms the real basis for the modern classification of elements is :

(a) Electron.

(b) Proton.

(c) Neuton.

(d) Meson.

Ans :- (b) Proton.

Q.13. Which of the following statements is not a correct statements about the trends when going from left to right across the periods of the periodic table ?

(a) The elements become less metallic in nature .

(b) The number of valence electrons increases .

(c) The atoms loss their electrons more easily .

(d) The oxides become more acidic.

Ans :- (c) The atoms loss their electrons more easily .

Q.14. The electronic configuration of the atom of an element X is 2 , 8 , 4. In modern periodic table , the element X is placed in :

(a) 2nd group.

(b) 4th group.

(c) 14th group.

(d) 8th group.

Ans :- (c) 14th group.

Q.15. The atomic number of an element is 20. In modern periodic table , this element is placed in :

(a) 2nd period.

(b) 4th period.

(c) 3rd period.

(d) 1st period.

Ans :- (b) 4th period.

Q.16. Five elements A , B , C , D and E have atomic numbers of 2 , 3 , 7 , 10 and 18 respectively . The elements which belong to the same period of the periodic table are :

(a) A , B , C

(b) B, C, D

(c) A, D, E

(d) B, D, E

Ans :- (b) B, C, D

Q.17. The elements A , B , C , D and E have atomic number 9 , 11 , 17 , 12 and 13 respectively . The pair of elements which belongs to the same group of the periodic table is :

(a) A and B

(b) B and D

(c) A and C

(d) D and E

Ans :- (c) A and C

Q.18. Which of the following element would lose an electron easily ?

(a) Mg

(b) Na

(c) K

(d) Ca

Ans :- (c) K

Q.19. Which of the following element does not lose an electron easily ?

(a) Na

(b) F

(c) Mg

(d) A1

Ans :- (b) F

Q.20. 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

Ans :- (c) Group 18

Q.21. An element which is an essential constituent of all organic compounds belongs to following group of modern periodic table :

(a) Group 4

(b) Group 14

(c) Group 15

(d) Group 16

Ans :- (b) Group 14

Q.22. Which of the following is the valence shell for the elements of second period of the modern periodic table?

(a) M shell.

(b) k shell.

(c) L shell.

(d) N shell.

Ans :- (c) L shell.

Q.23. The element which has the maximum number of valence electrons is :

(a) Na

(b) P

(c) Si

(d) Al

Ans :- (b) P

Q.24. The correct increasing order of the atomic radii of the elements oxygen , fluorine and nitrogen is :

(a) O , F , N

(b) N , F , O

(c) O , N , F

(d) F , O , N

Ans :- (d) F , O , N.

Q.25. The atomic numbers of the elements Na , Mg , K and Ca are 11 , 12 , 19 and 20 respectively . The element having the largest atomic radius is :

(a) Mg

(b) Na

(c) K

(d) Ca

Ans :- (c) K

Q.26. Which of the following are the correct characteristics of isotopes of an element ?

(i) same atomic mass.

(ii) same atomic number.

(iii) same physical properties.

(iv) same chemical properties.

(a) (i) , (ii) and (iv)

(b) (ii) , (iii) and (iv)

(c) (ii) and (iii)

(d) (ii) and (iv)

Ans :- (d) (ii) and (iv)

Q.27. The correct formula of the oxide of Eka - aluminium element predicted by Mendeleev was :

(a) EaO_3

(b) Ea_3O_2

(c) Ea_2O_3

(d) EaO

Ans :- (c) Ea_2O_3

Q.28. The element which can form an acidic oxide should be on the one whose atomic number is :

(a) 6

(b) 16

(c) 12

(d) 19

Ans :- (b) 16

Q.29. The element which forms a basic oxide has the atomic number of :

(a) 18

(b) 17

(c) 14

(d) 19

Ans :- (d) 19

Q.30. Which one of the following does not increase while oily lo moving doesn the group of the periodic table ?

(a) Atomic radius.

(b) Metallic character.

(c) Valence electrons.

(d) Shells in the atoms.

Ans :- (c) Valency electrons .

Q.31. On moving from left to right in a period of the periodic A table , the atomic number of elements increases . What happens to the size of atoms of elements on moving from left to right in a period ?

(a) Increases.

(b) Decreases.

(c) Remains he same.

(d) First increases then decreases.

Ans :- (b) Decreases.

Q.32. Which of the following set of elements is written correctly in the order of their increasing metallic character ?

(a) Mg , Al , Si

(b) C , O , N

(c) Na , Li , K

(d) Be , Mg , Ca

Ans :- (d) Be , Mg , Ca.

Short Questions :

Q.1. Write two merits of the modern periodic table .

Ans :- (i) The modern periodic table is based on the atomic numbers of elements which is the most fundamental property of elements .

(ii) The modern periodic table helps us understand why elements in a group show similar properties but elements in different groups show different properties.

Q.2. Write the three similar chemical properties of lithium , sodium and potassium .

Ans :- (i) All these elements are metals .

(ii) All of them react with water to form alkalis and hydrogen gas.

(iii) All of them have a valency of 1.

Q.3. Write newlands law of octaves .

Ans :- When elements are arranged in the order of increasing atomic masses , the properties of the eight element starting from a given element are a repetition of the properties of the first element .

Q.4. Write three merits of Mendeleev's classification of elements .

Ans :- (i) Mendeleev's periodic law predicted the existence of some elements that had not been discovered at that time .

(ii) Mendeleev's periodic table could predict the properties of several elements on the basis of their positions in the periodic table .

(iii) Mendeleev's periodic table could accommodate noble gases when they were discovered .

Q.5. Write the two limitations of mendeleev's classification of elements .

Ans :- (i) The position of isotopes could not be explained .

(ii) Wrong order of atomic masses of some elements could not be explained .

Q.6. Why all the elements of a group show similar chemical properties ?

Ans :- All the elements of a group in the periodic table have similar electronic configurations that is having the same number of valence electrons , so all the elements of a group show similar chemical properties .

Q.7. Write two advantages of the periodic table .

Ans :- (i) The periodic table has made the study of chemistry systematic and easy . It acts as an aid to memory.

(ii) It is easier to remember the properties of an element if its position in the periodic table is known .

Q.8. Which of the following belong to :

(i) The same period.

(ii) the same group ?

Element	Atomic number
A	2
B	10
C	5

Ans :- Electronic configuration of A =

Electronic configuration of B = 2 ,8

Electronic configuration of C = 2, 3

(i) The elements B and C have the same valence shell(L) therefore B and C belong to the same period .

(ii) Elements A and B belong to the same group because their valence shells are completed .