CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

PERIODIC CLASSIFICATION OF ELEMENTS

Example

1. Identify the elements to complete the table :

Period	Group	Element
1	1	
2	2	
3	1	

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2. Elements A, B, C, D and E have the electronic configura-tion as shown in the table :

	K	L	M
A	2	3	
B	2	8	1
C	2	8	5
D	2	8	7
E	2	8	8

(i) Name the element which belongs to the 2^{nd} period.

(ii) Name two elements which will exhibit a valency of 1.

(iii) Name another element which will have the same valency as the element C.

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3. Based on the group valency of elements state the formula for the following giving justification for each :

(i) Oxides of 1st group elements,

(ii) Halides of the elements of group 13,

(iii) Compounds formed when an element of group 2 combines with an element of group 16.

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4. The formulae of the oxides of two elements X and Y are XO and Y_2O_3 respectively.

(i) Find the valencies of X and Y.

(ii) Identify the groups, in which they would be placed in the Modern Periodic Table.

(iii) Name one more element belonging to each of these groups.

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5. An element of group 15 has atomic number 15. Write the number of shells in its configuration. Write its configuration and find its valency. Examine if this element will have metallic properties or not.

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6. Arrange giving reason the following elements in increasing order of their atomic size :

(a) Be, O, F (Given that they beiong to 2nd, 16th and 17th groups respectively and to 2nd period).

(b) I, CI, F (Given that they belong to 5th, 3rd and 2nd periods respectively of 17th group).

(c) Mg, N, P (Given that Mg and P belong to 2^{nd} and 15^{th} group respectively of 3^{rd} period and N belongs to 15^{th} group of 2^{nd} period).

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7. The atomic number of an element X is 19.

(a) Write its electronic configuration.

(b) To which group Modern Periodic Table does it belong and what is its valency ?

(c) If 'X' burns in oxygen to form its oxide, what will be its nature-acidic, basic or neutral ?

(d) Write balanced chemical equation for the reaction when this oxide is dissolved in water.

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8. An element P(atomic number 20) reacts with an element Q (atomic number 17) to form a compound. Answer the following questions giving reasons :

(a) Write the positions of P and Q in the Modern Periodic Table.

(b) Write the molecular formula of the compound when P reacts with Q.

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9. Carbon (atomic no. 6) and silicon (atomic no. 14) belong to group 14 of the periodic table. Write electronic configuration of these two elements. Predict whether these are metallic or not. Give reason for your answer.

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10. Four elements P, Q, R and S have atomic numbers 12, 13, 14 and 15 respectively. Answer the following questions giving reasons :

(i) What is the valency of element Q ? (ii) Classify these elements as metals and non-metals.

(iii) Which of the elements will form the most basic oxide ?

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11. Two elements X and Y belong to group 1 and 2 respectively in the same period of periodic table. Compare these elements with respect to

(i) number of electrons in their outermost orbits (ii) their valencies

(iii) metallic character (iv) their atomic size

(v) formula of their chlorides (vi) formula of their sulphates

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12. Position of three elements A, B and C in the periodic table is shown below :

Group → / Period ↓	I	II	III	IV	V	VI	VII	VIII
1								
2							C	
3	A	B						

Giving reasons explain :

(a) Element A is a metal.

(b) Element B has larger atomic size than the element C.

(c) Element C has a valency of one.

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N C E R T In Text Problems

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

find out.

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

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

4. Use Mendeléev's Periodic Table to predict the formulae for the oxides of the following elements:

K, C, Al, Si, Ba.

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

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6. What were the criteria used by Mendeléev in creating his Periodic Table?

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

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

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

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10. 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.

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11. (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?

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

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13. 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

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N C E R T End 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.

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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

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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?

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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?

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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)

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6. The position of three elements A, B and C in che periodic table are shown below :

Group 16	Group 17
–	–
–	A
–	–
B	C

(a) State whether A is metal or non-metal.

(b) Seate 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 the element A ?

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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?

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

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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?

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

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Very Short Answer Questions

1. Indicate the elements which belong to the same group from their atomic numbers as 9, 17, 24, 30, 35, 45.

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2. Arrange the following in decreasing atomic size :

(i) Na, Mg, K (ii) N, F, O (iii) N, S, P

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3. Give the name and electronic configuration of second alkali metal.

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4. What is the similarity in the electronic configuration of Mg, Ca and Sr ?

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5. Name the members of alkaline earth family. Which out of them is radioactive in nature ?

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6. The two isotopes of chlorine have atomic mass 35 u and 37 u. Should they be placed in separate slots in the periodic table ?

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7. An element "X" has mass number 35 and number of neutrons is 18. Identify group number and period of the element "X".

8. How does metallic character of the elements vary (i) in a group (ii) in a penod ?

9. Name three elements which behave as metalloids.

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10. Which property do all the elements possess that is present in the same period as the element boron ?

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11. Which common property do all the elements present in the same group have as the element fluorine ?

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12. Write the electronic configuration of the element present in the third period and seventeenth group of the periodic table.

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13. What is the basic difference in the electronic configuration of the elements belonging to group 1 and group 2 ?

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14. Three elements X, Y and Z belong to 17th group but to 2nd, 3rd and 4th period respectively. Number of valence electrons in Y is 7. Find the number of valence electrons in X and Z.

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15. Element 'Y' with atomic number 3 combines with element 'A' with atomic number 17. What would be the formula of the compound ?

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16. Name two other elements which belong to the same family as

(i) fluorine (ii) calcium (iii) carbon.

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17. On the basis of the periodic classification, identify each set belonging to either a group or a period :

(a) Na, Mg, Al (b) Na, K, Rb (c) B, C, N (d) He, Ne, Ar.

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18. The formula of magnesium oxide is MgO. Write the formula of magnesium chloride.

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19. The electronic configuration of an element is 2, 8, 7. What is its expected valency ?

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20. Two elements A and B belong to rhe same period. What is common in them ?

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21. The electronic configuration of an element is 2, 8, 6. Identify the element and name of the family to which it belongs.

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

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23. Why do elements present in a group show similar characteristics after definite gaps of atomic numbers 8, 8, 18, 18, 18, 32 ?

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24. Given below are some of the elements of first group

Li, Na, K (Their atomic numbers are 3, 11 , 19 respectively and they belong to 2nd, 3rd and 4th period respectively). Arrange these in the

decreasing order of metallic character exhibited by them.

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25. An element has electronic configuration 2, 8, 3. What is the atomic number of the element ? To which

(i) group and (ii) period does this element belong ?

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26. The atomic numbers of three elements X, Y and Z are 9, 11 and 17 respectively. Which of these two elements will show similar characteristics and why ?

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27. Choose from the following :

$_{20}Ca$, $_{3}Li$, $_{11}Na$, $_{10}Ne$

(i) An element having two shells completely filled with electrons.

(ii) Two elements belonging to the same group in the periodic table.

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28. Given below are the atomic radii of some elements of second period.

Element	B	O	N	C
Atomic Radius in pm	88	66	74	77

Arrange these elements in the increasing order of their atomic number. Give reason for your answer.

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29. Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same ? Justify your answer.

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30. The electronic configuration of an element 'X' is 2, 8, 8, 2. To which period and group of the periodic table does the element 'X' belong

? State its valency. Justify your answer in each case.

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31. Write the number of vertical columns in the modern periodic table. What are these columns called ?

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32. Why are elements H, Li, Na and K placed in group 1 ?

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Short Ansewer Questions

1. Identify the elements X a from the following information.

(a) X has 17 protons and 18 neutrons (b) Y has 17 protons and 20 neutrons.

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2. Identify the elements from the following characteristics and arrange them in increasing order of metallic character.

(a) An element which imparts golden yellow colour to the flame.

(b) An element whose oxide is used as a white wash.

(c) An element which is constituent of of chlorophyll i.e. green colouring matter in plants.

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3. (a) Atomic numbers of Mg and Al are 12 and 13 respectively. Write their electronic configuration.

(b) Mention the period of the Modern Periodic Table to which the above two elements belong. Give reason for your answer.

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4. From the part of a periodic table, answer the following questions

1 Hydrogen	2	13	14 Carbon	15	16 Oxygen	17 Fluorine
X			P			Q
Y						R
Z						T

(a) Atomic number of oxygen is 8. What would be the atomic number of, Fluorine ?

(b) Out of 'X' and 'Q' which element has larger atomic size ? Give reason for your answer.

(c) Out of 'Y' and 'Z' which element has smaller atomic size ? Give reason for your answer.

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5. Calcium is an element with atomic number 20.

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

(ii) Will its size be more or smaller than chat of potassium?

(iii) Write the formula of its chloride.

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6. An element "X" has mass number 35 and number of neutrons is 18. Identify group number and period of the element "X".

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7. Two elements X and Y have atomic numbers 12 and I 6 respectively. Write the electronic configuration for these elements. To which period of the modern periodic table do these two elements belong ? What type of bond will be formed between them and why ?

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8. (a) What is common in the elements belonging to the same period in the periodic table ?

(b) Why are chlorine and bromine kept in the same group in the periodic table ?

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9. An element belongs to third period and second group in the periodic table.

(a) State number of valence electrons in it. (b)

Is it a metal or non-metal ?

(c) Name the element (d) Write the formula of its oxide

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10. (a) The elements of the second period along with their atomic numbers in parentheses are given below :

B (5), Be (4), O(8), N(7), Li (3), C (6), F (9)

(i) Arrange them in the same order as they appear in the periodic table.

(ii) Which element has the largest and smallest atom ?

(b) Why does atomic radius change as we move from left to right in a period ?

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11. Account for the following :

(a) Elements C, N, O and F are placed in the second period of the periodic table.

(b) Elements of group 17 are monovalent.

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12. Chlorine (atomic number 17) is more electronegative than sulphur (atomic number 16). Explain.

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13. The atomic number of three elements are given below :

Element (symbol)	A	B	C
Atomic number	5	7	10

Write the symbol of the element which

belongs to (i) group 13, (ii) group 15, of the periodic table. State the period of the periodic table to which these elements belong. Give reason for your answer.

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14. Write two reasons responsible for the late discovery of noble gases.

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15. The positions of three elements P, Q and R in the periodic table are shown below

Group 15	Group 16	Group 17
.....	.....	.....
.....	.....	Q
.....	.....	.....
P	.....	R

Which of these three elements is most non-metallic ?

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16. Examine elements of the third period : Na, Mg, Al, Si, P, S, Cl, Ar and answer the following :

(a) Choose (i) Metals and (ii) Non-Metals out of

these elements. (b) On which side of the periodic table can we locate (i) Metals and (ii) Non-Metals ?

(c) Name the Metalloid out of the elements given above. Where are they located in the periodic table ?

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17. Two elements M and N belong to group I and II respectively and are in the same period of the periodic table. How do following

properties of M and N vary ?

(a) Size of their atoms (b) Their metallic character

(c) Their valencies in forming oxides (d) Formulae of their chlorides

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18. In the modern periodic table calcium (atomic number 20) is surrounded by elements with atomic numbers 12,19,21 and 38.

Which of these physical and chemical properties resembling calcium?

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19. The elements of group eighteen of the periodic table are given

(i) The elements of this group are unreactive, why ?

(ii) Which atom is bigger in size Ne or Ar, Why?

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20. Explain the variation in the following properties of the elements in the periodic table.

(i) Atomic radius in the periodic table (ii) Metallic character in a period (iii) Valency in a group.

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21. Na, Mg and Al are the elements having one, two and three valence electrons respectively. Which of these elements (i) has the largest

atomic radius, (ii) is least reactive ? Justify your answer stating reason for each.

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22. Arrange the following elements in the descending order of atomic size and give a reason for your answer.

Mg, Cl, P, Ar (Atomic numbers of the above elements are 12, 17, 15, 18 respectively).

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23. The following table shows the positions of six elements A, B, C, D, E and F in the modern periodic table

Group/Period	1	2	3 to 12	13	14	15	16	17	18
2	A					B			C
3		D			E				F

(i) Which element will form only covalent compounds ?

(ii) Which element is a metal with valency two ?

(iii) Out of D and E, which one has a bigger atomic radius ? Give reason for your answers.

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24. Given below are some elements of the modern periodic table :

$_4Be, _9F, _{14}Si, _{19}K, _{20}Ca$

(i) Select the element that has one electron in the outermost shell and write its electronic configuration.

(ii) Select two elements that belong to the same group. Give reason for your answer.

(iii) Select two elements that belong to the same period. Which one of the two has bigger atomic size ?

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25. The elements Li, Na and K, each having one valence electron, are in period 2, 3 and 4 respectively of modern periodic table.

(a) In which group of the periodic table should they be ?

(b) Which one of them is least reactive ?

(c) Which one of them has the largest atomic radius ? Give reason to justify your answer in each case.

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26. An element X (atomic number 17) combines with an element. Y (atomic number 20) to form a compound.

(i) Write the positions of these elements in the modern periodic table.

(ii) Write the formula of the compound formed. Justify your answer in each case.

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27. Two elements X and Y have atomic number 12 and 17 respectively.

(i) Write the electronic configuration of both.

(ii) Which type of bond will they form ?

(iii) Write the formula of the compound formed by their combination (in terms of X and Y).

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28. Calcium forms the following salts :

Calcium oxide -CaO, Calcium hydroxide-$Ca(OH)_2$ and Calcium sulphate-$CaSO_4$ Barium belongs to same group. Write the formulae of its oxide, hydroxide and sulphate.

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29. The atomic number of K and Ca is 19 and 20 respectively and they belong to the same period.

(a) Which amongst them would have smaller atomic size ?

(b) Which one would be more electropositive ?

(c) To which group would each of them belong ?

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30. Lithium, sodium and potassium are placed in the same group on the basis of similar properties. List three similar properties of these elements.

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31. (a) Name metals among first five elements of the Modern Periodic Table.

(b) Write their chemical symbols.

(c) Write the formula of their oxides.

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32. As we move across a period in the periodic table, what is the gradation in the following properties ?

(a) Atomic number (b) Atomic size (c) Electronegativity.

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33. How does the tendency of the elements to lose electrons change in the Modern Periodic Table in

(i) a group, (ii) a period and why?

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34. An element 'X' belongs to 3^{rd} period and group 16 of the Modern, Periodic Table.

(a) Determine the number of valence electrons and the valency of 'X'.

(b) Molecular formula of the compound when 'X' reacts with hydrogen and write its electron dot structure.

(c) Name the element 'X' and state whether it is metallic or non-metallic.

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35. Three elements 'X', 'Y' and 'Z' have atomic numbers 7, 8 and 9 respectively.

(a) State their positions (Group number and period number both) in the Modern Periodic Table.

(b) Arrange these elements in the decreasing order of their atomic radii.

(c) Write the formula of the compound formed when 'X' combines with 'Z'.

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36. An element 'X' belongs to 3^{rd} period and group 13 of the Modern Periodic Table.

(a) Determine the valence electrons and the valency of 'X'.

(b) Molecular formula of the compound formed when 'X' reacts with an element 'Y' (atomic number = 8).

(c) Write the name and formula of the compound formed when 'X' combines with chlorine.

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

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38. Write the names given to the vertical columns and horizontal rows in the Modern Periodic Table. How does the metallic charcter of elements very on moving down a vertical column ? How does the size of atomic radius

vary on moving left to right in a horizontal row ? Give reason in pupport of your answer in the above two cases.

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39. Out of the elements H(1), Be(4), Na (11), Mg(12) :

(a) Write the pair of elements having similar chemical properties.

(b) State the group number of each pair.

(c) Name one another element belonging to each of these groups.

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40. The atomic number of an element is 19.

(a) Write the electronic configuration of the element and determine (i) the valency of the element and (ii) whether the element is a metal or non-metal.

(b) Write the formula of the oxide of the element.

(c) Is the element more reactive or less reactive than Na (atomic number 11). Justify your answer giving example.

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41. The electronic configuration of an element 'X' is 2, 8, 6. To which group and period of the modern periodic table does 'X' belongs ? State its valency and justify your answer in each case.

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Long Answer Questions

1. Three elements A, B and C have atomic numbers 7, 8 and 9 respectively.

(a) What would be their positions in the modern periodic table ? (Mention group and period both)

(b) Arrange A, B and C in decreasing order of their size.

(c) Which one of the three elements is most reactive and why ?

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2. The elements with atomic number 3 to 10 belong to the second period. Taking into account the trends in the general periodic properties, predict.

(a) The most electronegative element

(b) The most electropositive element

(c) The element belonging to noble gas family

(d) The element which constitutes large number of organic compounds.

(e) The element most abundant in air

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3. Elements in Periodic Table show periodicity of properties". List any four properties.

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4. The electronic configuration of three clements X, Y and Z are given below ,

X = 2 , Y = 2, 6 , Z = 2, 8, 2.

(i) Which element belongs to the second

period ? (ii) Which element belongs to the eighteenth group ?

(iii) Which element belongs to the second group ? (iv) What is the valency of Y ?

(v) Are Y and Z metals or non-metals ?

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5. The atomic numbers of elements A, B, C, D and E are given below :

Element	A	B	C	D	E
Atomic no.	7	10	12	4	19

From the above table, answer the following

questions -

(a) Which two elements are chemically similar ? (b) Which is an inert gas ?

(c) Which element belongs to 3^{rd} period of periodic table ? (d) Which element among these is a non-metal ?

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6. Using the part of the periodic table given below, answer the questions that follow.

Group ⇒ Period ⇓	I	II	III	IV	V	VI	VII	Zero
1	H							He
2	Li	Be	B	C	N	O	F	Ne
3	Na	Mg	Al	Si	P	S	Cl	Ar
4	K	Ca						

(i) Na has physical properties similar to which elements and why ?

(ii) Write the electronic configuration of N and P.

(iii) State one property common to fluorine and chlorine.

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7. The atomic radii of the elements of second period are given below:

2nd period elements :	B	Be	O	N	Li	F	C
Atomic radii (pm) :	88	111	66	74	152	64	77

(a) Arrange these elements in the decreasing order of their atomic radii (Keeping the element with the largest atomic radius first).

(b) Are the elements now arranged in the pattern of a period in the periodic table?

(c) Which elements have the largest and the smallest atoms?

(d) From this data, infer how the atomic size (or atomic radius) of the elements changes as you go from left to right in a period?

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8. 'The atomic number of Cl is 17. On the basis of this information, answer the questions that follow :

(a) Write the electronic configuration of Cl.

(b) Find its valency.

(c) To which group does it belong ?

(d) Identify the type of ion it will form.

(e) Write down the formula of the compound it forms with other elements.

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9. The list of the elements present in the same period but in different groups is given :

12 13 14 15 16 17 18

(a) Do these groups represent modern periodic table ?

(b) Which element will belong to oxygen family ?

(c) Which element will not take part in chemical combination ?

(d) The elements belonging to which groups will form ionic bonds most readily ?

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10. An element E has following electronic configuration :

K	L	M
2	8	6

(a) To which group of the periodic table does element E belong ?

(b) To which period of the periodic table does element E belong ?

(c) State the number of valence electrons present in element E.

(d) State the valency of the element E.

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11. From the part of the periodic table given, answer the following questions.

1 Lithium	2	13	14 Carbon	15	16 Oxygen	17 L	18 Neon
X Y Z			S		P	Q R T	

(a) Which is the most reactive metal ? (b) Name the family of L, Q, R, T.

(c) Name one element of group 2 and 15, (d) Name one member of group 18 other than neon. (e) Give the name of the element S placed below carbon in group 14.

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12. Atomic number of an element is 16. Predict.

(i) the number of valence electrons in its atom

(ii) its valency

(iii) its group number (iv) whether it is a metal or a non-metal

(v) the nature of oxide formed by it. (vi) the formula of the chloride.

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13. (a) How are the following related ?

(i) Number of valence electrons of the different elements present in the same group.

(ii) Number of the shells of the elements in the same period.

(b) How do the following change ?

(i) Number of shells of the elements as we go down a group.

(ii) Number of valence electrons of elements on moving from left to right in a period.

(iii)Atomic radius in moving from left to right

along a period.

(iv) Atomic size down a group.

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14. The position of some elements A, B, C, D, E, F, and G in the Modern Periodic Table is given as under.

Group→ Period ↓	16	17	18
1			A
2	B	C	D
3	E	F	G

(a) In which group are inert elements placed ?

(b) What type of ions would B, C, E, and F form ?

(c) Which element would have chemical properties similar to C ?

(d) How many shells can A have ?

(e) What is the similarity between A and D ?

(f) Identify the most abundant element in the earth's crust.

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15. (a) The modern periodic table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.

(b) Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.

State Modern periodic law.

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16. An element is placed in 2^{nd} group and 3^{rd} period of the periodic table, burns is presence of xygen of form a basic oxide

(a) Identify the element

(b) Write the electronic configuration

(c) Write a balanced equation when it burns in the presence of air

(d) Write a balanced when this oxide is dissolved in water

(e) Draw the electron dot structure for the formation of this oxide.

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17. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a divalent halide

(a) Where in the periodic table are elements X and Y placed ?

(b) Classify X and Y as metal (s), non-metal (s) or metalloid (s)

(c) What will be the nature of oxide of element Y ? Identify the nature of bonding in the compound formed

(d) Draw the electron dot structure of the divalent halide.

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18. Atomic number of few elements are given below 10, 20, 7, 14

(a) Identify the elements

(b) Identify the group number of these elements in the periodic table

(c) Identify the periods of these elements in the periodic table

(d) What would be the electronic configuration for each of these elements

(e) Determine the valency of these elements.

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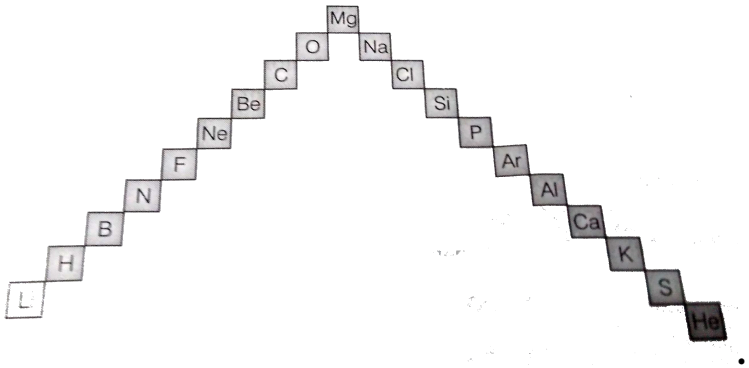
19. (a) In this ladder (Figure) symbols of elements are jumbled up. Rearrange these symbols of elements in the increasing order of their atomic numbers in the periodic table

(b) Arrangement them in the order of their group also



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20. Complete the following crossword puzzle (Figure)

Across

(1) An element with atomic number 12

(3) Metal used in making cans and member of group 14

(4) A lustrous non-metal which has 7 electrons in its outermost shell

Down

(2) Highly reactive and soft metal which

imparts yellow colour when subjected to flame and is kept in kerosene

(5) The first element of second period

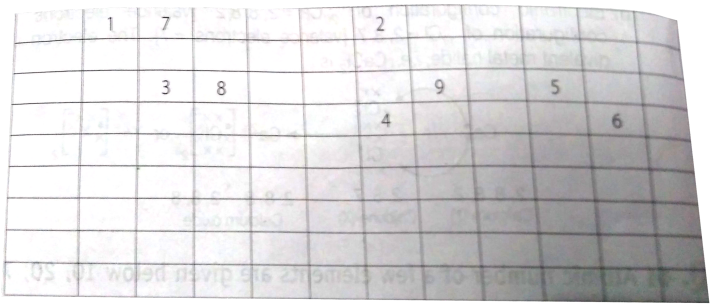
(6) An element whihc is used in making flurescent bulbs and is second member of group 18 in the modern periodic table

(7) A radioactive element which is the last member of halogen family

(8) Metal which is an important constituent of steel and forms rust when exposed to moist air

(9) The first metalloid in modern periodic table whose fibres are used in making bullet-proof

vests



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21. Mendeleev predicted the existence of certain elements not known at that time and named two of them as Eka-Silicon and Eka-aluminium

(a) Name the elements which have taken the

place of these elements

(b) Mention the group and the period of these electron in the modern periodic table

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

(d) How many valence electrons are present in each one of them ?

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22. (a) Electropositive nature of the element(s) increases down the group and decreases

across the period

(b) Electronegativity of the element decreases down the group and increases across the period

(c) Atomic size increase down the group and decreases across a period (left to right)

(d) Metallic character increases down the group and decreases across a period

On the basis of the above trends of the periodic table, answer the following about the electron with atomic number 3 to 9

(a) Name the most electropositive element among them

(b) Name the most electronegative element

(c) Name of the element with smallest atomic size

(d) Name the element which is a metalloid

(e) Name the element which shows maximum valency.

 Watch Video Solution

23. An element X which is a yellow solid at room temperature shows catenation and allotropy. X forms two oxides which are also

formed during the thermal decomposition of ferrous sulphate crystals and are the major air pollutants

(a) Identify the element X

(b) Write the electronic configuration of X

(c) Write the balanced chemical equation for the thermal decomposition of ferrous sulphate crystals ?

(d) What would be the nature (acidic/basic) of oxides formed ?

(e) Locate the position of the element in the modern table.

Watch Video Solution

24. An element X of group 15 exists as diatomic molecule and combines with hydrogen at 773 K in presence of the catalyst to form a compound, ammonia which has a characteristic pungent smell

(a) Identify the element X. How many valence electrons does it have ?

(b) Draw the electron dot structure of the diatomic molecule of X. What type of bond is formed in it ?

(c) Draw the electron dot structure for

ammonia and what type of bond is formed in it ?

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25. Which group of elements could be placed in mendeleev's periodic table without disturbing the original order ? Give reason.

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26. Give an account of the process adopted by Mendeleev for the classification of elements. How did he arrive at "periodic law" ?

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Higher Order Thinking Skill Based Questions

1. Atoms of eight elements A, B, C, D, E, F, G and H have the same number of electronic shells but different number of electrons in their

outermost shell. It was found chat elements A and G combine to form an ionic compound. This compound is added in a small amount to almost all vegetable dishes during cooking Oxides of elements A and B are basic in nature while those of E and F are acidic. The oxide of D is almost neutral. Based on the above information answer the following questions :

(i) To which group or period of the periodic table do the listed elements belong ?

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

(iii) Which two elements could definitely be metals ?

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

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

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2. The following table shows the position of six elements A, B, C, D, E and F in the period table.

Groups / Periods	1	2	3 to 12	13	14	15	16	17	18
2.		A				B			C
3.		D			E				F

Using the above table answer the following questions :

(a) Which element will form only covalent compounds ?

(b) Which element is a metal with valency 2 ?

(c) Which element is a non-metal with valency of 3 ?

(d) Out of D and E, which one has more atomic radius and why?

(e) Write a common name for the family of elements C and F.

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3. Two elements X and Y belong to group 1 and 2 respectively in the same period. Compare them with respect to:

(a) the number of valence electrons (b) valency (c) metallic character (d) size of the atoms (e) formulae of their oxides and chlorides.

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4. Atoms of seven elements A, B, C, D, E, F and G have a different number of electronic shells but have the same number of electrons in their outermost shells. The elements A and C combine with chlorine to form an acid and common salt respectively. The oxide of element A is liquid at room temperature and is a neutral substance while the oxides of the remaining six elements are basic in nature. Based on the above information, answer the following questions given ahead :

(i) What could the element A be ?

(ii) Will elements A to G belong to the same period or same group of the periodic table ?

(iii) Write the formula of the compound formed by the reaction of the element A with oxygen.

(iv) Show the formation of the compound by a combination of element C with chlorine with the help of electronic structure.

(v) What would be the ratio of number of combining atoms in a compound formed by the combination element A with carbon ?

(vi) Which one of the given elements is likely to have the smallest atomic radius ?

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Test Your Knowledge Very Short Answer Questions

1. Name two other elements which belong to the same family as

(i) fluorine (ii) calcium (iii) carbon.

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2. On the basis of the periodic classification, identify each set belonging to either a group or a period :

(a) Na, Mg, Al (b) Na, K, Rb (c) B, C, N (d) He, Ne, Ar.

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3. The formula of magnesium oxide is MgO. Write the formula of magnesium chloride.

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4. The electronic configuration of an element is 2, 8, 7. What is its expected valency ?

Watch Video Solution

5. Two elements A and B belong to rhe same period. What is common in them ?

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6. The electronic configuration of an element is 2, 8, 6. Identify the element and name of the family to which it belongs.

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

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8. Why do elements present in a group show similar characteristics after definite gaps of atomic numbers 8, 8, 18, 18, 18, 32 ?

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9. Would you place the two isotopes of chlorine, Cl-35 and Cl-37 in different slots because of their different atomic masses or in the same slot because their chemical properties are the same ? Justify your answer.

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10. The electronic configuration of an element 'X' is 2, 8, 8, 2. To which period and group of the periodic table does the element 'X' belong ? State its valency. Justify your answer in each case.

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11. Write the number of vertical columns in the modern periodic table. What are these

columns called ?

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12. Why are elements H, Li, Na and K placed in group 1 ?

Watch Video Solution

13. why are metals called electropositive elements whereas non-metals are called electronegative elements?

Watch Video Solution

14. Among the elements Na, Ca, Al, K, Mg, and Li, which belong to the same period in the periodic table ?

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15. The electronic configuration of an element is 2, 8, 5. To which group are period does it belong ?

Watch Video Solution

Test Your Knowledge Short Answer Questions

1. In the modern periodic table calcium (atomic number 20) is surrounded by elements with atomic numbers 12,19,21 and 38. Which of these physical and chemical properties resembling calcium?

Watch Video Solution

2. Explain the variation in the following properties of the elements in the periodic table.

(i) Atomic radius in a period (ii) Metallic character in a period (iii) Valency in a group.

 Watch Video Solution

3. Na, Mg and Al are the elements having one, two and three valence electrons respectively. Which of these elements (i) has the largest

atomic radius, (ii) is least reactive ? Justify your answer stating reason for each.

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4. Given below are the atomic radii of some elements of second period.

Element	B	O	N	C
Atomic Radius in pm	88	66	74	77

Arrange these elements in the increasing order of their atomic number. Give reason for your answer.

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5. The elements Li, Na and K, each having one valence electron, are in period 2, 3 and 4 respectively of modern periodic table.

(a) In which group of the periodic table should they be ?

(b) Which one of them is least reactive ?

(c) Which one of them has the largest atomic radius ? Give reason to justify your answer in each case.

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6. An element X (atomic number 17) combines with an element. Y (atomic number 20) to form a compound.

(i) Write the positions of these elements in the modern periodic table.

(ii) Write the formula of the compound formed. Justify your answer in each case.

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7. Calcium forms the following salts :

Calcium oxide -CaO, Calcium hydroxide-$Ca(OH)_2$ and Calcium sulphate-$CaSO_4$ Barium belongs to same group. Write the formulae of its oxide, hydroxide and sulphate.

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8. State Modern Periodic Law ? Why is it considered better than Mendeleev's periodic law for the classification of the elements ?

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9. (a) The oxide of an element has the formula X_2O_3. Write the formula of the phosphate of the same element.

(b) Name the elements with complete K and L shells. Predict the valency of the element.

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10. The atomic size of an element increases down the group while along a period, it tends

to decrease. Explain.

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11. Two elements X and Y have atomic number 12 and 17 respectively.

(i) Write the electronic configuration of both.

(ii) Which type of bond will they form ?

(iii) Write the formula of the compound formed by their combination (in terms of X and Y).

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12. (a) Name metals among first five elements of the Modern Periodic Table.

(b) Write their chemical symbols.

(c) Write the formula of their oxides.

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13. An element 'X' belongs to 3rd period and group 16 of the Modern Periodic Table.

(a) Identify the element.

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

(c) What is the valency of the element ?

(d) Write the formulae of its compound with hydrogen.

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14. Write the names given to the vertical columns and horizontal rows in the Modern Periodic Table. How does the metallic charcter of elements very on moving down a vertical column ? How does the size of atomic radius vary on moving left to right in a horizontal

row ? Give reason in pupport of your answer in the above two cases.

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Test Your Knowledge Long Answer Questions

1. Two elements M and N belong to group I and II respectively and are in the same period of the periodic table. How do following properties of M and N vary ?

(a) Size of their atoms (b) Their metallic

character

(c) Their valencies in forming oxides (d) Formulae of their chlorides

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Ncert Exemplar Problems Multiple Choice Questions

1. Upto which element, the law of octaves was found to be applicable ?

A. Oxygen

B. Calcium

C. Cobalt

D. Potassium

Answer: B

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2. According to Mendeleev' 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.

Answer: C

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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

Answer: A

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4. Which of the following statements (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 numbers

(ii) The elements in the modern periodic table are arranged on the basis of their increasing atomic mases.

(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

Answer: B

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5. 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

Answer: C

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6. 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

Answer: B

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7. The elements A, B, C, D and E have atomic number $9, 11, 17, 12$ and 13

respectively. Which pair of elements belongs to the same group ?

A. A and B

B. B and D

C. A and C

D. D and E

Answer: C

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8. 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

Answer: C

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9. 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

Answer: B

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10. 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

Answer: B

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11. Which one of the following elements exhibit maximum number of velence electrons ?

A. Na

B. Al

C. Si

D. P

Answer: D

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12. 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

Answer: D

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13. Which among the following elements has the largest atomic radii ?

A. Na

B. Mg

C. K

D. Ca

Answer: C

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

A. Mg

B. Na

C. K

D. Ca

Answer: C

Watch Video Solution

15. Which of the following elements does not lose an electron easily ?

A. Na

B. F

C. Mg

D. Al

Answer: B

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16. Isotopes of an element have :

(a) the same physical properties

(b) different chemical properties

(c) different number of neutrons

(d) different atomic numbers

A. (i), (iii) and (iv)

B. (ii), (iii) and (iv)

C. (ii) and (iii)

D. (ii) and (iv).

Answer: D

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17. Arrange the following elements in the order of their decreasing metallic character Na, Si, Cl, Mg, Al.

A. $Cl > Si > Al > Mg > Na$

B. $Na > Mg > Al > Si > Cl$

C. $Na > Al > Mg > Cl > Si$

D. $Al > Na > Si > Ca > Mg.$

Answer: B

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18. Arrange the following elements in the order of their increasing non-metallic character Li, O, C, Be, F

A. $F < O < C < Be < Li$

B. $Li < Be < C < O < F$

C. $F < O < C < Be < Li$

D. $F < O < Be < C < Li$

Answer: B

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19. What type of oxide would Eka-aluminium form ?

A. EO_3

B. E_3O_2

C. E_2O_3

D. EO

Answer: C

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20. Three elements B, Si and Ge are

A. metals

B. non-metals

C. metalloids

D. metal, non-metal and metalloid respectively

Answer: C

Watch Video Solution

21. 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.

Answer: A

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22. 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.

Answer: B

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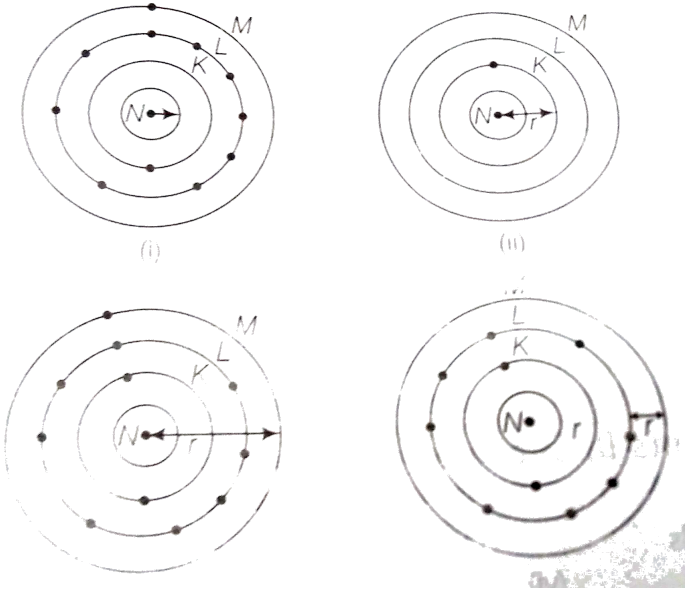
23. Which one of the following depict the correct representation of atomic radius (r) of an atom ?



A. (i) and (ii)

B. (ii) and (iii)

C. (iii) and (iv)

D. (i) and (iv).

Answer: B

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24. 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.

Answer: C

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25. 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

Answer: B

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

A. $Be \quad Mg \quad Ca$

B. $Na \quad Li \quad K$

C. $Mg \quad Al \quad Si$

D. $C \quad O \quad N$

Answer: A

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Saqs

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

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2. Elements have been arranged in the following sequence on the basis of their

increasing atomic masses. F, Na, Mg, Al, Si, P, S, Cl,Ar, K.

(a) Pick two sets of elements which have similar properties

(b) The given sequence represents which law of classification of elements ?

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3. Can the following groups of elements be classified as Dobereiner's triad ?

(a) Na, Si, Cl

(b) Be, Mg, Ca

Atomic mass of Be 9, Na 23, Mg 24, Si 28, Cl 35, Ca 40

Explain by giving reason.

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4. 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.

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5. Hydrogen occupies a unique position in modern periodic table. Justify the statement.

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6. Write the formulae of chlorides of Eka-Silicon and Eka-aluminium, the elements

predicted by Mendeleev.

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7. Three elements A, B and C have 3,4 and 2 electrons respectively in their outermost shell. Give the group number to which they belong in the modern periodic table. Also, give their valencies.

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

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9. Compare the radii of two species X and Y. Give reasons for your answer.

(a) X has 12 protons and 12 electrons

(b) Y has 12 protons and 10 electrons.

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10. Arrangement the following elements in increasing order of their atomic radii

(a) Li, Be, F, N

(b) Cl, At, Br, I

Watch Video Solution

11. Identify and name the metal 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.

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12. Write the formula of the product formed when the element A (atomic number 19) combines with the element B (atomic number 17) Draw its electronic dot structure. What is the nature of the bond formed ?

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13. Arrange the following elements in the increasing order of their metallic character Mg, Ca, K, Ge, Ga.

Watch Video Solution

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

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

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

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

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15. Properties of the elements are given below. Where would you locate the following elements in the periodic table ?

(a) A soft metal stored under kerosene

(b) An element with variable (more than one)

valency stored under water.

(c) An element which is tetravalent and forms the basis of organic chemistry

(d) An element which is an inert gas with atomic number 2

(e) An element whose thin oxide layer is used to make other element corrosion resistant by the process of "anodising".

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Pbqs

1. A student dipped a strip of pH paper in distilled water taken in a tube. As expected, the pH paper acquired green colour. He then dissolved a pinch of common sale in the same tube. What will be the expected change in colour of the pH paper ?

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2. Five solutions A,B,C,D and E when tested with universal indicator showed pH as 4,1,11,7 and 9, respectively. Which solution is

(a) neutral?

(b) strongly alkaline?

(c) strongly acidic?

(d) weakly acidic?

(e) weakly alkaline?

Arrange the pH in increasing order of hydrogen-ion concentration.

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3. Name the acid and base from which the following salts have been formed :

(i) Sodium acetate (ii) Ammonium chloride (iii) Calcium nitrate (iv) Sodium carbonate.

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4. When water is added gradually to a white solid X, a hissing sound is heard and a lot of heat is produced forming a product Y.A suspension of Y in water is applied to the walls of a house during white washing. A clear solution of Y is also used for testing carbon dioxide gas in the laboratory.

(a) What could be solid X? Write its chemical formula.

(b) What could be product Y ? Write its chemical formula.

(c) What is the common name of the solution of Y which is used for testing carbon dioxide gas?

(d) Write chemical equation of the reaction which takes place on adding water to solid X.

(e) Which characteristic of chemical reactions is illustrated by this example ?

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5. Two drinks P and Q gave acidic and alkaline reactions, respectively one has a pH value of 9?

Watch Video Solution

6. Take five test tubes and label them as A, B, C, D and E. Add 5 mL of five unknown solutions in them. Put a small strip of universal indicator in each of them. Following colours appear in these :

Solution A-Orange, Solution B-Green, Solution

C-Red, Solution D-Blue, Solution E-Violet. Predict the nature of the solutions in these from the pH character.

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7. An alkali metal A gives a compound B (molecular mass = 40) on reacting with water. The compound B gives a soluble compound C on treatment with aluminium oxide. Identify A, B and C and give the reactions involved.

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8. You want to study a decomposition reaction by taking ferrous sulphate crystals in a boiling tube. List two steps you would follow while doing the experiment.

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9. On keeping iron nails in a blue coloured copper sulphate solution, it is observed that the colour of the solution turns light green

after sometime. Give reasons for this colour change. Name the type of reaction.

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10. While studying the double displacement reaction, the solutions of barium chloride and sodium sulphate are mixed together.

(i) What do you observe as soon as the two solutions are mixed together ?

(ii) What will happen in the above observation made by you after ten minutes ?

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11. You want to perform an experiment to study a double displacement reaction in your school laboratory. Name two aqueous solutions required for the experiment. Stare the colour change you are likdy to observe on mix- ing the two solutions.

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12. You are given two colourless solutions present in two test tubes. One out of these is ethyl alcohol and the other is acetic acid. Give three tests to identify these.

Watch Video Solution

13. You are provided with two samples of hard water, one containing temporary hardness and the other permanent hardness. Without the

help of any chemical, how will you identify the nature of the sample.

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14. How will you distinguish between ethane and ethene with the help of a chemical test ?

Watch Video Solution

15. An unknown organic liquid does not turn blue litmus red and gives no effervescence

with sodium hydrogen carbonate. However, when a dry piece of sodium pellet is added to the liquid, a gas is evolved with brisk effervescence. Identify the liquid.

A. alcohol

B. aldehyde

C. ketone

D. carboxylic acid

Answer: A

 Watch Video Solution

16. How will you distinguish between hydrochloric acid and ethanoic acid with the strip of a universal pH paper ?

Watch Video Solution

17. Give a simple test to distinguish soaps from detergents.

Watch Video Solution

18. Write the name of apparatus/chemicals required to study the following properties of ethanoic acid in the laboratory.

Nature, odour, solubility and action are sodium hydrogen carbonate.

Watch Video Solution

19. A student added sodium hydrogen carbonate solution in ethanoic acid taken in a test tube and the gas evolved was tested with

a burning splinter. Write the chemical equation for the evolution of this gas and its effect on burning splinter.

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20. A student is studying the properties of acetic acid in his school laboratory. List two chemical properties which he must observe and note in his record book.

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21. A student adds a spoon full of powdered sodium hydrogen carbonate to a flask containing ethanoic acid. List two main observations, he must note in his note book, about the reaction chat takes place. Also write chemical equation for the reaction.

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22. A gas is liberated immediately with brisk effervescence when you add acetic acid to sodium hydrogen carbonate powder in a test

tube. Name the gas and describe a test to confirm the identity of the gas.

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23. If you are asked to report two observations about the following two properties of acetic acid, what would you report (i) Odour (ii) Effect on litmus?

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24. Mention the essential material (chemicals) to prepare soap in the laboratory. Describe in brief the test of determining the nature (acidic/alkaline) of the reaction mixture of saponification reaction.

Watch Video Solution

25. What do you observe when you add a few drops of acetic acid to a test tube containing.

(a) phenolphthalein (b) distilled water (c)

universal indicator (d) sodium hydrogen carbonate.

Watch Video Solution

26. A student addd few pieces of aluminium metal to two test tubes A and B containing aqueous solutions of iron sulphate and copper sulphate. In the second part of her experiment, the added iron metal to another test tubes C and D containing aqueous solutions of aluminium sulphate and copper

sulphate.

In which test tube or test tubes will she observe colour change? On the basis of this experiment, state which one is the most reactive metal and why ?

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27. When a few drops of phenolphthalein are added to a dilute solution of sodium hydroxide, a pink colour is produced. What will be the colour of the final mixture when excess

of HCI is added to it ? (jusify your answer)

Arrange the metals iron, magnesium, zinc and copper in the increasing order of their reactivity. What will be the two observations made by the student when iron filings are added to copper sulphate solution ?

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28. From an experiment to study the properties of acetic acid. Answer the following

questions :

(a) Name the substance which on addition to acetic acid produces carbon dioxide gas. Give relevant chemical equation for the above ?

(b) How is CO_2 gas tested in the laboratory?

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