



# CHEMISTRY

## BOOKS - S CHAND CHEMISTRY (HINGLISH)

### PERIODIC CLASSIFICATION OF ELEMENTS

**Solved Examples**

1. 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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2. 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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3. 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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4. 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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5. The positions of three elements  $A$ ,  $B$  and  $C$  in the periodic table are shown here

(a) State whether  $A$  is a metal or non-metal?

Group

16

Group

17

—	—
—	A
—	—
B	C

State whether  $C$  is more reactive or less reactive than  $A$

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

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



6. The atomic radii of group 1 elements of the periodic table are as follows:

$Na(186\text{pm})$ ,  $Li(152\text{pm})$ ,  $R(244\text{pm})$ ,  $Cs(262\text{pm})$   
and  $K(231\text{pm})$ .

(a) Arrange these elements in the increasing order of their atomic radii in a vertical column (keeping the element with the smallest atomic radius at the top).

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

(c) From this data, infer how the size (or atomic radius) of elements vary as we go down in the group



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7. 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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8. Carbon (atomic number 6) and silicon (atomic number 14) are elements in the same group of the periodic table. Give the electronic arrangements of the carbon and silicon atoms, and state the group in which these elements, occur.



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9. Name of elements you would expect to show chemical reactions similar to

magnesium. What is the basis for your choice?



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10. Which of the following belong to (i) same period and (ii) the same group?

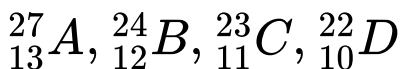
<i>Element</i>	<i>Atomic number</i>
A	2
B	10
C	5



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11. In the following set of elements, one element does not belong to the set. Select this element and explain why it does not belong:



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12. The electronic configuration of three elements  $X$ ,  $Y$  and  $Z$  are given below:

$X$  2

$Y$  2, 6

$Z_2, 8, 2$

(i) Which element belongs to second period?

(ii) Which element belongs to second group?

(iii) Which element belongs to eighteenth group?



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**13.** The atomic numbers of three elements

$A$ ,  $B$  and  $C$  are given below:

Element Atomic

$A_3$

*B9*

*C11*

Giving reasons state, which two elements will show similar chemical properties.



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**14.** The electronic configuration of an element

*X* is:

*KLM*

2, 8, 6

(i) What is the group number of element *X* in

the periodic 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 is  $X$ ?

(iv) What is the valence of  $X$ ?

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



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**15.** An element  $A$  belongs to third period and group 1 of the periodic table. Find out:

(i) the number of valence electrons in its atoms (ii) valency of the element

(iii) metal or non-metal (iv) name of the element

(v) name of the family to which this element belongs



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**16.** Elements  $X$  and  $Y$  belong to groups 1 and 17 of the periodic table respectively. What will

be the nature of the bond in the compound  $XY$ ? Give two properties of  $XY$



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**17.** An element  $X$  is in group 13 of the periodic table. What is the formula of its oxide?



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**18.** In the following diagram for the first three periods of the periodic table, five elements

have been represented by the letters *a*, *b*, *c*, *d* and *e* (which are not their chemical symbols):

1							18
	2	13	14	15	16	17	
			<i>a</i>			<i>b</i>	
	<i>c</i>				<i>d</i>		<i>e</i>

(i) Select the letter which represents a halogen.

(ii) Select the letter which represents a noble gas.

(iii) What type of bond is formed between *a* and *b*?

(iv) What type of bond is formed between *c* and *b*?

(v) Which element will form a divalent anion?



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## Exercise

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

(b) On what basis are they arranged now?



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

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

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

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



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3. Name of Russian chemist who said that the properties of elements are a periodic function of their atomic masses.



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4. Rewrite the following statements after correction, if necessary:

(a) Groups have elements with consecutive atomic numbers.

(b) Periods are the horizontal row of elements

(c) Isotopes are the elements of the same group.



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## 5. Triads And Law Of Octaves



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6.  $A$ ,  $B$  and  $C$  are the elements of a Deobereiner's triad. If th atomic mass of  $A$  is 7

and that of  $C$  is 39, what should be the atomic mass of  $B$ ?



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7.  $X$  and  $Y$  are the two elements having similar properties which obey Newland's law of octaves. How many elements are there in between  $X$  and  $Y$ ?



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**8.** What was the Mendeleev's basis of the classification of elements.?



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**9.** In the classification of the then known elements, Mendeleev was guided by two factors. What are those two factors?



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



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**11.** The three elements predicted by Mendeleev 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?





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



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**13.**  $A$ ,  $B$  and  $C$  are the elements of a Dobereiner's triad. If the atomic mass of  $A$  is 7 and that of  $C$  is 39, what should be the atomic mass of  $B$ ?



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



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**15.** Fill in the following blanks with suitable words:

(a) The basis for modern periodic table



is.....

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

(c) Group 1 elements are called.....

(d) Group 17 elements are known as.....

(e) Group 18 elements are called.....

(f) According to Newland's classification of elements, the properties of sulphur are similar to those of oxygen because sulphur is the ..... element starting from oxygen.



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16. (a) What is meant by (i) a group and (ii) a period in a periodic table?

(b) How many periods and groups are there in the long form periodic table?

(c) Give two examples each of (i) group 1 elements (ii) group 17 elements (iii) group 18 elements.



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## 17. NEWLAND'S LAW OF OCTAVES



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**18.** (a) State the merits of Mendeleev's classification of elements.

(b) Describe two anomalies of Mendeleev's periodic classification of elements.



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**19.** (a) How do the properties of eka-aluminium element predicted by Mendeleev compare with the actual properties of gallium element? Explain your answer.

(b) What names were given by Mendeleev to the then undiscovered elements (i) Scandium (ii) gallium, and (iii) germanium?



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**20.** (a) Why do we classify elements?

(b) What were the two criteria used by Mendeleev to classify the elements in his periodic table?

(c) Why did Mendeleev leave some gaps in his periodic table?

(d) In Mendeleev's periodic table, why was there no mention of noble gases like helium, neon and argon?

(e) 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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21. 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

**Answer: B**



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22. 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

**Answer: B**



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23. According to Mendeleev' 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

**Answer: D**



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24. Three elements  $B$ ,  $Si$  and  $Ge$  are :

A. all metals

B. all non -metals

C. all metalloids

D.  $Si$  is metalloid,  $B$  is metal and  $Ge$  is  
non-metal

**Answer: C**



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25. 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. *Be*

B. *Si*

C. *Ge*

D. *Se*

**Answer: C**



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26. The three imaginary elements  $X$ ,  $Y$  and  $Z$  represent a Döbereiner's triads. 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

**Answer: C**



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27. The atomic numbers of four elements  $P$ ,  $Q$ ,  $R$  and  $S$  are 6, 8, 14 and 16 respectively. Out of these, the element known as metalloid is

A.  $P$

B.  $Q$

C.  $R$

D.  $S$

**Answer: C**



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**28.** Which of the following statement is correct in regard to the classification of elements ?

A. Elements in modern periodic table are arranged on the basis of increasing atomic masses

B. Element 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 same group

**Answer: D**



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**29.** 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 period.

C. It has 18 vertical columns known as groups

D. It has 7 horizontal rows known as groups.

**Answer: C**



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**30.** An element  $X$  forms an oxide  $X_2O_3$ . In which group of Mendeleev's periodic table is this element placed ?



A. Group II

B. Group III

C. Group V

D. Group VIII

**Answer: B**



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**31.** The modern periodic table was prepared by

A. Dobereiner

B. Newlands

C. Moseley

D. Mendeleev

**Answer: C**



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**32.** 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. neutron

D. meson

**Answer: B**



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**33.** 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 a set of elements which can be classified according to this law.



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**34.** In the following set of elements one element does not belong to the set. Select this element and explain why it does not belong:

Calcium, Magnesium, Sodium, Beryllium



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**35.** In the following set of elements, one element does not belong to the set. Select this element and state why it does not belong:

Oxygen, Nitrogen, Carbon, Chlorine, Fluorine



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**36.** 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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**37.** Consider the following elements:

*Na, Ca, Al, K, Mg, Li*

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

(b) Which of these elements belong to the same group of the periodic table?



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**38.** 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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**39.** Consider the following elements:

*Ca, Cl, Na, I, Li, Ba, Sr, K, Br*



Separate these elements into three groups (families) of similar properties. State one property in each case on the basis of which you have made your choice.



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**40.** Mendeleve predicted the existence of certain elements 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 modern periodic table.

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

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



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**41.** 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 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.



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**42.** (a) Explain why:

(i) All the elements of a group have similar chemical properties.

(ii) All the elements of a period have different chemical properties.

(b) The atomic radii of three elements  $X$ ,  $Y$  and  $Z$  of a period of the periodic table are 186

pm, 104 pm and 143 pm respectively. Giving reason arrange these elements in the increasing order of atomic numbers in the period.



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**43.** (a) How does the electropositive character of elements change on going down in a group of the periodic table?

(b) State how the valency of elements varies (i)

in a group and (ii) in a period, of the periodic table.



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**44.** (a) What is the fundamental difference in the electronic configurations between the group 1 and group 2 elements?

(b) On the basis configuration, how will you identify:

(i) chemically similar elements?

(ii) the first element of a period?



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**45.** (a) What is the usual number of valence 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?



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**46.** (a) What is the main characteristic of the last elements in the periodic of the periodic table? What is the general name of such elements?

(b) What is he number of elements in : (a) 1st period, and (b) 3rd period, of the modern periodic table?



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47. (a) How does the atomic size vary on going down from top to bottom in a group of the periodic table? Why does it vary this way?

(b) Lithium, sodium and potassium are all metals that react with water to liberate hydrogen gas. Is there any similarity in the atoms of these elements? Explain your answer.



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**48.** (a) How does the tendency to lose electrons change as we go down in group 1 of the periodic table? Why does it change this way?

(b) How does the tendency to gain electrons change as we go down in group 17 of the periodic table? Why does it change this way?



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49. (a) Why does the size of the atoms progressively become smaller when we move from sodium ( $Na$ ) to chlorine ( $Cl$ ) in the third period of the periodic table?

(b) Helium and neon are unreactive gases. What if anything do their atoms have in common?



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**50.** (a) In the modern Periodic Table, why does cobalt with higher atomic mass of 58.93 appear before nickel having lower atomic mass of 58.71?

(b) Why could no fixed position be given to hydrogen in Mendeleev's periodic table?



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**51.** (a) Explain why the first period of the modern periodic table has only two elements

whereas second period has eight elements

(b) Why do elements in the same group show similar properties but the elements in different groups show different properties?

(c) For each of the following triads, name the element with the characteristics specified

below:

<i>Elements</i>	<i>Least atomic radius</i>	<i>Chemically least reactive</i>
(i) F, Cl, Br	.....	.....
(ii) Li, Na, K	.....	.....

(d) State on reason for keeping fluorine and chlorine in the same group of the periodic table.

(e) What are the merits of the moderns periodic table of elements?



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**52. (a)** What is a group in the periodic table in which part of a group would you separately expect elements to have (i) the greatest metallic character (ii) the largest atomic size?

(b) In what respects do the properties of group 1 elements differ from those of group 17 elements? Explain with examples by taking one

element from each group.

(c) From the standpoint of atomic structure, what determines which element will be the first and which the last in a period of the periodic table?

(d) Explain why, the properties of elements are repeated after 2,8,18 and 32 elements in the periodic table.



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**53.** 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

**Answer: C**



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**54.** 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. 2<sup>nd</sup> group

B. 4<sup>th</sup> group

C. 14<sup>th</sup> group

D. 8<sup>th</sup> group

**Answer: C**



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**55.** 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

**Answer: B**



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**56.** 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

**Answer: B**



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

A. *Mg*

B. *Na*

C. *K*

D. *Ca*

**Answer: C**



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**59.** 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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**60.** 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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**61.** An element which is an essential constituent of all organic compounds belongs to



A. group 4

B. group 14

C. group 15

D. group 16

**Answer: B**



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**62.** 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

**Answer: C**



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**63.** The element which has the maximum number of valence electrons is:

A. *Na*

B. *P*

C. *Si*

D. *Al*

**Answer: B**



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**64.** The correct increasing order of the atomic radii of the elements oxygen, fluorine and nitrogen :

A.  $O, F, N$

B.  $N, F, O$

C.  $O, N, F$

D.  $F, O, N$

**Answer: D**



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**65.** 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*

**Answer: C**



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**66.** 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

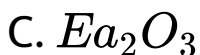
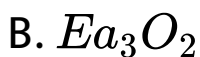
D. ii and iv

**Answer: D**



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



**Answer: C**



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**68.** The element which can form an acidic oxide should be the one whose atomic number is:

A. 6

B. 16

C. 12

D. 19

**Answer: B**





**69.** The element which forms a basic oxide has the atomic number of:

A. 18

B. 17

C. 14

D. 19

**Answer: D**



70. 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 electrons
- D. shells in the atoms

**Answer: C**



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

A. increases

B. decreases

C. remains the same

D. first increases then decreases

**Answer: B**



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

A. *Mg, Al, Si*

B. *C, O, N*

C. *Na, Li, K*

D. *Be, Mg, Ca*

**Answer: D**



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**73.** 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?

Given reasons for your choice.



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**74.** An atom has the electronic structure of 2,7

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

(b) To which of the following would it be chemically similar?

${}_7N$ ,  ${}_{15}P$ ,  ${}_{17}Cl$ ,  ${}_{18}Ar$

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



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**75.** Consider the following elements,

${}_{20}Ca$ ,  ${}_8O$ ,  ${}_{18}Ar$ ,  ${}_{16}S$ ,  ${}_4Be$ ,  ${}_2He$

Which of the above elements would you expect to be:

(i) very stable? (ii) in group 2 of the periodic table?

(iii) in group 16 of the periodic table?



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**76.** In the 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)



77. The atomic numbers of three elements

$A$ ,  $B$  and  $C$  are given below:

Element Atomic number

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?





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**78.** An element  $X$  belongs to 3rd period and group 2 of the periodic table. State:

(a) number of valence electrons (b) valency (c) metal or non-metal (d) name of the element



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**79.** The following diagram shows a part of the periodic table in which the elements are

arranged according to their atomic numbers. (

The letters given here are not the chemical symbols of the elements):

(i) Which element has a bigger atom, a or f?

(ii) Which element has a higher valency, k or o?  
?

(iii) Which element is more metallic, i or k?

(iv) Which element is more non-metallic, d or g?

(v) Select a letter which represents a non-metal of valency 2.

(vi) Select a letter which represents a noble

gas.

<i>a</i>	<i>b</i>		<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
3	4		5	6	7	8	9	10
<i>i</i>	<i>j</i>		<i>k</i>	<i>l</i>	<i>m</i>	<i>n</i>	<i>o</i>	<i>p</i>
11	12		13	14	15	16	17	18



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80. An element  $X$  is in group of the periodic table:

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

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



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**81.** 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?



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**82.** (a) An element  $X$  has mass number 40 and contains 21 neutrons in its atom. To which group of the periodic table does it belong?

(b) The element  $X$  forms a compound  $X_2Y$ . Suggest an element that  $Y$  might be and give reasons for your choice.



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**83.** An element  $X$  combines with oxygen to form an oxide  $XO$ . This oxide is electrically

conducting.

(a) How many electrons would be there in the outermost shell of the element  $X$ ?

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

(c) Write the formula of the compound formed when  $X$  reacts with chlorine.



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**84.** 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 expect 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  $B$ .



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**85.** The elements  $A$ ,  $B$ ,  $C$  and  $D$  belong to groups 1, 2, 14 and 17 respectively of the

periodic table. Which of the following pairs of elements would produce a covalent bond?

- (i) A and D (ii) C and D (iii) A and B (iv) B and C  
(v) A and C



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**86.** An element  $X$  from group 2 reacts with element  $Y$  from group 16 of the periodic table.

- (a) What is the formula of the compound formed?



(b) What is the nature of bond in the compound formed?



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**87.** A metal  $X$  is in the first group of the periodic table. What will be the formula of its oxide?



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**88.** 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.



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**89.** An element  $X$  from group 2 of the periodic table reacts with an element  $Y$  from group 17 to 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 outer most shell of an atom of element  $Y$ ?



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90. The following diagram shows a part of the periodic table containing first three periods in which five elements have been represented by the letters *a*, *b*, *c*, *d* and *e* (which are not their chemical symbols):

1							18
<i>a</i>	2	13	14	15	16	17	
		<i>b</i>					<i>c</i>
<i>d</i>						<i>e</i>	

- (i) Select the letter which represents an alkali metal.
- (ii) Select the letter which represents a noble gas.

(iii) Select the letter which represents a halogen.

(iv) What type of bond is formed between  $a$  and  $e$ ?

(v) What type of bond is formed between  $d$  and  $e$ ?



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**91.** The elements  $A$ ,  $B$  and  $C$  belong to groups 1, 14 to 17 respectively of the periodic table.

(a) Which two elements will form a covalent compound?

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



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**92.** Find the neutral atom in the periodic table which has the same number of electrons as  $K^+$  and  $Cl^-$ . What is this number?



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**93.** Write the names and symbols of two very reactive metals belonging to group 1 of the periodic table. Explain by drawing electronic structure, how either one of the two metals reacts with a halogen. With which name is the bond formed between these elements known and what is the class of the compound so formed known? State any four physical properties of such compounds.



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94. The non-metal  $A$  is an important constituent of our food and most of the fuels around us  $A$  forms two oxides  $B$  and  $C$ . The oxides  $B$  is poisonous whereas oxide  $C$  causes global warming.

(a) Identify  $A$ ,  $B$  and  $C$

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

(c) Name another element which is placed in the same group as  $A$



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**95.** 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 fertilizer.

(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?



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**96.** Solid sodium bicarbonate was placed on a strip of  $pH$  paper. The colour of the strip :

A. turned blue

B. did not change

C. turned green and suddenly yellow

D. turned light pink

**Answer: B**



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**97.** When dilute hydrochloric acid is added to granulated zinc placed in a test tube, the observation made is:

A. The surface of the metal turns shining

B. the reaction mixture turns milky

C. odour of chlorine is observed

D. a colourless and odourless gas evolves  
with bubbles

**Answer: D**



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**98.** When an aluminium strip is kept immersed in freshly prepared ferrous sulphate solution

taken in a test tube, the change which is observed is:

A. light green solution slowly turns colourless

B. the lower end of the test tube becomes slightly warm

C. a colourless gas with smell of burning sulphur is observed

D. light green solution changes to blue

**Answer: D**



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99. The description which most approximately suits sulphur dioxide gas is that it is colourless and :

A. insoluble in water

B. has pungent and suffocating odour

C. lighter than air

D. has smell of rotten eggs

**Answer: B**



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**100.** Ethanoic acid was added in drops to water and it was noticed that :

A. the acid formed a separate layer on the top of water

B. water formed a separate layer on the top of the acid

C. a clear and homogeneous solution was formed

D. a pink and clear solution was formed

**Answer: C**



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**101.** A colourless liquid sample was tested with *pH* paper strip. The colour of the strip changed to reddish pink. The sample could be:

A. tap water

B. sodium hydroxide solution



C. distilled water

D. ethanoic acid solution

**Answer: C**



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**102.** Ethanoic acid was added to sodium hydrogencarbonate solution and the gas evolved was tested with a burning splinter.

The following four observations were reported:

The gas burns with a pop sound and the flame

gets extinguished

The gas does not burn but the splinter burns with a pop sound

The flame extinguishes and the gas does not burn.

The gas burns with a blue flame and the splinter burns brightly.

The correct observation is reported in,

A. a

B. b

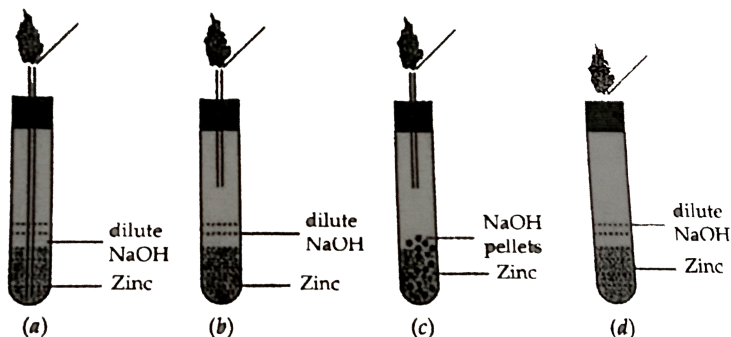
C. c

D. d

Answer: A

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103. Which one of the following set ups is the most appropriate for the evolution of hydrogen gas and its identification?



A. a

B. b

C. c

D. d

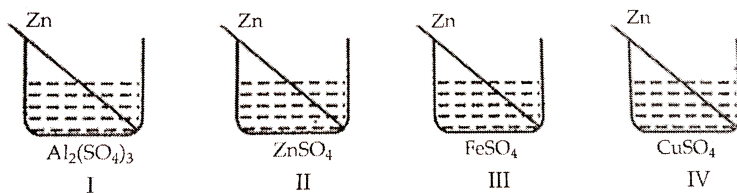
**Answer: C**



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**104.** Four students A,B,C and D noted the initial colour of the solutions in beakers I, II, III and IV. After inserting zinc rods in each

solution and leaving it undisturbed for two hours, noted the colour of each solution again.



They recorded their observations in the form of a table given below:

Student	Colour of the solution	I	II	III	IV
A	Initial	Colourless	Colourless	Light green	Blue
	Final	Colourless	Colourless	Colourless	Colourless
B	Initial	Colourless	Light yellow	Light green	Blue
	Final	Colourless	Colourless	Light green	Colourless
C	Initial	Colourless	Colourless	Light green	Blue
	Final	Light blue	Colourless	Colourless	Light blue
D	Initial	Light green	Colourless	Light green	Blue
	Final	Colourless	Colourless	Dark green	Colourless

Which student noted the colour change in all four beakers correctly?

A. A

B. B

C. c

D. D

**Answer: A**



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**105.** Four gas jars filled with sulphur dioxide gas were inverted into troughs of water by four students and the following observations and

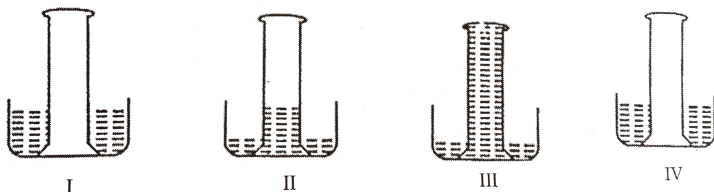
inference were reported:

(a) Water did not enter the gas jar and sulphur dioxide is insoluble in water.

(b) A small amount of water entered the gas jar and sulphur dioxide is sparingly soluble in water.

(c) Water rushed into the gas jar and sulphur dioxide is highly soluble in water.

(d) Water did not enter the gas jar and sulphur dioxide is soluble in water.



The correct set of observations and inference drawn is reported in

A. a

B. b

C. c

D. d

**Answer: A**



**Watch Video Solution**



**106.** The colour of the pH strip turned red when it was dipped into a sample. The sample could be :

A. dilute sodium bicarbonate solution

B. tap water

C. diluted sodium hydroxide solution

D. dilute hydrochloric acid

**Answer: D**



**Watch Video Solution**

**107.** A drop of colourless liquid was placed on blue litmus paper. The litmus paper turned red. The liquid could be:

- A. dilute hydrochloric acid
- B. dilute sodium hydroxide solution
- C. distilled water
- D. sodium bicarbonate solution

**Answer: C**



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**108.** A piece of granulated zinc was dropped into copper sulphate solution. After some time the colour of the solution changed from:

- A. light green to blue
- B. blue of colourless
- C. light green to colourless
- D. blue to yellow

**Answer: A**



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**109.** When sulphur dioxide gas is passed through acidified potassium dichromate solution, the colour of the solution changes from:

A. orange to yellow

B. orange to green

C. green to orange

D. yellow to green

**Answer: B**



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**110.** The odour of ethanoic acid resembles with

:

A. tomato juice

B. kerosene

C. orange juice

D. vinegar

**Answer: D**



**Watch Video Solution**

**111.** Which of the following solutions would you use test the pH of a given sample?

A. blue litmus solution

B. red litmus solution

C. universal indicator solution

D. mixture of red and blue litmus solution

**Answer: D**



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**112.**  $5\text{mL}$  of dilute acetic acid were added to  $5\text{mL}$  of water and the mixture was shaken for one minute. It was observed that:

A. the turbidity appeared in the test tube

B. the acid formed a separate layer at the  
bottom

C. water formed a separate layer at the  
bottom

D. a clear solution was formed

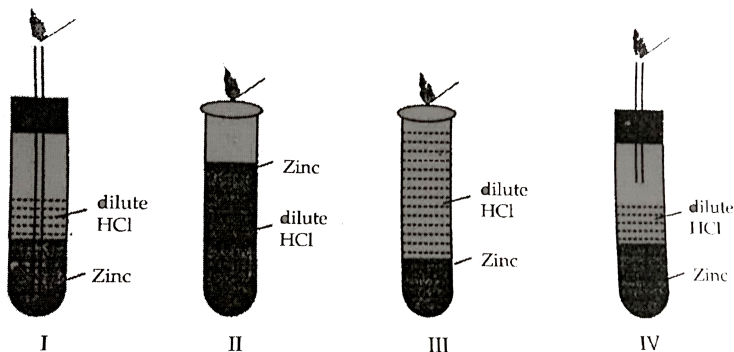
**Answer: C**



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**113.** Four set ups a given below were arranged to identify the gas evolved when dilute hydrochloric acid was added to zinc granules.

The most appropriate set up is:





A. I

B. II

C. III

D. IV

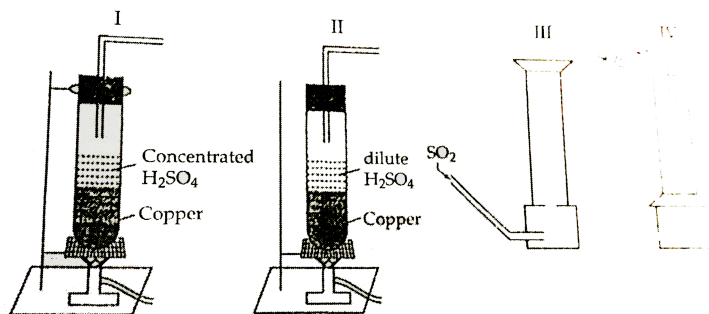
**Answer: A**



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**114.** Which of the equipments would you choose to prepare and collect sulphur dioxide

# gas in the laboratory?



A. I and IV

B. I and III

C. II and IV

D. II and III

**Answer: D**



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**115.** Aqueous solutions of zinc sulphate and iron sulphate were taken in test tubes I and II by four students A,B, C and D. Metal pieces of iron and zinc were dropped in the two solutions and observations made after several hours and recorded in the form of a table as given below:

Observation by	Metal	Solution	Colour change of solution	Deposit/Residue obtained
A	Fe	ZnSO <sub>4</sub>	turned green	silvery grey coating
	Zn	FeSO <sub>4</sub>	no change	no change
B	Fe	ZnSO <sub>4</sub>	no change	black residue
	Zn	FeSO <sub>4</sub>	colour faded	grey coating
C	Fe	ZnSO <sub>4</sub>	no change	no change
	Zn	FeSO <sub>4</sub>	turned colourless	black residue
D	Fe	ZnSO <sub>4</sub>	no change	grey residue
	Zn	FeSO <sub>4</sub>	no change	black residue

The correct reporting has been made in observation reported by the student:

A. A

B. B

C. C

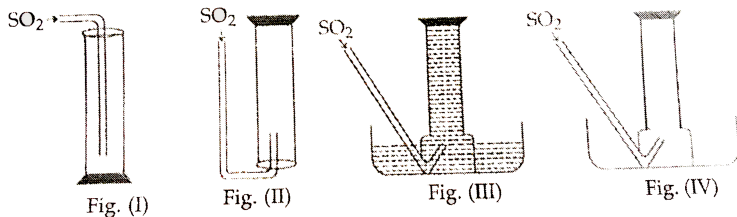
D. D

**Answer: A**



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**116.** The set up used in the laboratory to collect sulphur dioxide is that shown in figure.



A. I

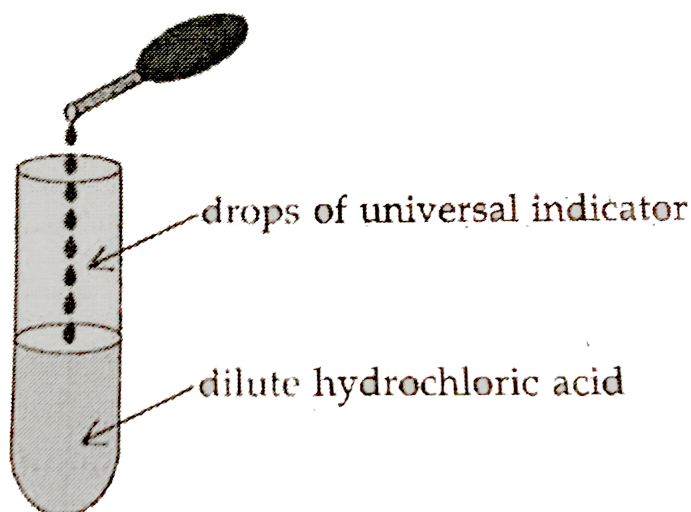
B. II

C. III

D. IV

**Answer: A**

117. A student adds a few drops of the universal indicator to a solution of dilute hydrochloric acid in the way shown here. He would observe that the colour of the solution changes from colourless to:



A. red

B. yellow

C. violet

D. green

**Answer: C**



**Watch Video Solution**

**118.** When zinc metal is heated with caustic soda solution, the gas evolved is

A. hydrogen

B. carbon dioxide

C. oxygen

D. hydrogen chloride

**Answer: A**



**Watch Video Solution**

**119.** Four students observed the colour and odour of acetic acid and its reaction with sodium hydrogen carbonate. They tabulated



their observations as given below:

Student	Colour of acetic acid	Odour of acetic acid	Action with sodium hydrogencarbonate
A	blue	fruity	gas evolves without bubbles
B	colourless	smell of vinegar	effervescence
C	light green	odourless	gas evolves without bubbles
D	light brown	rotten eggs	effervescence

The correct set of observations is that of student:

A. A

B. B

C. c

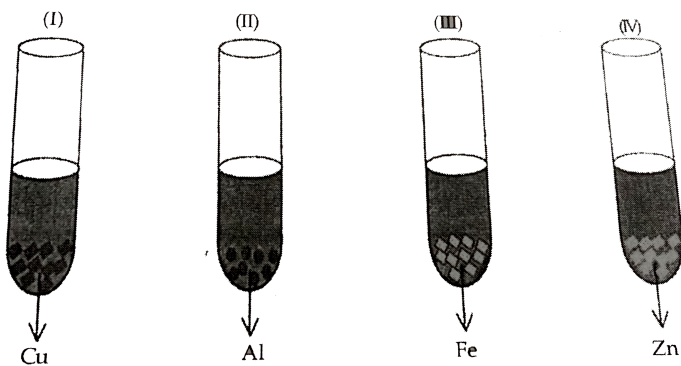
D. D

**Answer: A**



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**120.** A student takes *Cu*, *Al*, *Fe* and *Zn* pieces separately in four test tubes labelled as I, II, III and IV respectively. He adds 10mL of freshly prepared ferrous sulphate solution to each test tube observes the colour of the metal residue in each case.



He would observe a black residue in the test tube:

A. I and III

B. I and III

C. II and III

D. II and IV

**Answer: B**



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121. Four students (A),(B),(C) and (D) observed the colour and solubility of iron, sulphur and iron sulphide in carbon disulphide. The tick mark represents soluble and cross mark represents insoluble, in carbon disulphide. Their observation are tabulated below

Student	Colour			Solubility in carbon disulphide		
	Fe	S	FeS	Fe	S	FeS
(A)	Yellow	Silvery	Greyish silver	(✓)	(×)	(✓)
(B)	Silvery	Orange	Reddish brown	(×)	(✓)	(✓)
(C)	Grey	Yellow	Greyish black	(×)	(✓)	(×)
(D)	Silvery	White	Silvery white	(✓)	(×)	(×)

The student who correctly reported the observations, is student :

A. A

B. B

C. C

D. D

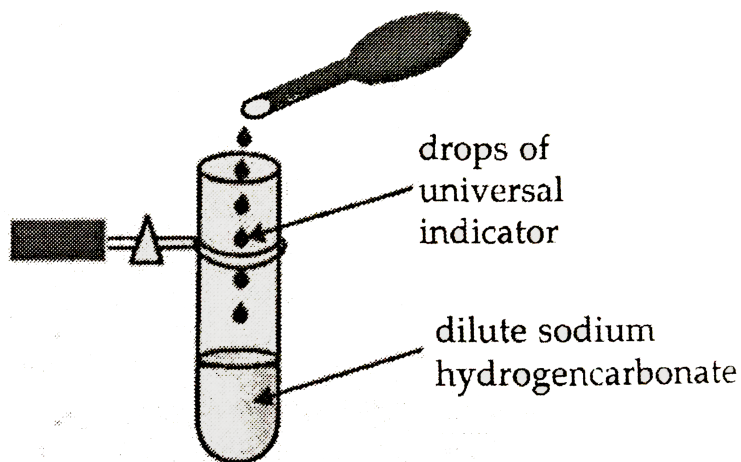
**Answer: D**



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**122.** A student adds a few drops of the universal indicator solution to a dilute solution of sodium hydroencarbononate taken

in a test tube. Which of the following colour would he observe?



A. blue

B. green

C. mustard

D. yellow

**Answer: A**



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**123.** A student strongly heats hydrated ferrous sulphate salt in a dry test-tube. He would observe a :

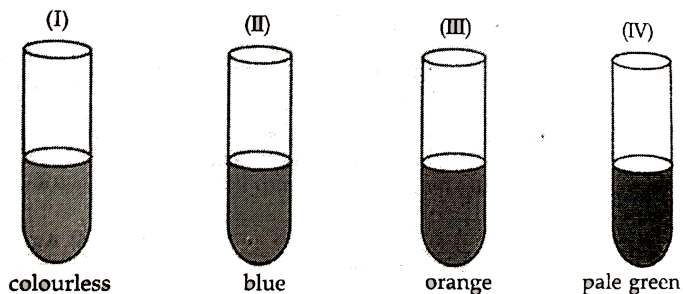
- A. yellow residue
- B. brown residue
- C. light green residue
- D. white residue

**Answer: B**



**Watch Video Solution**

**124.** A student took four test tubes containing solutions of different colours marked I, II, III and IV as shown here. The test tubes containing copper sulphate solution and ferrous sulphate could be the tubes:





A. I and III

B. II and III

C. III and IV

D. II and IV

**Answer: B**



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**125.** A student while heating solid lead nitrate taken in a test tube would observe :

A. white residue of  $PbO_2$

B. green residue of  $NO_2$

C. yellow residue of  $PbO$

D. brown residue of  $NO$

**Answer: C**

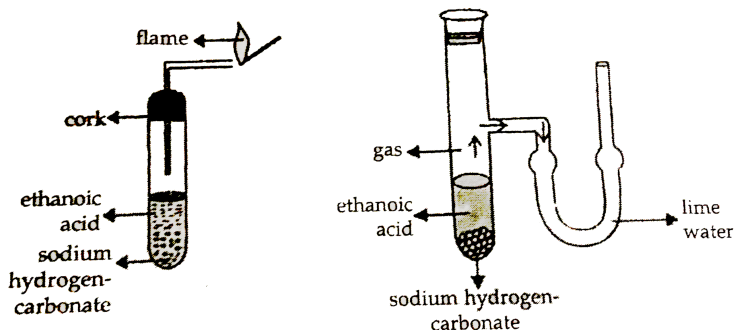


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**126.** Four students added a small amount of ethanoic acid to sodium hydrogencarbonate.

The gas evolved was tested for its behaviour

with burning splinter and lime water. They reported their observations as given on the next page.



Student	Gas evolved	Action on burning splinter	Action on lime water
A	CO <sub>2</sub>	The flame of splinter extinguishes and gas does not burn	Turned milky
B	SO <sub>2</sub>	The splinter burns brightly and the gas burns with a pop	Turned green
C	NO <sub>2</sub>	The gas does not burn but the splinter burns with a hissing sound	Turned black
D	O <sub>2</sub>	The gas burns with a yellow flame and the splinter extinguishes	Turned purple

The correct observations have been reported by student:

A. A

B. B

C. C

D. D

**Answer: A**



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**127.** A student was given an unknown solution in a test tube. When he added universal indicator solution to the test tube the

solution turned violet. The unknown solution is most likely to be:

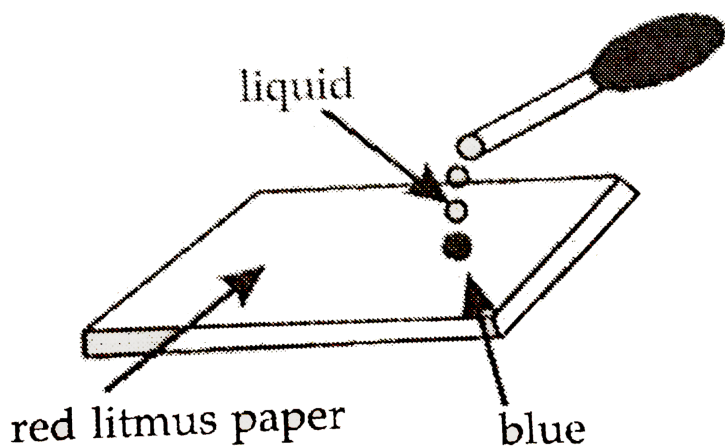
- A. baking soda solution
- B. washing soda solution
- C. caustic soda solution
- D. household ammonia solution

**Answer: B**



**Watch Video Solution**

**128.** A student placed a few drops of a liquid over a portion of the red litmus paper as shown here. He observed that the red litmus paper turned blue. The liquid could be:



A. dilute hydrochloric acid

B. dilute sodium hydroxide solution

C. water

D. dilute acetic acid

**Answer: B**



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**129.** A student was asked to carry out a chemical reaction by placing four different metal strips in  $CuSO_4$  solution for a considerable time, one by one. Which of the following metal strip will turn the blue

$CuSO_4$  solution to a light green solution in  
due course of time ?

A.  $Fe$

B.  $Au$

C.  $Mg$

D.  $Ag$

**Answer: D**



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**130.** When a student added universal indicator solution to one of the following chemicals its colour changed to have blue. The chemical is most likely to be:

A. lemon juice

B. milk of magnesia

C. vinegar

D. tomato juice

**Answer: A**



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**131.** A student prepared hydrogen chloride gas by treating sodium chloride with concentrated sulphuric acid in a test tube. He held a strip of dry blue litmus paper in  $HCl$  gas coming out the test tube. The student observed that on coming in contact with  $HCl$  gas, the colour of blue litmus paper:

A. turned yellow

B. turned violet

C. remained blue

D. turned red

**Answer: B**



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**132.** When a student added a few drops of barium chloride solution to sodium sulphate solution, he obtained a white precipitate instantly. Which of the following type of

chemical reaction has been carried out by the student ?

A. combination

B. double displacement

C. displacement

D. decomposition

**Answer: B**



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**133.** A student placed a pinch of solid sodium hydrogencarbonate on a strip of red litmus paper. He found that the colour of red litmus paper strip:

- A. turned green
- B. turned blue
- C. turned violet
- D. did not change

**Answer: D**



**Watch Video Solution**

**134.** A student placed a clean iron nail in blue coloured copper sulphate solution for a considerable time. He observes that :

- A. iron nail gets green coating
- B. iron nail gets brown coating
- C. iron nail gets no coating
- D. iron nail gets blue coating

**Answer: B**





**135.** For students A,B,C and D were studying the effect of the solutions of hydrochloric acid, sodium hydroxide, sodium chloride and pure water respectively on the blue litmus solution. Which of the students observed the colour change of blue litmus solution to red?

A. A

B. B

C. C

D. D

**Answer: B**



**Watch Video Solution**

**136.** Which of the following solutions having same concentration will have lowest  $pH$  value?

A. hydrochloric acid

B. lemon juice



C. water

D. sodium hydroxide

**Answer: C**



**Watch Video Solution**

**137.** We can show that iron is more reactive than copper :

A. by preparing copper sulphate solution  
and dipping iron strip in it

B. by dipping both the strips in water for some time

C. by preparing iron sulphate solution and dipping copper strip in it

D. by heating both iron and copper strips

**Answer: A**



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**138.** The  $pH$  of a sample of hydrochloric acid is 2. The  $pH$  of this sample when diluted by adding some water will be:

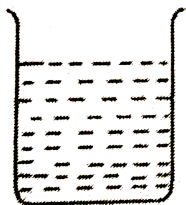
- A. more than 7
- B. more than 2 but less than 7
- C. unchanged
- D. less than 2 but more than 0

**Answer: B**

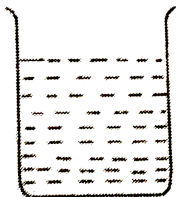


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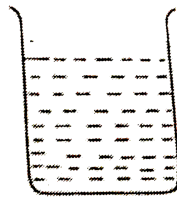
139. Observe the given figures and choose the correct option:



Hydrochloric acid  
I



Sodium hydroxide  
II



Water  
III

- A. pH of I is greater than pH of II and III
- B. pH of III is greater than pH of I and II
- C. pH of I, II and III is equal
- D. pH of II is greater than pH of I and III

**Answer: D**



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**140.** When treated with diluted hydrochloric acid which of the following gives a gas which does not turn lime water milky?

- A. sodium sulphate
- B. sodium carbonate
- C. copper metal
- D. zinc metal

**Answer: C**



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**141.** Which one of the following procedures is correct to detect the acidic nature of  $SO_2$  gas?

- A. Insert wet blue litmus paper in a gas jar filled with  $SO_2$  gas
- B. Insert wet red litmus paper in a gas jar filled with  $SO_2$  gas

C. Insert dry blue litmus paper in a gas jar filled with  $SO_2$  gas

D. Insert dry red litmus paper in the gas jar filled with  $SO_2$  gas

**Answer: B**



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**142.** Which of the following metal strips when placed in colourless  $AgNO_3$  solution, turns the solution blue?

A. *Fe*

B. *Cu*

C. *Mg*

D. *Zn*

**Answer: A**



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**143.** A small piece of aluminium metal was placed in a beaker containing a greenish solution. After some time a grey coating was



observed on the aluminium piece. The greenish solution is most likely to be:

- A. salt solution of copper metal
- B. salt solution of iron metal
- C. salt solution of zinc meal
- D. salt solution of aluminium metal

**Answer: B**



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**144.** A student measured the pH values of four solutions marked A,B,C and D and found them to be 6,12,2 and 14 respectively. The solution which is likely to be strongly acidic is:

A. A

B. B

C. C

D. D

**Answer: A**



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**145.** Which of the following solutions should be put on a universal indicator paper so that its colour may change to green?

- A. Milk
- B. Common salt solution
- C. Baking soda solution
- D. Milk of magnesia

**Answer: B**





**146.** A student took solution  $X$  in a test -tube and added a few drops of universal indicator to it. The solution turned blue. On adding another solution  $Y$  to this test tube drop wise, the colour of solution changed to green. When a yet another solution  $Z$  was added the solution turned yellow. Which of the following gives the correct conclusion of the student?

A.  $X$  is acid  $Y$  is base  $Z$  is salt solution

B.  $X$  is base  $Y$  is acid  $Z$  is acid

C.  $X$  is acid  $Y$  is base  $Z$  is base

D.  $X$  is base  $Y$  is acid  $Z$  is sugar solution

**Answer: D**



**Watch Video Solution**

**147.** In order to study the neutralisation reaction of acid and base a student took  $10\text{mL}$  of dilute hydrochloric acid in a conical flask and added a few drops of

phenolphthalein indicator to it. He then added dilute sodium hydroxide solution to the conical flask dropwise with a dropper while shaking the conical flask constantly. When the acid is completely neutralised by the base, the solution in conical flask will turn:

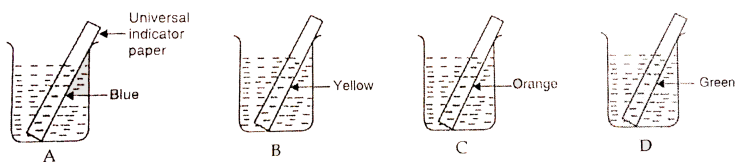
- A. slightly red
- B. slightly yellow
- C. colourless
- D. slightly pink

**Answer: C**



Watch Video Solution

**148.** In an experiment to measure the pH values of solutions, a student placed strips of universal indicator paper in four beakers containing solutions A, B, C and D. The colour of universal indicator paper in these solutions is as shown below:



The solution having lowest pH value is:

A. A

B. B

C. C

D. D

**Answer: B**



**Watch Video Solution**

**149.** A student was given four unknown solutions in test tubes marked A,B,C and D and asked to test them with universal indicator



solution. He observed that on putting universal indicator solution, the solutions A,B,C and D turned blue, orange, green and red respectively. The test tube which contains sodium chloride solution is:

A. A

B. B

C. C

D. D

**Answer: C**



**150.** When a student added red litmus to an aqueous solution, the red litmus turned blue. Which one of the following should be added in excess so that the change in colour is reversed?

- A. baking soda solution
- B. lime water
- C. vinegar solution
- D. ammonia solution

**Answer: B**



**Watch Video Solution**

**151.** A student was asked to test an unknown colourless solution with an indicator. When he added a few drops of phenolphthalein indicator, the solution turned pink. Which one of the following chemicals should be added in excess so as to obtain the colourless solution again?

A.  $HCl$  solution

B.  $NaOH$  solution

C.  $NH_3$  solution

D.  $NaCl$  solution

**Answer: C**



**Watch Video Solution**

**152.** A student mixed equal volumes of hydrochloric acid and sodium hydroxide solution of same concentrations in a beaker

and tested the pH of the resulting mixture with a pH paper. What will be the colour of pH paper in this case?

A. red

B. yellow

C. green

D. blue

**Answer: C**



**Watch Video Solution**

**153.** In an experiment to measure the pH values by using a universal indicator a student found that the pH values of four given solution *A*, *B*, *C* and *D* are 10, 6, 2 and 14 respectively. The solution which will require the maximum volume of sodium hydroxide solution for complete neutralisation is solution:

A. A

B. B

C. C

D. D

**Answer: C**



**Watch Video Solution**

**154.** A student measured the pH values of four solutions  $P$ ,  $Q$ ,  $R$  and  $S$  as 10, 6, 0 and 12 respectively. The solution which is the most acidic is likely to be the solution:

A. P

B. Q

C. R

D. S

**Answer: B**



**Watch Video Solution**

**155.** A student mixed some soil with water in a beaker and allowed it to settle. He filtered the contents of the beaker and obtained a clear filtrate. When he put a few drops of the filtrate



on the pH paper, the pH paper turned yellowish orange. Which of the following should the student put on this pH paper so that it may change its colour to greenish blue?

A.  $NaHCO_3$  solution

B.  $HCl$  solution

C. vinegar solution

D. Common salt solution

**Answer: C**



**Watch Video Solution**

**156.** When a student added a few drops a methyl orange indicator to a colourless solution, the solution turned red. Which of the following should he added in excess so that the colour changes to yellow?

A.  $NaOH$  solution

B.  $H_2SO_4$  solution

C. Lemon juice

D. Vinegar solution

**Answer: C**



**Watch Video Solution**

**157.** A student measured the pH values of four solutions  $A$ ,  $B$ ,  $C$  and  $D$  which were found to be 4, 1, 13 and 11 respectively. Which of the following statements are correct about these solutions?

(a)  $A$  is strong acid and  $B$  is weak acid (b)  $B$  is strong acid and  $D$  is weak base

(c)  $D$  is strong base and  $C$  is weak base (d)  $C$   
is strong base and  $A$  is weak acid

A. a and b

B. b and c

C. c and d

D. b and d

**Answer: D**



**Watch Video Solution**

**158.** When a student put some copper turnings in a colourless solution, he observed that the solution gradually turned blue. The solution is most likely to be:

- A. ferrous sulphate solution
- B. magnesium nitrate solution
- C. silver nitrate solution
- D. copper sulphate solution

**Answer: C**



**Watch Video Solution**

**159.** A student added blue litmus solution to a colourless aqueous solution. The solution turned red. Which one of the following chemical should be added in excess so that the change in colour is reversed?

- A. ethanol solution
- B. caustic soda solution
- C. hydrochloric acid solution
- D. vinegar solution

**Answer: B**



**Watch Video Solution**

**160.** Aluminium sulphate and copper sulphate solutions were taken in two test tubes I and II respectively. Iron filings were then added to both the solutions. The four students A, B, C and D recorded their observations in the form of a table as given on the next page.

Student	Aluminium sulphate solution (I)	Copper sulphate solution (II)
A	Colourless solution changes to light green	Blue colour of the solution is retained
B	Colour of colourless solution does not change	Blue colour of the solution changes to light green
C	Colourless solution changes to light blue	Blue colour of the solution changes to colourless
D	Colour of colourless solution remains unchanged	Blue colour of the solution fades away

The correct set of observations have been recorded by the student:

A. A

B. B

C. C

D. D

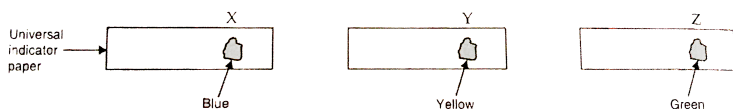
**Answer: C**



**Watch Video Solution**



**161.** A student was given three solutions marked  $X$ ,  $Y$  and  $Z$  and asked to arrange them in the increasing order of their pH values. The student put two drops of each solution on three strips of universal indicator paper separately. The colours shown by the three indicator strips are as follows:



Which of the following gives the correct increasing order of pH values?

A.  $Z < X < Y$

B.  $Y < Z < X$

C.  $X < Y < Z$

D.  $Z < Y < X$

**Answer: B**



**Watch Video Solution**

**162.** When the strip of pH paper was put in a given solution the pH paper changes to orange red. The given solution is most likely to be of:

A. sodium hydroxide

B. hydrochloric acid

C. sodium bicarbonate

D. ethanoic acid

**Answer: A**



**Watch Video Solution**

**163.** The test tube I contains sodium bicarbonate solution whereas test tube II contains lemon juice. On introducing pH paper

strips in both the solutions, it is observed that the pH paper turns:

- A. red in I and blue in II
- B. blue in both
- C. blue in I and red in II
- D. red in I and pink in II

**Answer: D**



**Watch Video Solution**

**164.** No observable change is noticed when dilute hydrochloric acid is added to:

A. sodium hydroxide solution

B. sodium carbonate solution

C. blue litmus solution

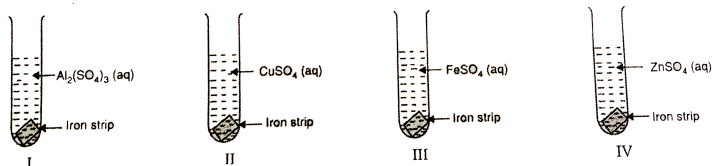
D. zinc metal

**Answer: A**



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**165.** A student took four test tubes I,II,III and IV containing aluminium sulphate, copper sulphate, ferrous sulphate and zinc sulphate solutions respectively. He placed iron strips in each one of them. After some time he found a brown deposit formed in test-tube marked:



A. I

B. II

C. III

D. IV

**Answer: C**



**Watch Video Solution**

**166.**  $2\text{mL}$  of ethanoic acid was taken in each of test tube I and test tube II. A red litmus paper was introduced in test tube I and a pH paper was introduced in test tube II. The experiment was performed by four students A,B,C and D and they reported their observations as given

below:

Student	Action on red litmus	Action on pH paper
A	Turned blue	Turned pink
B	Remains unchanged	Turned green
C	Turned blue	Turned blue
D	Remains unchanged	Turned pink

The correct set of observations was made by the student:

A. A

B. B

C. C

D. D

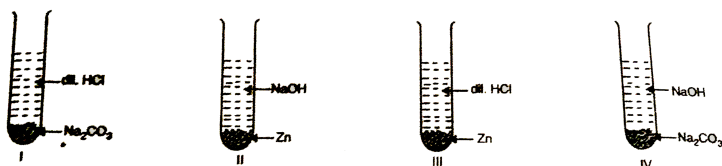
**Answer: C**



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**167.** Four students A,B,C and D were asked by their teacher to arrange the set up I to IV as given below and identify the gas, if any evolved in each case:



After observations the students arrived at the inferences recorded in the following table:

Student	I	II	III	IV
A	Hydrogen	No gas	Carbon dioxide	Hydrogen
B	Carbon dioxide	Hydrogen	No gas	Carbon dioxide
C	Carbon dioxide	Hydrogen	Hydrogen	No gas
D	No gas	Carbon dioxide	Carbon dioxide	Hydrogen

The correct observations and inferences have been reported by the student:

A. A

B. B

C. C

D. D

**Answer: B**

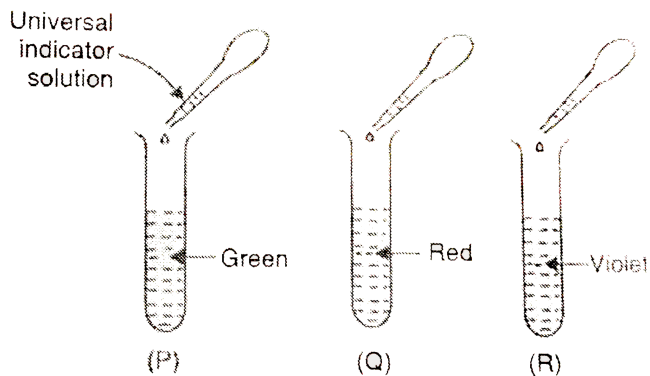


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**168.** On adding a few drops of universal indicator solution to three unknown colourless solutions  $P$ ,  $Q$ , and  $R$  taken separately in three test-tubes shown in the diagrams, a student observed the changes in colour as green in solution  $P$  red in solution  $Q$  and violet in solution  $R$ .

The decreasing order of the pH of the three

solutions is:



A.  $P > Q > R$

B.  $R > P > Q$

C.  $Q > P > R$

D.  $R > Q > P$

**Answer: A**



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**169.** A few drops of ethanoic acid were added to solid sodium carbonate. The observation made was that:

- A. a hissing sound was produced
- B. brown fumes evolved
- C. brisk effervescence occurred
- D. a pungent smelling gas was evolved

**Answer: C**



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



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



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



**Watch Video Solution**

**173.** Use Mendeléeev's Periodic Table to predict the formulae for the oxides of the following elements:

K, C, Al, Si, Ba.



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



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



**Watch Video Solution**



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



**Watch Video Solution**

**177.** How could the Modern Periodic Table remove various anomalies of Mendeléeév's Periodic Table?



**Watch Video Solution**

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



**Watch Video Solution**

**179.** 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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**180.** (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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**181.** In the Modern Periodic Table, which are the metals among the first ten elements?



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**182.** 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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**183.** 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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**184.** Element X forms a chloride with the formula  $XCl_2$ , which is a solid with a high

melting point. X would most likely be in the same group of the Periodic Table as

A. Na

B. Mg

C. Al

D. Si

**Answer:**



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**185.** 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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**186.** (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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**187.** The atom of an element 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 of elements are given in parentheses)

$N(7)$ ,  $F(9)$ ,  $P(15)$ ,  $Ar(18)$



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**188.** The positions of three elements  $A$ ,  $B$  and  $C$  in the periodic table are shown here

(a) State whether  $A$  is a metal or non-metal?

Group

16

Group

17

—	—
—	A
—	—
B	C

State whether  $C$  is more reactive or less reactive than  $A$

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

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



189. The positions of three elements  $A$ ,  $B$  and  $C$  in the periodic table are shown here

(a) State whether  $A$  is a metal or non-metal?

Group 16	Group 17
—	—
—	$A$
—	—
$B$	$C$

State whether  $C$  is more reactive or less reactive than  $A$

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

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



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**190.** 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?



**Watch Video Solution**

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



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**192.** 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**

**193.** Compare and contrast the arrangement of elements in MendeléeV's Periodic Table and the Modern Periodic Table.



**194.** Rahul is a ten year old boy. He had purchased a packet of potato chips more than a month ago. Rahul opened the packet at the time but could eat only some of the potato chips from it. He then kept the open packet containing remaining potato chips on his book rack. He wanted to eat the remaining potato chips today. Just when Rahul was about to put these potato chips into his mouth, his elder sister Pavni, who is a student of class  $X$

entered the room. She found that these potato chips were giving unpleasant smell. When she put one potato chip in her mouth, it had so unpleasant taste. Pavni took away the packet from Rahul and did not allow him to eat these potato chips. She threw away the potato chips into a dustbin.

(a) What is given to the condition in which potato chips kept open for a considerable time give out unpleasant smell and taste?

(b) Which chemical reaction is responsible for the spoilage of potato chips kept exposed by Rahul for a considerable time?



(c) What produces the unpleasant smell as well as unpleasant taste in potato chips? Explain.

(d) With which gas the plastic bags containing potato chips are filled and then sealed by manufactures?

How does it help?

(e) What values are displayed by Pavni in this episode?



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**195.** Mr. Kumar runs a small garment making factory in a premises having a roof made of asbestos sheets. These asbestos sheets are supported on long wooden planks are fixed to planks with J-shaped hooks. For the last many days, the workers of factory are complainig to Mr. Kumar that the new clother made by them and kept on hangers are getting spoiled with a red brown powdery substace. Mr. Kumar tried his best but could not locate the surface of this substance which was spoiling theri newly fabricated clothes. One day Mr. Kumar's

son Rajesh who is a student of class  $X$ , came to the factory. Mr. Kumar told him the problem which he was facing for the last so many days. Rajesh went near the clothes which had been spoiled, looked up at the roof carefully from that place and understood the problem. He explained everything to his father. He also suggested the measure to be taken to solve this problem. Mr. Kumar was very happy.

(a) What is the red -brown powdery substance known as?

(b) From where do you think this substance was coming on the newly made garments in

the factory?

(c) What type of chemical reaction is involved in the formation of red -brown substance?

(d) What is the general name of the process in which metals are eaten up by air or moisture, etc?

(e) What is the special name of the above process if the metal involved is iron?

(f) What suggestion do you think was given by Rajesh to solve this problem?

(g) What values are displayed by Rajesh in this episode?



**196.** Raghav is a student of class  $X$  who was trying to convert the groundnut oil into solid fat (vanaspati ghee). He took the oil in an appropriate flask having an arrangement for passing hydrogen gas into it. Raghav passed the hydrogen gas into oil and heated them together for a considerable time. On cooling the apparatus, Raghav found that even after heating them together for a considerable time. On cooling the apparatus, Raghav found that even after heating together oil and

hydrogen for a considerable time, no solid fat was formed. Raghav shared this problem with his sister Divya who is studying in class XI. She advised him to add a certain finely divided substance while heating oil with hydrogen gas. When Raghav repeated the experiment by adding this substance to oil and hydrogen mixture, then the liquid oil was converted into a solid fat. Divya advised Raghav not to consume the fat prepared by him in the laboratory.

(a) What was the finely divided substance which Raghav was asked to add for converting oil

into fat?

What is its function?

(b) What type of substance is (i) an oil, and (ii) a fat?

(c) What is the special name of conversion of oils into fats used in Industry?

(d) What are the two types of chemical reactions exemplified by the conversion of oils into fats?

(e) Why did Divya ask Raghav not to consume the fat prepared by him in the laboratory?

(f) What values are exhibited by Divya in this episode?



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**197.** Reshma is the student of class X in a city school. One day she was sitting in the school garden with her friends during the recess. There was a tall tree at the edge of the garden having a large honeycomb attached to it. Some students were playing cricket in the school playground. Suddenly the cricket ball hit the honeycomb due to which a large number of honey-bees started flying here and there. Reshma was stung on her face by a



honey-bee. The sting was so painful that Reshma started crying. She was immediately rushed to the science laboratory. One of her classmates Shanta gave her vinegar solution to rub on the stung area to get relief from pain. Another classmate Amarjit, however, asked Reshma to rub baking soda solution on the stung area of face. On rubbing baking soda solution, Reshma felt a lot of relief from pain.

(a) What kind of liquid is injected into the skin when a honey-bee stings a person?

(b) Why did rubbing baking soda solution on

the stung area of skin give relief from pain?

(c) What type of chemical reaction takes place when baking soda solution is rubbed on the honey-bee sting area?

(d) Why do you think rubbing the honey-bee sting area with vinegar could not give relief from pain?

(e) Name one plant whose stinging hair on leaves inject a similar liquid to that injected by honey-bee sting and can be treated by rubbing baking soda solution?

(f) What values are displayed by Amarjit in this episode?



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**198.** Given alongside is a part of the periodic table:

As we move horizontally from left to right:

(i) What happens to the metallic character of the elements?

(ii) What happens to the atomic size?

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



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**199.** How would the tendency to gain electrons change on moving from left to right in a period of the periodic table?



**Watch Video Solution**

**200.** How would the tendency to lose electrons change as we go from left to right across a period of the periodic table?



**Watch Video Solution**

**201.** What property do all elements in the same column of the periodic table as boron in common?



**Watch Video Solution**

**202.** What property do all the elements in the same group of the periodic table as fluorine have in common?



**Watch Video Solution**

**203.** (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?



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**204.** 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.



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**205.** How does the valency of elements vary is going down a group of the periodic table?



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**206.** Name the element which is in:

(a) first group and third period: (b)

seventeenth group and second period.



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**207.** How do electronic configurations of elements change in second period of periodic table with increase in atomic numbers?



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



(a) Li, Be, F, N

(b) Cl, At, Br, I



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**209.** Arrange the following elements in the increasing order of their metallic character

Mg, Ca, K, Ge, Ga.



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**210.** 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.



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**211.** Fill in the blanks in the following statements:

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

(b) In going across a period (right to left) (in periodic table, the atomic size of the atom.....

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

(d) On going down in a group in the periodic table, the metallic character of elements.....

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



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**212.** 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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**213.** (a) How does the size of atoms (atomic size) generally vary in going from left to right in a period of the periodic table? Why does it vary this way?

(b) What happens to the metallic character of the elements as we move from left to right in a period of the periodic table?



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**214.** In the following diagram for the first three periods of the periodic table, five elements have been represented by the letters *a*, *b*, *c*, *d* and *e* (which are not their chemical symbols):

1							18
	2	13	14	15	16	17	
			<i>a</i>			<i>b</i>	
	<i>c</i>				<i>d</i>		<i>e</i>

(i) Select the letter which represents a halogen.

(ii) Select the letter which represents a noble gas.

(iii) What type of bond is formed between *a* and *b*?

(iv) What type of bond is formed between  $c$  and  $b$ ?

(v) Which element will form a divalent anion?



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**215.** 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?



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## Short Answer Type

1. (a) In the modern periodic table, which are the metals among the first ten element?

(b) What is the significance of atomic number in the modern classification of elements?

Explain with the help of an example.





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2. (a) How were the positions of isotopes of an element decided in the modern periodic table?

(b) How were the positions of cobalt and nickel resolved in the modern periodic table?

(c) Where should hydrogen be placed in the modern periodic table? Give reason for your answer.



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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?



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

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

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



**View Text Solution**

5. What is Dobereiner's law of triads? Explain with the help of one example of a Dobereiner's

triad.



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6. (a) Did Debereiner's triads also exist in the columns of Newland's law of octaves? Explain your answer.

(b) What were the limitations of Debereiner's classification of elements?

(c) What were the limitations of Newlands' law of octaves?



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7. (a) State the periodic law on which Mendeleev's periodic table was based. Why and how was this periodic law changed?

(b) Explain why, the noble gases are placed in a separate group.



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8. An element  $X$  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 in  $Y$ ? (d) What is the valency of  $Y$ ?

Explain how you have arrived at your answers.



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**Long Answer Type**

1. (a) State Mendeleev's periodic law.

What chemical properties of elements were

used by Mendeleev in creating his periodic table?

(c) State any three limitations of Mendeleev's classification of elements.

(d) Besides gallium, which two other elements have since been discovered for which Mendeleev had left gaps in the periodic table?

(e) Which group of elements was missing from Mendeleev's original periodic table?



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2. (a) State modern periodic law.

(b) How does the electronic configuration of the atom of an element relate to its position in the modern periodic table?

(c) How could the modern periodic law remove various anomalies of Mendeleev's periodic table? Explain with examples.

(d) Is it possible to have an element having atomic number 1.5 placed between hydrogen and helium?

(e) Name the scientist who prepared modern periodic table.





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3. (a) What are the periods and groups in a periodic table? Give two characteristics of each.

(b) In terms of electronic configurations, explain the variation in the size of the atoms of elements belonging to the same period and same group.

(c) Given alongside is a part of the periodic table. As we move vertically downward from  $Li$  to  $Fr$ :

(i) What happens to the size of atoms?

(ii) What happens to their metallic character?

(d) Name two properties of elements whose magnitudes change when going from top to bottom in a group of the periodic table. In what manner do they change?

(e) Rewrite the following statement after correction, if necessary:

Groups have elements with consecutive

atomic numbers.

Li	Be
Na	
K	
Rb	
Cs	
Fr	Ra



[View Text Solution](#)

1. 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 or 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  $G$ .



[View Text Solution](#)

## Mcq Type

1. A student was given two metal strips  $X$  and  $Y$  alongwith colourless nitrate solution to

perform two separate displacement reactions.

When the student placed metal strip  $X$  in nitrate solution for a considerable time he observed that the solution turned blue and coating of silver metal was formed on the strip.

And when the student immersed metal strip  $Y$  in silver nitrate solution for an equal time, he observed that the solution turned light green with the formation of a coating of silver metal on the strip. The correct conclusion of the student about the identity of metals  $X$  and  $Y$  is:

A.  $X$  is copper and  $Y$  is magnesium

B.  $X$  is zinc and  $Y$  is copper

C.  $X$  is iron and  $Y$  is copper

D.  $X$  is copper and  $Y$  is iron

**Answer: D**



**View Text Solution**

**Exercise Type**



1. Piyush is a student of class 10. His teacher was teaching the type of chemical reactions in the class. Piyush was asked to carry out the reaction of electrolysis of water in the laboratory. Piyush set up the complete apparatus for the electrolysis of water. He took pure water (distilled water) to carry out this reaction. When Piyush passed electric current through this water for a considerable time even then no chemical reaction took place. Piyush told this problem to his classmate Arjun. Arjun thought over the problem and

asked Piyush to add a little of a certain substance into pure water before passing electric current through it. When electric current was passed through water after adding a little of this substance then a chemical reaction took place to form two gases  $X$  and  $Y$ . The volume of gas  $X$  collected over one of the electrodes was  $8\text{mL}$  whereas the volume of gas  $Y$  collected over the other electrode was  $16\text{mL}$

(a) Why no chemical reaction took place when electric current was passed through pure water?

(b) What substance was added in little quantity to pure water before passing electric current again?

(c) How did the addition of little of this substance help in the electrolysis of water?

(d) What is gas  $X$ ? Over which electrode is it collected?

(e) What is gas  $Y$ ? Over which electrode is it collected?

(f) What type of chemical reaction is demonstrated by this experiment ? Why?

(g) What values are displayed by Arjun in this episode?



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2. Shailesh lies in a big industrial city having a large number of chemical industries units outskirts. This city has also a very heavy traffic density. There is a big lake in the middle of this city which has much less water left in it but the lake has still a large number of fish in it. During the last one and a half months, there has been too much rain in the city with the pH of rain water being about 5.5. One day people found that many fish in the lake had died. No

one knew the reason for the death of fish in the lake or how the death of remaining fish in the lake could be prevented. Shailesh, who is a student of class X could understand the reason for the death of fish in lake. He also suggested an immediate solution for the prevention of death of more fish in the lake water.

(a) What conclusion do you draw the fact that the rain water has a pH of about 5.5? What name is given to such a rain?

(b) What makes the pH of rain water to be about 5.5?

(c) What happens to lake water when too much rain water having pH of 5.5 collects in it?

(d) Why have the fish died after the heavy rains?

(e) Why suggestion do you think has been made by Shailesh to prevent the death of more fish in the lake? Why

(f) What values are displayed by Shailesh in this episode?



[View Text Solution](#)

3. Shivani is a of class X. She lives in a big house on the outskirts of Delhi. Her family has a kitchen garden at the back of the house in which various types of seasonal vegetables are grown. Shivani's parents have been getting good crops of vegetables for many years. But from last year, the yield of vegetables from the kitchen garden has reduced a lot. Shivani asken the gardener if he was putting any chemical fertiliser into the soil or not. The gardener told Shivani that he was putting a lot of ammonium sulphate fertiliser into the

soil every time before sowing the fresh crop of vegetables and he has been doing this for any years to increase the yield of vegetables more and more. Shivani could now understand the problem. She then asked the gardener to mix a certain substance with the soil uniformly before growing the next crop of vegetables. the gardener did the same. every one was happy to see that there was bumper crop of vegetables this time.

(a) What had happened to the soil in the kitchen garden over the years? Why?

(b) Shivani took a little of soil from the kitchen



garden stirred it with some water in a test tube, filtered it and tested and filtrate with universal indicator. The universal indicator. The universal indicator turned orange. What does this tell us about the nature of soil?

(c) Why did the yield of vegetables in the kitchen garden reduce a lot?

(d) What substance/ substances do you think Shivani asked the gardener to put in the soil of kitchen garden?

(e) How did the addition of above substance/substances help the soil?

(f) What values are displayed by Shivani in this episode?



[View Text Solution](#)

4. Veena and Seema were coming home after attending the birthday party of their classmate Beena. Beena's mother had prepared a large number of delicious dishes for this occasion. A lot of soft drinks like Coca Cola and Pepsi, etc. were also served. The homemade cake and ice-cream were also there

in plenty for everyone. Veena and Seema ate a lot of food, cake and ice-cream. They also had many soft drinks each. Acutally, Seema liked the fool too muchso she ate too much. On reaching home, Seema started feeling uncomfortable. SHe also got pain in the stomach. Seema is a student of class X and her mother Mrs. Sarla is a teacher in the same shcool who teaches science to class X. Mrs. Sarla told her daughter Seema that she had three substance A,B and C in the kitchen which can be consumeds safely. The substances A,B and C give blue colour, orange colour and

green colour respectively with the universal indicator. Mrs. Sarla asked Seema which substance would she like to take in order to obtain relief from pain and why? Seema made the right choice and explained the reason to her mother.

(a) What is the general, name of the condition which is faced by Seema?

(b) Which substance is produced in excess in the stomach that causes the above condition?

(c) What is the general name of substances which are usually taken to obtain relief from the above condition?

(d) What is the nature of (i) substance A (ii) substance B, and (iii) substance C?

(e) Which substance A, B or C do you think was chosen by Seema to get relief from stomach pain? Why?

(f) What values are displayed by Seema in this incident?



[View Text Solution](#)

5. Bunty is a ten year old boy who was playing in the park with other friends. Suddenly a wasp

came flying and stung him on the face. Bunty felt a lot of pain and came running home . Just then, Bunty's younger sister Arti, who is just five five years old was stung by an ant on the arm causing a lot of burning pain. She also came running home Bunty's elder sister Reema who is a student of class  $X$  was at home at that time. Reema immediately took vinegar bottle from the kitchen shelf and rubbed some vinegar on the stung area of skin on Bunty's face. This gave Bunty some relief. Reema than took baking soda container from the kitchen made a solution of baking soda in

water, and rubbed this baking soda solution on the stung area of Arti's arm. She also got relief from pain.

(a) What type of liquid was injected by wasp's sting into Bunty's skin?

(b) Why did rubbing vinegar on the stung area of skin reduce Bunty's pain?

(c) Which chemical is injected by an ant's sting into Arti's skin?

(d) Why did rubbing baking soda solution on stung area of skin reduce Arti's pain?

(e) Name a plant whose stinging leaf hair inject the same chemical into the skin of a

person (who touches it) as the anty's sting.

(f) What type of chemical reaction takes place:

(i) When vinegar is rubbed on Bunty's skin having wasp sting?

(ii) When baking soda solution is rubbed on Arti's arm having ant's sting?

(g) What values are displayed by Reema in this whole episode?



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**6.** Rohan and Vikram are very good friends.

Rohan studies in class 9 whereas Vikram studies

in class 10. During a dental check up in the

school, Rohan was told that tooth decay had

just started on the top of his large back teeth

and where one tooth touches another. He also

heard the dentist telling his assistant that pH

change is the cause of tooth decay. Rohan

could not understand anything. He told

everything to Vikram. Vikram could

understand what had happened. He

explained everything to Rohan and also gave

him advice to prevent further tooth decay.

- (a) What is meant by tooth decay?
- (b) What type of micro-organisms are responsible for causing tooth decay?
- (c) How does tooth decay start?
- (d) What is meant by saying that pH change is the cause of tooth decay?
- (e) What advice do you think Vikram gave to Rohan to prevent further tooth decay?
- (f) What values are displayed by Vikram in this episode?



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7. Radha is a student of class X in a city school. One day Radha was doing practicals in the science laboratory of her school. Just then her science teacher, Mrs, Chopra, came to the laboratory with a beaker of a colourless solution. She told Radha that the colourless solution contains the nitrate of a metal which is usually alloyed with 24 carat gold to make 22 carat gold for ornaments. Mrs. Chopra asked Radha to devise a method to obtain the dissolved metal from the solution in the solid form. Radha started thinking about it. After

some time Radha took a certain wire from the laboratory, cleaned it and placed it in the colourless solution in the beaker. She allowed this wire to remain immersed in the solution for a considerable time. Radha noticed a gradual change in the colour of solution in the beaker and saw a thick deposit of a substance on the wire kept in the solution. Radha was happy that she had done her job well.

(a) Name the metal whose nitrate solution you think is given in the beaker? Why do you think so?

(b) What was the nature of wire placed by

Radha in the given solution? Why was this particular wire used?

(c) What change in the colour of solution was observed by Radha in the beaker and why?

(d) Which substance was deposited on the wire placed in the solution?

(e) Which chemical reaction is utilised by Radha in this process? Why does this reaction occur?

(f) What values are displayed by Radha in this episode?



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**8.** Mukesh is student of class X. He lives in a big house. There is a big iron gate in the boundary wall of his house which was installed about one year back. For the last few days, Mukesh has been observing that red -brown patches have appeared at some of the places on the iron gate. When Mukesh brought this development to the notice of his family, his sister, who is a student of class VI, said that the iron gate should be cleaned properly with sand paper to remove the red -brown patches and then smeared with oil or grease to

protect it from further damage. Mukesh did not agree with her and suggested a different treatment for the iron gate. Mukesh's father also agreed with his plan of action.

(a) What are the red brown patches on the surface of iron gate? Name the process which leads to the formation of these patches.

(b) What conditions are necessary for the formation of red-brown patches on the iron gate?

(c) What can be done if this iron gate having red-brown patches is allowed to remain as such for a long time (without any

treatment)?

(d) Explain why this iron gate cannot be smeared with oil or grease to protect it from further damage?

(e) What treatment do you think was suggested by Mukesh to protect the iron gate from further damage?

How does this treatment work to protect the iron gate?

(f) What values are displayed by Mukesh in this episode?



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9. Arun's elder sister Rama is getting married next month. His father and mother were taking Rama to a jeweller's shop to select and buy gold jewellery for this occasion. Arun insisted on going with them to the jeweller's shop. The family saw a number of jewellery pieces. Rama liked one of the gold necklaces very much and wanted to buy it immediately. The jeweller said that this necklace was made of 22 carat gold. Just when Arun's father was about to make payment for this necklace, Arun stepped in. He asked the jeweller to show the hallmark on

this gold necklace. The jeweller told him that this necklace is yet to be sent to the hallmarking laboratory for testing and stamping. Arun asked his father not to buy this necklace until the jeweller gets it hall marked. The jeweller then asked for one week's time to get the necklace hallmarked. Mean while Arun explained the need for hallmarking of gold jewellery to his family. When Arun and his family returned after one weak, the necklace carried hallmark. They also obtained hallmark certificate and a proper receipt from the jeweller before paying money and taking

delivery of necklace.

Rama was very happy to get this necklace.

(a) How many carats is pure gold? Why are ornaments not made of pure gold?

(b) What is meant by 22 carats gold? What can a dishonest jeweller do to earn more profit from gold jewellery?

(c) What is hallmark? Which Government Organisation controls the hallmark scheme for jewellery in India?

(d) Why should we buy only hallmarked gold jewellery?

(e) What values are displayed by Arun in this episode?



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**10.** One day Anita was standing in the kitchen and talking to her mother who was cooking vegetables in a stainless steel utensil. Anita observed that the bottom of cooking utensil was getting blackened from outside. She showed this to her mother. The mother told Anita that the bottoms of all the cooking

utensils kept on the gas stove were getting blackened for the last few days and she had a tough time cleaning these utensils. Being a science student of class X Anita checked the gas stove thoroughly and could understand the reason for this problem. She explained everything to her mother. As Anita was getting late for school, she asked her mother to take a particular step to stop the blackening of cooking utensils. Anita's mother did the same. The mother was glad that the bottoms of cooking utensils kept on gas burner were no longer being blackened.

(a) Why is the bottom of cooking utensil kept on burning gas stove getting blackene? Explain.

(b) Apart from blackening the bottom of cooking utensils state two other disadvantages of using gas stove in this condition.

(c) What did Anita find on checking the gas stove throughly which was causing this problem?

(d) What step Anita might have asked her mother to take to get rid of this problem?

(e) What type of flame was produced by the

gas stove burner after the required step was taken by Anita's mother? Why?

(f) What values are displayed by Anita in this episode?



[View Text Solution](#)

**11.** Abhinav studies in the  $n$ th standard in a city school. One day his science teacher was discussing oils and fats in the class. During this discussion Abhinav came to know many facts about oils and fats which he did not know

earlier. When Abhinav came back home from school, he asked his mother what type of cooking medium she used to prepare food for the family. The mother replied that she was using vegetable ghee(or vanaspati ghee) for cooking food. Abhinav requested his mother not to use vegetable ghee because it is said to be harmful for health. He asked her to purchase vegetable oil always and use it for cooking food because vegetable oils are said to be good for health. Abhinav's mother agreed to do the same.

(a) What is the difference in the physical



states of vegetable oils and fats such as vegetable ghee (or vanastpati ghee)?

(b) How are vegetable oils and fats different chemically?

(c) Name the process by which a vegetable oil is converted into a fat called vegetable ghee (or vanaspati ghee) in industry.

(d) Why is fat such as vegetable ghee (or vanaspati ghee) not considered good for health?

(e) Name the most common animal fat consumed by people?

(f) Why is vegetable oils considered to be

good for health?

(g) What values are displayed by Abhinav in this episode?



[View Text Solution](#)

**12.** Mohan went to his ancestral village during the summer holidays t met his uncle (chacha ji) and his family. Mohan's uncle has a very big house in the village but they have no piped water supply. They draw water from a well near their house. One day Mohan took a bucket of

water from the well and started washing his dirty clothes with soap given by his aunt. Mohan observed that the soap did not give lather with well water easily, only a curdy precipitate was formed making it difficult to wash the clothes properly. Mohan had brought a packet of some powder with him from the city. So Mohan used this powder to wash his clothes with well water without facing any difficulty. Mohan explained everything to his uncle's family and advised them to stop using soap for washing clothes by using well water and asked them to use the

powder which he had for washing clothes with the same well water easily.

(a) What type of water is the well water? Why?

(b) Why is soap not suitable for washing clothes with well water?

(c) What was the powder used by Mohan for washing clothes easily even with well water?

(d) Why is this powder for washing clothes suitable even with well water?

(e) What values are displayed by Mohan in this episode?



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**13.** One day Amit went to a bicycle repair shop to get broken iron part of his younger brother's bicycle welded. This shop has a gas welding set. At that time the main welder Mr. Ahmad was not present in the shop. Mr. Ahmad's assistant Chhotu offered to do the welding of broken bicycle part. When Chhotu started doing welding, Amit observed that a yellow sooty flame was being produced by the welding torch. By using this flame, Chhotu was unable to weld the two pieces of broken iron part together. Being a science student of class

X Amit could understand the mistake being made by Chhotu. He pointed the mistake to Chhotu. Chhotu then followed the instructions of Amit and succeeded in welding the broken Iron part. By that time Mr. Ahmad had also arrived. He thanked Amit for correcting the mistake of Chhotu. He also advised Chhotu to be careful in future.

(a) Which organic compound is used in gas welding?

(b) What was the reason for the yellow sooty flame being produced by the welding torch?

(c) Why the yellow sooty flame could not weld

the broken iron pieces?

(d) What was the mistake being made by Chhotu which was corrected by Amit?

(e) What was the colour of the flame produced by welding torch now and why could it weld broken iron pieces together?

(f) What values are displayed by Amit in this episode?



[View Text Solution](#)

**14.** Rahu, is studying in clas X whereas his younger brother Mohan is a student of clas VI. Mohan has been asked by his teacher to make a working model to show that some non-metal can also be a good conductor of electricity. Mohan has already made an electric circuit by using a dry cell whose both the terminals are connected to two long copper wires having crocodile clips attached to their ends, and one of the copper wires has a torch bulb connected in it through a bulb holder. Mohan, however failked to get a non-metal which



could conduct electricity. Mohan asked his brother for help. Rahul told Mohan to take a pencil, sharpen this pencil at both ends, and then connect it in the circuit made by him attaching the two crocodile clips at its two ends. Mohan did the same. As soon as the pencil sharpened at both ends was connected in the circuit the torch bulb started glowing.

(a) Of what substance is the black core of pencil made? What does the glowing of bulb in this activity indicate?

(b) Name the element of which the above substance is an allotrope?

(c) Which allotrope of this element:

(i) is used in glass cutters?

(ii) is used in lubricating oils?

(iii) has a spherical molecule made up of 60 atoms?

(d) Name two properties of this element due to which it forms a large number of compounds.

(e) Name one compound each of this element which is used:

(i) as a solvent.

(ii) to ripen raw fruits

(iii) to preserve are displayed by Rahul in this episode?



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**15.** Vinod and Pramod are the best friends. Both study in class X in different schools. Vinod has been running around in various Government offices for the last one month to get sanction for PNG connection for his home. Due to his efforts Vinod's family has just got a PNG connection in which cooking gas is

supplied through pipes. On the other hand, Pamod's family has an LPG connection in which cooking gas is supplied in cylinders. One day Vinod and Pramod were discussing PNG and LPG. Pramod said that PNG is a cooking gas and LPG is also a cooking gas, therefore their chemical composition is exactly the same. Vinod, however, did not agree with Pramod. Vinod then explained the difference between PNG and LPG to Pramod, and also told him the advantage of having a PNG connection.

(a) What is the full form of PNG? Name the major component of PNG.

(b) What is the main advantage of having a PNG connection in the home over the LPG connection?

(c) What is the difference between PNG and CNG?

(d) Write the full form of LPG and the major component of LPG.

(e) The major component of LPG exists in two forms. Name these two forms. What special name is given to these two forms in organic chemistry?

(f) What values are displayed by Vinod in this episode?



[View Text Solution](#)

**16.** Rohit's family got a wedding invitation from a relative who lives in a village. Rohit was very excited. He had never attended a village wedding so he wanted to attend this marriage along with his parents. Rohit's family was invited by the Bride's side. When the marriage party (baraat) reached the village at around 9 PM Rohit noticed that a large number of persons in the marriage party were drunk and some were still drinking in the cars parked

along the roadside. One of the drunk persons (who was a sharpshooter of police in the city) fired two celebratory shots from his licenced gun one of which hit a child sitting on the rooftop and injured him. After a while some argument started between two drunk men of the marriage party over a petty matter and they came to blows in full public view. Everyone noticed that bridegroom's uncle was so drunk that he slept throughout the marriage ceremonies without eating food at all. While all this drama was unfolding at marriage venue in the village, a person

brought the news that the bridegroom's cousin brother, who was heavily drunk, had met with a car accident and taken to hospital in a serious condition. Being a student of class X Rohit had studied the harmful effects of drinking alcohol but today he had seen all this with his own eyes. Rohit's father told him that such things also happen in many city marriages. Next day, when the intoxication due to alcohol had worn off, Rohit gathered all the people in marriage and gave them a lecture on the harmful effects of drinking alcohol citing horrible incidents of the previous night. Most



of the people appreciated Rohit's effort and vowed not to drink alcohol again.

(a) Why did a famous sharpshooter fire a gun shot in the wrong direction which hit a child sitting on the rooftop and injured him?

(b) Why did a simple argument on a pretty matter between two drunk men lead to a serious quarrel?

(c) Why did bridegroom's drunk uncle sleep throughout the marriage ceremonies without eating anything?

(d) Why did bridegroom's drunk cousin brother cause a serious car accident?

(e) What values are displayed by Rohit in this episode?



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**17.** Vineet's father has got two more rooms constructed in their existing house. The rooms are almost complete but only the wood polish remains to be done on the doors and windows of the new room. Vineet's father had brought two litres of alcohol containing some additive which is specifically used for doing wood

polish. The bottle containing this alcohol was handed over to the painters and kept in the new room. Since Vineet's father wanted work to be finished as soon as possible, therefore, two painters were working till late at night. Before going to sleep, Vineet wanted to check how much wood polishing work the painters had done. As soon as Vineet entered one of the two new rooms, he was shocked to see that one of the painters had put some alcohol into a glass and was about to drink it. Vineet snatched the glass containing this alcohol from painter's hand before he could drink it. He

then told the painter that it was not pure alcohol. Actually, it was the alcohol to which some additive had been added to make it unfit for drinking. It was to be used only for wood polish. Vineet also told the painters about the extremely harmful effects of drinking such an impure alcohol. The painter said sorry to Vineet and promised not to drink it in future.

(a) What substance is most commonly added to ethyl alcohol to make it unfit for drinking?

(b) Why does the addition of above substance make ethyl alcohol unfit for drinking?

(c) What is alcohol called after the addition of

above substance?

(d) Why should alcohol be made unfit for drinking by mixing additive such as above?

(e) What could have happened if the painter had consumed this particular alcohol at Vineet's house?

(f) What values are displayed by Vineet this episode?



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**18.** Rohan was told that six elements A,B, C,D,E and F have atomic numbers of 2,12,20,18,4 and 10 respectively (where A,B,C,D,E and F are not the chemical symbols of these elements). Based on this information, Rohan was asked to answer the following questions:

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

(b) Which of these element belong to the same periods of the periodic table? Why?

(c) Which of these elements are (i) metals, and (ii) non-metals?

(d) Which of these elements are chemically (i) reactive and (ii) unreactive?

(e) What values are displayed by Rohan in answering the above questions?



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**19.** In his periodic table, Mendeleev arranged all the then known 63 elements in the order of increasing atomic masses in horizontal rows but in such a way that element having similar properties came directly under one another in

the same vertical column. In the classification of the then known elements, Mendeleev was guided mainly by two factors. In order to make sure that the elements having similar properties fell in the same vertical column, Mendeleev left some gaps in his periodic table. Though the leaving of gaps in the periodic table was considered to be a big drawback of his classification of elements at that time but Mendeleev stuck to his decision.

(a) What are the horizontal rows of Mendeleev's periodic table known as? How many horizontal rows of elements were there



in Mendeleev's original periodic table?

(b) What are the vertical columns of Mendeleev's periodic table known as? How many vertical columns were there in Mendeleev's original periodic table?

(c) What were the similar properties used by Mendeleev to classify the then known elements into vertical columns?

(d) What were the two main guiding factors for Mendeleev in the classification of the then known elements?

(e) For what purpose were some gaps left by Mendeleev in his periodic table ? Does the

modern periodic table also have the gaps left by Mendeleev? Explain your answer.

(f) What values were displayed by Mendeleev in presenting his classification of elements?



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**20.** There are three elements  $X$ ,  $Y$  and  $Z$  having atomic numbers of 6, 16 and 19 respectively. Based on this information, Rakshit has been asked to answer the following questions:

(a) In which group of the periodic table would you expect to find (i) element  $X$  (ii) element  $Y$  and (iii) element  $Z$ ?

(b) Which two elements will form ionic bonds? Why?

(c) What will be the formula of ionic compound formed?

(d) Which two elements will form covalent bonds? Why?

(e) What will be the formula of covalent compound formed?

(f) What values are displayed by Rakshit in answering the above questions?



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21. Devendra was told that the elements  $P$ ,  $Q$  and  $R$  belong to group 2, group 14 and group 17, respectively, of the long form of periodic table. Based on this information, he was asked to answer the following questions:

(a) What is the valency of (i) element  $P$  (ii) element  $Q$  and (iii) element  $R$ ? Give reasons for your answer.

(b) What is nature of oxide of (i) element  $P$  (ii) element  $Q$  and (iii) element  $R$ ? Give reasons

for your answer.

(c) Give one example each of (i) element  $P$  (ii) element  $Q$  and (iii) element  $R$ .

(d) Name three elements which occur in the same group as element  $R$  but exist in three different physical states at room temperature.

(e) What values are displayed by Devendra in answering these question?



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**Very Short Answer Type**

1. (a) How does the chemical reactivity of alkali metals vary on going down in group 1 of the periodic table?

(b) How does the chemical reactivity of the halogens vary on going down in group 17 of the periodic table?



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2. What is the major characteristic of the first elements in the periods of the periodic table?

What is the general name of such elements?

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3. How do the atomic radii of elements change as we go from left to right in a period of the periodic table?



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4. What happens to the metallic character of the elements as we go down in a group of the periodic table?





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5. How does the number of valence electrons vary on moving from left to right:

(i) in the first period of the periodic table? (ii) in the second period of the periodic table?



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6. How does the valency of elements change on moving from left to right in the third period of the periodic table?





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