



# CHEMISTRY

## JEE MAIN AND ADVANCED

# CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

### Example

1. Eka-aluminium and Eka -silicon are known as

:



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2. What would be the *IUPAC* name and symbol for the element with atomic number 120?



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3. How would you justify the presence of 18 elements in the 5th period of the Periodic Table?



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4. On moving across the period in the p-block what is expected to the oxidizing power of the elements ?



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5. The elements  $Z = 117$  and  $120$  have not yet have been discovered, In which family / group would you place these elements and also give the electronic configuration in each case.



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6. Considering the atomic number & position in the periodic table, arrange the following elements in the increasing order of metallic character: *Si*, *Be*, *Mg*, *Na*, *P*.



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7. Which of the following species will have the largest and the smallest size

$Mg, Mg^{2+}, Al, Al^{3+}?$



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**8.** On the basis of their positions in the periodic table which among the following will have the largest atomic radii ?

Be, N, O, Ne



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9. The first ionisation enthalpy ( $\Delta_i H^{o-}$ ) values of the third period elements, *Na*, *Mg* and *Si* are respectively 496, 737 and  $786 \text{ kJ mol}^{-1}$ . Predict whether the first  $\Delta_i H^{o-}$  value for *Al* will be more close to 575 or  $760 \text{ kJ mol}^{-1}$ ? Justify your answer.



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10. Which of the following will have the most negative electron gain enthalpy and which the

least negative?  $P, S, Cl, F$ . Explain your answer.



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**11.** Fluorine is more electronegative than chlorine. Is the statement true ?



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**12.** Using the periodic table, predict the formulas of compounds which might be

formed by the following pairs of elements : (a) silicon and bromine (b) aluminium and sulphur.



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**13.** Are the oxidation state and covalency of Al in  $[AlCl(H_2O)_5]^{2+}$  same ?



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**14.** Show by a chemical reaction with water that  $Na_2O$  is a basic oxide and  $ClO_7$  is an acidic oxide.



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**15.** The elements eka aluminum and eka silicon named by Mendeleev known today as



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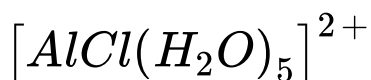
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27. The oxidation state and valency of  $Al$  in





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28. Show by chemical with water that  $Na_2O$  is a basic oxide and  $Cl_2O_2$  is an acidic oxide.



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Try Yourself

1. What were the 12 horizontal rows known in the periodic table prepared by Mendeleev ?



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2. Name the German chemist who classified the elements using the physical properties such as melting point, boiling point, atomic volume, etc.



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3. What would be the IUPAC name and symbol of Bohrium with atomic number 107 ?



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4. IUPAC symbol of atomic number 119.



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5. What is the position of lanthanide and actinide series in the periodic table ?



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6. How many elements can be there in the third period ?



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7. Do the non-metallic character exhibited by the halogens have any relation to ionization enthalpy ?



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**8.** Why s-block elements act as strong reducing agents ?



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**9.** Find the position of element with atomic number 35 in the periodic table



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**10.** What are transuranic elements ?



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**11.** Out of the following elements which is the most non-metallic ?

Na, Mg and Al.



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**12.** Pick the metalloid among the following given elements.

P, S, Si, Al.





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**13.** Describe the trend of atomic size along a period  
and a group in the periodic table.



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**14.** What will be the atomic radius of fluorine atom of a covalently bonded fluorine molecule with internuclear distance 128 pm ?



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**15.** The internuclear distance between adjacent chlorine atoms of the two neighboring molecules in the solid state is 360 pm. Thus, the van der Waals radius of chlorine atom is \_\_\_\_\_.



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**16.** Arrange the following elements in the order of increasing atomic radius N, O, F and

Ne.



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**17.** For which element the second ionization enthalpy is expected to be greater, N or O ?



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**18.** What is the expected order of ionization enthalpy for the given elements Li, Na, K and Rb ?





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**19.** Which among the following elements will have a positive electron gain enthalpy ? B, C, N, O.



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21. Is the electronegativity of an atom is constant ?



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**23.** What would be the formula of the compound formed by A and B, where A has the valence 3 and B has the valence 3 ?



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**24.** An element M combines with a halogen Cl. What would be the formula of the compound obtained if M has a valence of 2 ?



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25. What is the covalency of B in  $[B(OH)_4]$  and its oxidation state ?



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26. What happens to the oxidation state of the elements of the second moving from left to right with respect to their oxides ?



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27. What is the nature of  $Al_2O_3$  ?

(Acidic/Basic)



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28. Show that the nature of  $SO_3$  is acidic.



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**39.** What is the trend down the group in the periodic table of atomic size ?



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**40.** What will be the atomic radius of fluorine atom of a covalently bonded fluorine molecule with internuclear distance 128 pm ?



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**41.** The internuclear distance between two adjacent atoms of Ne is 360 pm . What will be its van der Waals radius ?



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**42.** Arrange the following elements in the order of increasing atomic radius . N, O, F and Ne.



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**43.** For which element the second ionization enthalpy is expected to be greater, N or O ?



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**44.** What is the expected order of ionization enthalpy for the given elements Li, Na, K and Rb ?



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**45.** Which among the following elements will have a positive electron gain enthalpy ? B, C, N, O.



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**47.** Is the electronegativity of an atom is constant ?



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**48.** It out of two given elements A and B, A has a higher ionization energy than B, which element is expected to be more electronegative A or B ?



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**49.** What would be the formula of the compound formed by A and B, where A has the valence 3 and B has the valence 3 ?



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53. What is the nature of  $Al_2O_3$  ?

(Acidic/Basic)



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Assignment Section A

1. On moving from left to right across a period in the periodic table the metallic character

A. Decreases

B. Increases

C. Remains constant

D. First increases and then decreases

**Answer: A**



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2. An element with atomic number 20 will be placed in which period of the periodic table

A. 2

B. 4

C. 3

D. 1

**Answer: B**



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3. The electronic structure

$(n - 1)d^{1-10}ns^{0-2}$  is characteristic of

- A. Lanthanides
- B. Actinides
- C. Rare gases
- D. Transition elements

**Answer: D**



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4. IUPAC name of element of atomic number 114 is

A. Ununtetradium

B. Ununquadium

C. Unnilquadium

D. Unniltetradium

**Answer: B**



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5. An element has electronic configuration  $1s^2 2s^2 2p^6 3s^2 3p^4$ . Predict its group, period and block

A. Group=16, period= $3^{rd}$ , block-s

B. Group =16, period =  $3^{rd}$ , block-p

C. Group=10, period =  $2^{nd}$ , block-p

D. Group=12, period =  $4^{th}$ , block-d

**Answer: B**



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6. Which of the following pairs has both members from the same group of the periodic table ?

A. Mg-K

B. Mg-Na

C. Na-Ba

D. Mg-Ca

**Answer: D**



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7. An element with atomic number 29 belongs to

A. s-block

B. p-block

C. d-block

D. f-block

**Answer: C**



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8. In the periodic table from left to right in a period, the atomic volume

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

**Answer: B**



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9. Which of the following electronic structure represents a metallic element ?

A. 2,8,7

B. 2,8,8

C. 2,8,4

D. 2,8,1

**Answer: D**



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10. The screening effect of d-electrons is

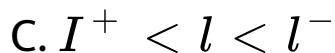
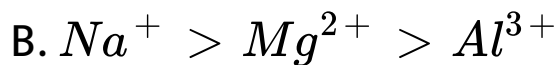
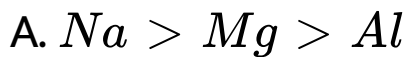
- A. Equal to that of p-electrons
- B. More than that of p-electrons
- C. Same as f-electrons
- D. Less than p-electrons

**Answer: D**



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11. Correct order of radii



D. All of these

**Answer: D**



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**12.** Which pair of elements shows positive electron gain enthalpy ?

A. He, N, O

B. Ne, N, Cl

C. O, Cl, F

D. N, He, Ne

**Answer: D**



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**13.** The elements of same group of the periodic table have

A. Atomic number

B. Electronic configuration

C. Atomic weight

D. Number of electrons in the valence shell

**Answer: D**



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**14.** Which pair of elements has same chemical properties ?

A.  $Z=13$ ,  $Z=22$

B.  $Z=3$ ,  $Z=11$

C.  $Z=4$ ,  $Z=24$

D.  $Z=2$ ,  $Z=4$

**Answer: B**



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**15.** Write the atomic number of the element present in the third period and seventeenth group of the periodic table.

A. 15

B. 16

C. 9

D. 17

**Answer: D**



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**16.** Chalcogen are elements of the group

A. 17<sup>th</sup>



B. 15<sup>th</sup>

C. 16<sup>th</sup>

D. 14<sup>th</sup>

**Answer: C**



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**17.** Which of the following shows diagonal relationship ?

A. Boron and silicon

B. Boron and aluminium

C. Boron and gallium

D. Boron and carbon

**Answer: A**



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**18.** What are representative elements?

A. s-block

B. s-block and p-block

C. d-block or transition elements

D. d-block and f-block

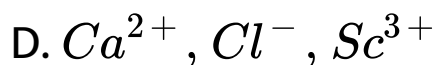
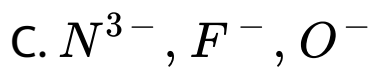
**Answer: B**



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**19.** Which group of elements represents a collection of isoelectronic species ?





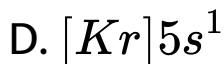
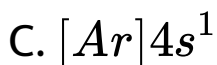
**Answer: D**



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20. Which of the following electronic configuration represents the most metallic element ?





**Answer: D**



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21. The group of elements in which the last electron is present the anti-penultimate shell of atom called

A. f-block elements

B. d-block elements

C. p-block elements

D. s-block elements

**Answer: A**



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**22. Which general electronic configuration of the element does not represent a non-metal ?**

A.  $ns^2, np^4$

B.  $ns^2, (n - 1)d^{1-10}, np^5$

C.  $ns^{1-2}, (n - 1)d^{1-10}$

D.  $ns^2, (n - 1)d^{1-10}, np^{1-6}$

**Answer: C**



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**23.** Find the incorrect statement.

A. Valence electron and valency is same for group 1

B. p-block elements are metals, nonmetals and metalloids

C. Noble gases has 8 valence electrons except He but valency zero

D. Smallest atom of periodic table is He

**Answer: D**



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24. The effective nuclear charge across the period (from left to right)

A. Increases

B. Decreases

C. First increases and then decreases

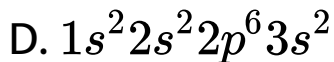
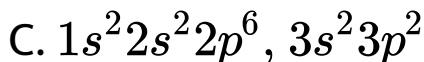
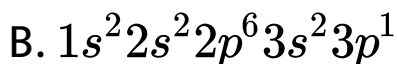
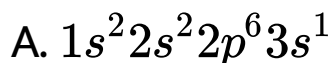
D. First decreases and then increases

**Answer: A**



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25. Which electronic configuration of an element has abnormally high difference between second and third ionization enthalpies ?

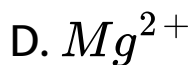


**Answer: D**



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26. Which of the following has the highest negative electron gain enthalpy ?

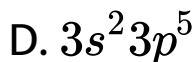
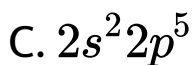
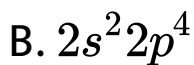
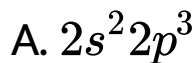


**Answer: B**



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27. The outermost electronic configuration of the most electronegative element is



**Answer: C**



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28. Match the elements given in column (I) with the most appropriate expected values given in column II

Column I	Column II
Element	Electronegative values
A. <i>F</i>	( <i>p</i> ) 3.5
B. <i>O</i>	( <i>q</i> ) 3.0
C. <i>N</i>	( <i>r</i> ) 4.0
D. <i>C</i>	( <i>s</i> ) 2.5

A. A(*r*), B(*p*), C(*q*), D(*s*)

B. A(*s*), B(*q*), C(*r*), D(*p*)

C. A(*p*), B(*q*), C(*r*), D(*s*)

D. A(*r*), B(*q*), C(*p*), D(*s*)

**Answer: A**



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**29.** Electronegativity of the elements O,F,S and Cl increases in the order

A. S,Cl,O,F

B. Cl,S,O,F

C. S,Cl,F,O

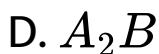
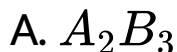
D. Cl,S,F,O

**Answer: A**



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**30.** Valence electrons in the atom of element A is 4 and in the element B is 2. Most probable compound formed from A and B is

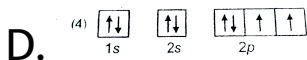
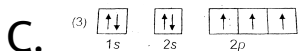
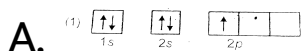


**Answer: C**



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**31. Which orbital diagram gives an insight ionization energy ?**





**Answer: C**



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**32. The largest atomic radius will be of**

A. Be

B. Na

C. F

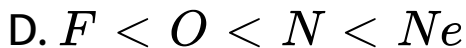
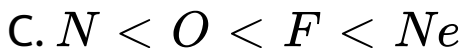
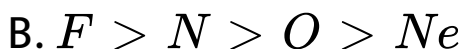
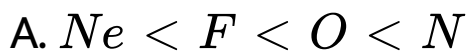
D. Mg

**Answer: B**



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33. The order of increasing atomic radii is



**Answer: D**



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**34.** Highest amount of energy will be required for the removal of electron from

A. s-subshell

B. p-subshell

C. d-subshell

D. f-subshell

**Answer: A**



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35. Arrangement of atoms according to their increasing ionization energy is clearly represented by the given option.

A.  $C < N < O < F$

B.  $C < O < N < F$

C.  $N < C < O < F$

D.  $C < O < F < N$

**Answer: B**



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**36.** Pick the incorrect statement about the factors affecting ionization energy

A. Half filled or full filled atomic orbitals have high ionization energy

B. More is the shielding of valence electrons more is the ionization energy

C. Larger is the atomic radii lower is ionization energy

D. Ionization enthalpy  $\propto$  effective nuclear charge

**Answer: B**



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**37.** What will be the correct order of size for the given elements ?

A.  $Na < Cl < F$

B.  $Na < F < Cl$

C.  $F < Cl < Na$

D.  $Cl < F < Na$

**Answer: C**



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**38.** In which element the electrons will be experiencing the highest effective nuclear charge ? The elements are Be, B, C, N & O.

A. O

B. Be

C.  $Be \approx B$

D.  $N=O$

**Answer: A**



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**39.** Which of the following is not a representative element ?

A.  $Z=37$



B.  $Z=31$

C.  $Z=54$

D.  $Z=24$

**Answer: D**



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**40.** Correct order of 1st ionisation potential (IP)

among following elements Be, B, C, N, O is

A.  $B < Be < C < O < N$

B.  $B < Be < C < N < O$

C.  $Be < C < B < N < O$

D.  $Be < B < C < O < N$

**Answer: A**



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## Assignment Section B

1. In Lothar Meyer's curve, the element on the peak of curve will be

A. F

B. Na

C. Mg

D. Ne

**Answer: B**



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2. According to Mendeleev's periodic law physical and chemical properties are function of

of

A. Atomic number

B. Atomic weight

C. Atomic volume

D. Number of neutrons

**Answer: B**



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3. With which block  ${}_{30}\text{Zn}$  belongs ?

A. s

B. p

C. d

D. f

**Answer: C**



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4. Out of following which has the highest electronegativity ?

A. H

B. Li

C. Na

D. Be

**Answer: A**



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5. Which of the following has largest size ?

A.  $H^{-}$

B.  $He$



**Answer: A**



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6. Which of the following orbitals has higher screening power ?

A. 4s

B. 4p

C. 4d

D. 4f

**Answer: A**



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7. The element which belongs with chalcogen family is

A. N

B. P



C. S

D. Cl

**Answer: C**



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**8.** The element which has highest 2nd ionisation energy is

A. Na

B. Mg

C. Ca

D. Ar

**Answer: A**



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**9. An atom with high electronegativity generally has :-**

A. Low electron affinity

B. Small atomic number

C. Large atomic radius

D. High ionisation potential

**Answer: D**



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**10. Ionic radii are**

A. Greater than the respective atomic radii  
of elements in general

B. Greater than the respective atomic radii of electropositive elements

C. Greater than the respective atomic radii of electronegative elements

D. Less than the respective atomic radii of electronegative elements

**Answer: C**



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11. The first ionisation potential of  $Na$ ,  $Mg$ ,  $Al$  and  $Si$  are in the order

A.  $Na < Mg > Al < Si$

B.  $Na < Mg < Al > Si$

C.  $Na > Mg > Al > Si$

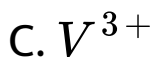
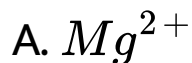
D.  $Na > Mg > Al < Si$

**Answer: A**



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12. Which of the following has maximum number of unpaired electrons ?



**Answer: D**



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**13.** Which of the following elements do not belong to the family indicated ?

- A. Cu- Coinage metal
- B. Ba- Alkaline earth metal
- C. Zn- Alkaline earth metal
- D. Xe- Noble gas

**Answer: C**



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**14.** If the atomic number of an element is 33, it will be placed in the periodic table in the

- A. 1st group
- B. 3rd group
- C. 15th group
- D. 17th group

**Answer: C**



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15. Which among the following elements has the highest value for third ionisation energy ?

A. Mg

B. Al

C. Na

D. Ar

**Answer: A**



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**16.** The screening effect of inner electrons of an atom can cause

- A. A decrease in the ionisation energy
- B. An increase in the ionisation energy
- C. No effect on the ionisation potential
- D. An increase in the attraction of the nucleus on the outermost electrons

**Answer: A**



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17. The diagonal similarities are due to similar polarising powers for the elements

The polarising power is defined as

- A.  $\frac{\text{ionic charge}}{\text{ionic radius}}$
- B.  $\frac{(\text{ionic charge})^2}{\text{ionic radius}}$
- C.  $\frac{\text{ionic charge}}{(\text{ionic radius})^2}$
- D.  $\frac{\text{ionic charge}}{(\text{ionic radius})^{1/2}}$

**Answer: C**



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**18.** Which of the following gradation in the properties is false, as we move from Left to right in the periodic table ?

- A. Metallic to non-metallic character
- B. Oxidising to reducing properties
- C. Metallic solids through network solids to molecular solids
- D. Base forming to acid forming character

**Answer: B**





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19. The increasing order of electron affinity values of  $O$ ,  $S$  and  $Se$  is

A.  $O > S > Se$

B.  $S > Se > O$

C.  $Se > O > S$

D.  $Se > S > O$

**Answer: B**



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20. The element which has highest  $II^{nd}$  I.E. ?

A. Li

B. Be

C. K

D. B

**Answer: A**



**Watch Video Solution**

21. The element which has highest electron affinity ?

A. Oxygen

B. Sulphur

C. Nitrogen

D. Phosphorus

**Answer: B**



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22. Electronegativity of an element is 1.0 on the Pauling scale. Its value of Mulliken scale will be

A. 2.8

B. 1

C. 2.0

D. 1.5

**Answer: A**



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23. Which of the following element has highest shielding constant ?

A. Mg

B. Al

C. K

D. Ga

**Answer: D**



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24. Which one of the following order is correct ?

A.  $I > I^+ > I^-$  (radii)

B.  $I^- > I > I^+$  (radii)

C.  $I^- > I > I^+$  (ionisation energy)

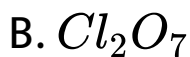
D.  $I^{+5} < I^+ < I^{+7}$  (ionisation energy)

**Answer: B**



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25. Which one of the following oxides has highest acidic character ?



**Answer: B**



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26. Electron gain enthalpy will be positive in

A.  $O^{-2}$  is formed from  $O^{-1}$

B.  $O^{-1}$  is formed from O

C.  $S^{-1}$  is formed from S

D.  $Na^{-}$  is formed from Na

**Answer: A**

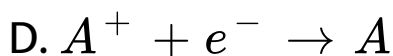
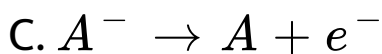
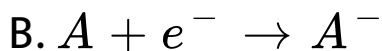
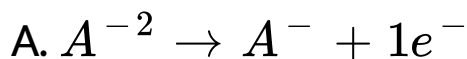


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27. Enthalpy change in the following process is



Which of the following processes has enthalpy change = X kJ/mole ?



**Answer: C**



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28. Uub is the symbol for the element with atomic number-

A. 102

B. 108

C. 110

D. 112

**Answer: D**



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29. An element has electronic configuration  $[\text{Xe}] 4f^7, 5d^1, 6s^2$ . It belongs to \_\_\_ block of this periodic table.

A. s

B. p

C. d

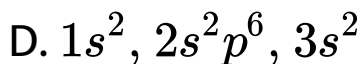
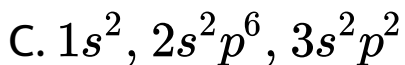
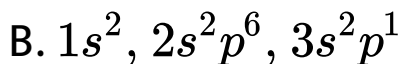
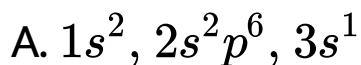
D. f

**Answer: D**



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**30.** A sudden large jump between the values of second and third ionisation energies of an element would be associated with the electronic configuration



**Answer: D**





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31. An element has 56 nucleons in nucleus and if it is isotonic with  ${}_{30}\text{Y}^{60}$ . Which group and period does it belong to ?

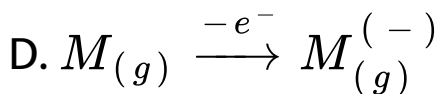
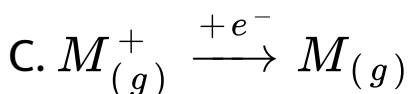
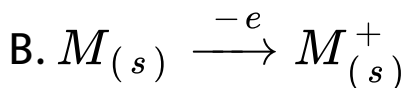
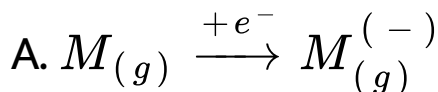
- A. 8<sup>th</sup> group, 4<sup>th</sup> period
- B. 14<sup>th</sup> group, 3<sup>rd</sup> period
- C. 12<sup>th</sup> group, 3<sup>rd</sup> period
- D. 12<sup>th</sup> group, 4<sup>th</sup> period

**Answer: A**



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32. Which of the following processes will release energy equal to ionization energy ?



**Answer: C**



**33.** The chemistry of Be is very similar to that of aluminium, because

- A. They belong to same group
- B. They belong to same period
- C. Both have nearly the same ionic size
- D. The ratio of their charge to size is nearly the same

**Answer: D**



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**34.** The ionisation energy of Li is 500 KJ/mole.

The amount of energy required to convert 70

mg of Li atoms required to convert 70 mg of Li

atoms in gaseous state into  $Li^+$  ion (in KJ) is

A. 5.2 kj

B. 52 kj

C. 520 kj

D. 52 J

**Answer: A**



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## Assignment Section C

1. Choose the correct pair regarding ionisation energy ( $IE_1$ )

A.  $B > Be$

B.  $Tl > Ga$

C.  $N > O$

D.  $Li > Na$

**Answer: B::C::D**



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2. The element which belong with p-block is/are

A. Fe

B. Ga

C. Na

D. I

**Answer: B::D**



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**3. Choose the correct statement/statements regarding Modern periodic table**

A. Actinoids are placed in main body of periodic table

B. Chemical properties are periodic

function of atomic number

C. In periodic table, 18 group are present

D. 7th period is incomplete

**Answer: B::C::D**



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4. Which of the following is/are correct pair regarding size ?



A.  $Zn > Cu$

B.  $N > O$

C.  $Al > Ca$

D.  $B > C$

**Answer: A:D**



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**5. Choose the correct option(s)**

A. Oxygen has highest electron gain enthalpy among chalcogens

B.

C.

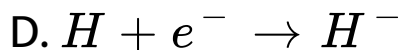
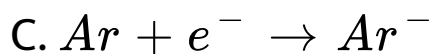
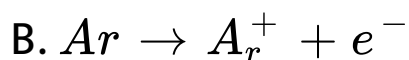
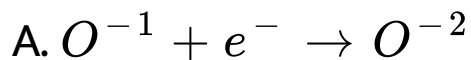
D.

**Answer: B::D**



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6. Choose the process which is/are endothermic ?

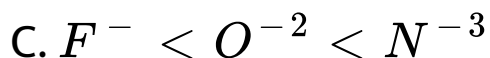


**Answer: A::B::C**



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7. Which of the following is/are correct order regarding radius ?



**Answer: B::C::D**



**Watch Video Solution**

8. Which of the following pairs contain metalloids ?

A. Ga, Ge

B. As, Te

C. I, Sb

D. In, Tl

**Answer: A::B**



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9. Choose the correct statement(s).

A.  $[Ar]3d^{10}4s^24p^6$  element in a noble gas

B.  $[Ar]3d^54s^1$  element belongs to s block

C.  $1s^2$  element belongs to f block

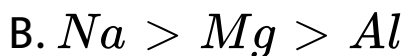
D.  $[Xe]4f^15d^16s^2$  element belongs to f block

**Answer: A::D**



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10. Which of the following is/are correct order in accordance of electropositive nature of metal ?



**Answer: B::C::D**



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11. Choose the pair in which  $IE_1$  of first element is greater than  $IE_1$  of second element but in case of  $IE_2$  order is/are reversed

A. N, O

B. P, S

C. Be, B

D. F, O

**Answer: A::B::C::D**



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12. Which of the following sequence represents atomic number of only representative elements?

A. 55,12,48,53

B. 13,33,54,83

C. 3,33,53,87

D. 22,33,55,66

**Answer: B::C**



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## Assignment Section D Linked Comprehension Type Questions

1. Ionisation energy is the amount of energy required to remove the outermost  $e^-$  from a gaseous atom. Its unit is kJ/mole or kcal/mole.

Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as  $IE_2$ ,  $IE_3$ ,  $IE_4$  etc. the difference in

the values of  $IE_1$ ,  $IE_2$  and  $IE_3$  helps to determine electronic configuration of the element.

Element	$IE_1$	$IE_2$	$IE_3$ (unit kcal/mol)
A	150	350	920
B	99	734	1100
C	418	1091	1652
D	550	1025	1500

Which element forms stable unipositive ion ?

A. A

B. B

C. C

D. D

**Answer: B**



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2. Ionisation energy is the amount of energy required to remove the outermost  $e^-$  from a gaseous atom. Its unit is kJ/mole or kcal/mole.

Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as  $IE_2, IE_3, IE_4$  etc. the difference in the values of  $IE_1, IE_2$  and  $IE_3$  helps to

determine electronic configuration of the element.

Element	IE <sub>1</sub>	IE <sub>2</sub>	IE <sub>3</sub> (unit kcal/mol)
A	150	350	920
B	99	734	1100
C	418	1091	1652
D	550	1025	1500

Which of the following is a non-metal ?

A. A

B. B

C. C

D. D

**Answer: C::D**



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3. Ionisation energy is the amount of energy required to remove the outermost  $e^-$  from a gaseous atom. Its unit is kJ/mole or kcal/mole.

Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as  $IE_2, IE_3, IE_4$  etc. the difference in the values of  $IE_1, IE_2$  and  $IE_3$  helps to determine electronic configuration of the element.

Element	$IE_1$	$IE_2$	$IE_3$ (unit kcal/mol)
A	150	350	920
B	99	734	1100
C	418	1091	1652
D	550	1025	1500

Which element is a noble gas ?

A. A

B. B

C. C

D. D

**Answer: D**



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4. Mulliken defined the electronegativity of an atom as the arithmetic mean of its ionisation energy and electron affinity.

$$X_A = \frac{1}{2}(I. P. + E. A. )$$

One more relationship given by him, if the values are given in eV is

$$X_A = \frac{\text{Ionisation potential} + \text{Electron affinity}}{5.6}$$

When there is pure covalent bond between A-  
B

$$\frac{(IP)_A + (EA)_A}{5.6} = \frac{(IP)_B + (EA)_B}{5.6}$$

$$\Rightarrow X_A = X_B$$



According to Mulliken, electronegativity depends on

- A. Ionisation potential
- B. Electron gain enthalpy
- C. Electron affinity
- D. Both (1) & (3)

**Answer: D**



**Watch Video Solution**

5. Mulliken defined the electronegativity of an atom as the arithmetic mean of its ionisation energy and electron affinity.

$$X_A = \frac{1}{2}(I. P. + E. A. )$$

One more relationship given by him, if the values are given in eV is

$$X_A = \frac{\text{Ionisation potential} + \text{Electron affinity}}{5.6}$$

When there is pure covalent bond between A-  
B

$$\frac{(IP)_A + (EA)_A}{5.6} = \frac{(IP)_B + (EA)_B}{5.6}$$

$$\Rightarrow X_A = X_B$$

When there is formation of  $\overset{\delta-}{A} - \overset{\delta+}{B}$  bond  
then condition will be

A. 
$$\frac{(IP)_A + (EA)_A}{5.6} > \frac{(IP)_B + (EA)_B}{5.6}$$

B. 
$$\frac{(IP)_A + (EA)_B}{5.6} > \frac{(IP)_A + (EA)_B}{5.6}$$

C. 
$$\frac{(IP)_A + (EA)_B}{2.8} = \frac{(IP)_A + (EA)_B}{2.8}$$

D. 
$$\frac{(IP)_A + (EA)_B}{5.6} > \frac{(IP)_A + (EA)_A}{5.6}$$

**Answer: A**



**Watch Video Solution**

6. Mulliken defined the electronegativity of an atom as the arithmetic mean of its ionisation energy and electron affinity.

$$X_A = \frac{1}{2}(I. P. + E. A. )$$

One more relationship given by him, if the values are given in eV is

$$X_A = \frac{\text{Ionisation potential} + \text{Electron affinity}}{5.6}$$

When there is pure covalent bond between A-B

$$\frac{(IP)_A + (EA)_A}{5.6} = \frac{(IP)_B + (EA)_B}{5.6}$$

$$\Rightarrow X_A = X_B$$

Pauling's Electronegativity scale is based on

A. Thermochemical data

B. I.E. data

C. E.A. data

D. Both (2) & (3)

**Answer: A**



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**Assignment Section E Assertion Reason Type  
Questions**

1. Statement-1 : Nitrogen and oxygen have nearly same size.

Statement-2 : Electron-electron repulsions tend to increase the size.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: B**



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2. Statement-1 : Nitrogen can form maximum four bonds with hydrogen.

Statement-2 : Valency is the combining capacity of element and it is always constant

- A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-2
- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-2
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: C**



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3. Statement-1 : Noble gases have high ionisation energy.

Statement-2 : Noble gases belong to 18<sup>th</sup> group.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-3

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-3

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: B**



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4. He and Be both have the same outer electronic configuration like  $ns^2$  type.

Statement-2 : Both are chemically inert.

- A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-4
- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-4
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: C**



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5. Statement-1: Fluorine has less electron affinity than chlorine.

Statement-2 : Due to small size, more electron-electron repulsions are observed in F.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: A**



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**6. Statement-1:** Long form of periodic table

exactly explain the position of hydrogen.

Statement-2 : Hydrogen is most abundant

element of the universe.

- A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-6
- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-6
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: D**



**Watch Video Solution**

7. Statement-1 : He and  $H^-$  have same size

Statement-2 : He and  $H^-$  have same number of electrons in valence shell.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: D**



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**8.** Statement-1 :  $B_2O_3$  is more acidic than  $BeO$ .

Statement-2 : Ionisation energy of B is more than Be.



- A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-1
- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-1
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: C**



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9. Statement-1 : Bond dissociation energy of  $F_2$  is more than  $Cl_2$ .

Statement-2 : Due to smaller size of fluorine there are greater electron repulsions between the F atoms than Cl atoms.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-1
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: D**



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**10. Statement-1 :** Ions  $Na^+$ ,  $Mg^{2+}$ ,  $Al^{3+}$  are isoelectronic.

**Statement-2 :** In each ion, the total number of electrons are 10.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: A**



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**11.** Statement-1 : First Ionisation energy of beryllium is more than boron.

Statement-2 : In boron, 2p orbital is fully filled, whereas, in beryllium, it is not fully filled.

- A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-1
- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-1
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: C**



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**12.** Statement-1 : Fluorine is more electronegative than chlorine.

Statement-2 : Fluorine is smaller in size than chlorine.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOT a correct explanation

for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: B**



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**13.** Statement-1 : Ionization energy of s-electrons are more than the p-electrons for the same shell.

Statement-2 : s electrons are closer to the



nucleus than p-electrons, hence, more tightly attached.

A. Statement-1 is True, Statement-2 is True,  
Statement-2 is a correct explanation for  
Statement-1

B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

**Answer: A**



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**14.** Statement-1 : Li and Mg show diagonal relationship.

Statement-2 : Li and Mg have nearly same atomic radius.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for

Statement-1

- B. Statement-1 is True, Statement-2 is True,  
Statement-2 is NOT a correct explanation  
for Statement-1
- C. Statement-1 is True, Statement-2 is False
- D. Statement-1 is False, Statement-2 is True

**Answer: C**



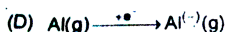
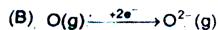
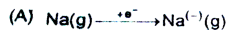
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Assignment Section F Matrix Match Type  
Questions

# 1. Match the following

Column-I

(Transformations)



Column-II

(Observation)

(p) Release of energy

(q) Absorb energy

(r) Attains noble gas configuration

(s) Accompany contraction in size



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Assignment Section G Integer Answer Type Questions

1. What is the group no of element Une ?



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2. What is screening constant for outer electron of H?



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3. Which group will show lowest second ionization energy ? (Non radioactiv element)



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4. The element which has highest electron affinity will belong with group number  $x$ . Then  $x-10$  will be.



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5. The largest group in Modern periodic table is



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# Assignment Section H Multiple True False Type Questions

1. Statement-1 : Electronegativity of an element depends on ionisation energy of that element.

Statement-2 : Electroegativity regularly decreases along the group.

Statement-3 : Fluorine is the most electronegative element.

A. T F T

B. T T T

C. F T T

D. F F T

**Answer: B**



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2. Statement-1 : In Mendeleev's periodic table arrangement of elements depend on their atomic weight.

Statement-2 : Some vacant sites were present in this periodic table.



Statement-3 : Position of isotope was well explained by Mendeleev

A. T T F

B. F F T

C. T F T

D. T F F

**Answer: A**



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3. Statement-1 : Tendency of salts of group II getting hydrated increases down the group.

Statement-2 : Alkali metal salts have less tendency to get hydrated than group II salts.

Statement-3 : Hydration of salts occur due to imbalance of sizes of cation and anion.

A. F T F

B. T T T

C. T F T

D. F T T

**Answer: D**



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## Assignment Section I Subjective Type Questions

1. Covalent radius of an element having 82 electrons in extranuclear part and 82 protons in the nucleus is  $146 \text{ \AA}$ . Calculate the electronegativity on Allred Rochow scale of that element.



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2. Calculate the energy required to convert all the atoms of M (atomic number : 12) to  $M^{2+}$  ions present in 12 mg of metal vapours. First and second ionization enthalpies of M are 737.77 and 1450.73  $\text{kJ mol}^{-1}$  respectively.



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3. Calculate the electronegativity value of chlorine on Mulliken's scale, given that

$IP = 13.0eV$  and  $EA = 4.0eV$ .



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4. There are three elements I, II, III and their ionisation energies are given below.

$IE_1$	$IE_2$
I 2372	5251
II 900	1760
III 520	7300

Now identify

(a) Which element is most reactive ?

(b) Which element is noble gas ?

(c) Which can form a stable dihalide ?



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5. Out of Ne and  $Na^+$  which has higher ionisation energy and why ?



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6. Alkali metals and coinage metals both have  $ns^1$  electron in outermost orbitals.

(a) Out of these two groups, which group elements have higher stability. Explain.

(b) Compare the polarising power of their cation.



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7. Why are lanthanides and actinides placed at the bottom of the periodic table?



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8. Arrange the following in increasing order as directed

(a)  $Li^+$ ,  $Be^+$ ,  $B^+$ ,  $C^+$  (Stability)

(b) B, Al, Ga, In, Tl (First Ionisation energy)



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9. Why  $Al_2O_3$  is amphoteric while  $B_2O_3$  is acidic ?



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Assignment Section J Aakash Challengers  
Questions



1. Which of the following has the largest ionisation energy ?

A. Zn

B. Sc

C. Cd

D. Hg

**Answer: D**



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2. s orbital is more penetrating because

A. Probability of finding electron is maximum on the surface of nucleus

B. s orbital is non-directional

C. s orbital is spherical in shape

D. All of these

**Answer: A**



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3. The correct pair regarding property given in bracket is

A.  $F_2 > Cl_2$  (Oxidising character)

B.  $F > Cl$  (Electron affinity)

C.  $F < Cl$  (Electronegativity)

D.  $O > N$  (Ionisation energy)

**Answer: A**



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4. Choose the correct statement

A. Isotopes have nearly same chemical properties

B. Isoelectronic species may be neutral

C. Na and K have nearly same  $Z_{\text{effective}}$

D. All of these

**Answer: D**



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5. Maximum number of electrons in  $n^{\text{th}}$  shell is

A.  $n^2$

B.  $2(l+1)$

C.  $2n^2$

D.  $(l + 1)^2$

**Answer: C**



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6. Choose the correct regarding E.N.

A.  $B > Al > Ga > In$

B.  $B > Al = Ga = In$

C.  $B > In > Ga > Al$

D.  $B > Al < Ga < In$

**Answer: D**



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**Exercise**

1. All the elements in a group in the periodic table have the same

A. Atomic number

B. Electronic configuration

C. Atomic weight

D. Number of electrons in the valence shell

**Answer: D**



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2. Which pair of elements has same chemical properties ?

A.  $Z=13$  ,  $Z=22$

B.  $Z=3$  ,  $Z=11$

C.  $Z=4$  ,  $Z=24$

D.  $Z=2$  ,  $Z=4$

**Answer: B**



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3. Write the atomic number of the element present in the third period and seventeenth group of the periodic table.

A. 15

B. 16

C. 9

D. 17

**Answer: D**



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4. Chalcogen are elements of the group

A. 17<sup>th</sup>

B. 15<sup>th</sup>

C. 16<sup>th</sup>

D. 14<sup>th</sup>

**Answer: C**



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5. Representative elements are elements of

A. s - block

B. s-block and p-block

C. d-block or transition elements

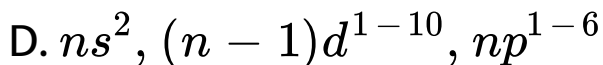
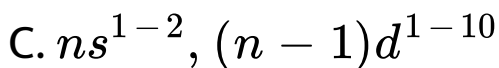
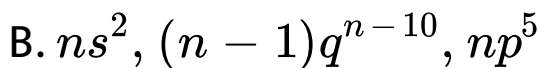
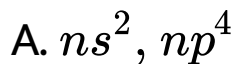
D. d-block and f-block

**Answer: B**



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6. Which general electronic configuration of the element does not represent a non-metal ?



**Answer: C**



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7. Which of the following is not a representative element ?

A.  $Z=37$

B.  $Z = 31$

C.  $Z=54$

D.  $Z=24$

**Answer: D**



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8. The element having no neutron in the nucleus of its atom is-

(a). hydrogen

(b). nitrogen

(c). helium

(d). boron

A. H

B. Mg

C. He

D. Ag

**Answer: A**



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**9. Number of groups in d-block**

A. 5

B. 10

C. 15

D. 20

**Answer: B**



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10. Which of the following is transition element ?

A. P

B. Zn

C. Cu

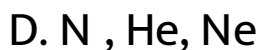
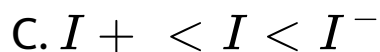
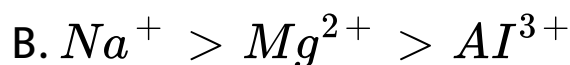
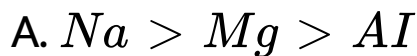
D. Na

**Answer: C**





11. Correct order of radii



**Answer: A**



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12. Which pair of elements shows positive electron gain enthalpy ?

A. He , N , O

B. Ne , N, Cl

C. O, Cl,F

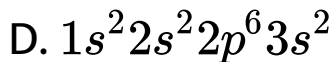
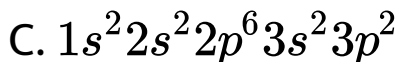
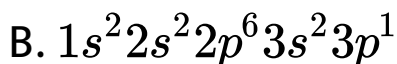
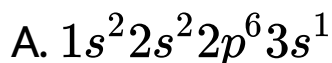
D. N, He, Ne,

**Answer: D**



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13. Which electronic configuration of an element has abnormally high difference between second and third ionization enthalpies ?



**Answer: D**



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14. Which of the following has the highest positive electron gain enthalpy ?

A. F

B.  $O^-$

C.  $Na^-$

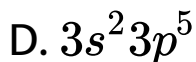
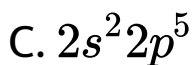
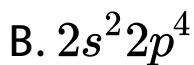
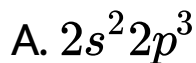
D.  $Mg^{2+}$

**Answer: B**



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15. The outermost electronic configuration of the most electronegative element is



**Answer: C**



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16. Which orbital diagram gives an insight into ionization energy?



**Answer: C**



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17. The largest atomic radius will be of

A. Be

B. Na

C. F

D. Mg

**Answer: B**



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**18.** Highest amount of energy will be required for the removal of electron from

A. s - subshell

B. p-subshell

C. d-subshell

D. f-subshell

**Answer: A**



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19. Pick the incorrect statement about the factors affecting ionization energy

A. Half filled or full filled atomic orbitals have high ionization energy

B. more is the shielding of valence electrons more is the ionization energy

C. Larger is the atomic radii lower is ionization energy

D. Ionization enthalpy  $\propto$  effective nuclear charge

**Answer: B**



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20. The correct order of first ionization potential among following elements Be, B, C is

A.  $B < Be < C$

B.  $B = Be = C$

C.  $Be < C < B$

D.  $Be < B < C$

**Answer: A**



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**21. Which of the following shows diagonal relationship ?**

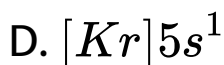
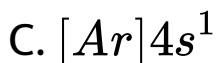
- A. Boron and silicon
- B. Boron and aluminium
- C. Boron and gallium
- D. Boron and carbon

**Answer: A**



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22. Which of the following electronic configuration represents the most metallic element ?



**Answer: D**



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**23.** The group of elements in which the last electron is present the anti-penultimate shell of atom called

- A. f-block elements
- B. d - block elements
- C. p-block elements
- D. s-block elements

**Answer: A**



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**24.** Find the incorrect statement.

A. Valence electron and valency is same for  
group 1

B. p- block element are metals nonmetals  
and metalloids

C. Noble gases have 8 valence electrons

except He

D. Smallest atom of periodic table is He

**Answer: D**



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**25.** The effective nuclear charge across the period (from left to right)

A. Increases

B. Decreases

C. First increases and then decreases

D. first decreases and then increases

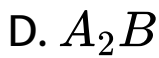
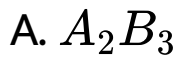
**Answer: A**



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**26.** Valence electrons in the atom of element A is 4 and in the element B is 2. Most probable compound formed from A and B is





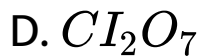
**Answer: C**



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**27. The most acidic oxide is:**





**Answer: D**



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**28.** The most basic oxide among the following is



B. CaO

C. MgO

D. FeO

**Answer: A**



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**29. Neutral oxide out of following is**

A. CO

B. NO

C.  $N_2 O$

D. All of these

**Answer: D**



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**30. Which of the following is amphoteric ?**

A. MgO

B. BeO

C. CO

D.  $CO_2$

**Answer: B**



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## Assignment Section A Objective Type Questions

1. Modern periodic law is .

A. The physical and chemical properties of the elements are periodic function of

their atomic numbers

B. The physical and chemical properties of the elements depend upon the energy of the electrons

C. The physical and chemical properties of the elements depends upon atomic wt.

D. None of these

**Answer: A**



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2. Which one of the following statements related to the modern periodic table is incorrect?

A. The p-block has 6 column because a maximum of 6 electrons can occupy all the orbitals in the p - subshell

B. The d-block has 8 columns because a maximum of 8 electrons can occupy all the orbitals in the d - subshell

C. Each block contains a number of columns equal to number of electrons that can occupy the subshell

D. The block indicates the value of azimuthal quantum number for the last subshell which received electrons

**Answer: B**



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3. Elements which generally exhibit multiple oxidation states and whose ions are usually coloured are

A. Metalloids

B. Transition elements

C. Non - metals

D. Gasses

**Answer: A**



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4. The IUPAC name of element having atomic number 108 is

A. Unniloctium

B. Ununoctium

C. Nilniloctinium

D. Ununoctinium

**Answer: B**



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5. Which of the following is a representative element ?

A. Zn

B. Sr

C. Cu

D. Fe

**Answer: D**



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6. When a neutral atom is converted into cation, there is

A. Atomic weight increases

B. Atomic weight decreases

C. Size increases

D. Size decrease s

**Answer: D**



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7. Which one is a correct statement of the following-

A. Ionic radius of a metal is same as its atomic radius

B. The ionic of a metal is greater than its atomic radius

C. The atomic radius of a non - metal is more than its ionic radius

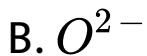
D. The ionic radius of a metal is less than its atomic radius

**Answer: D**



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8. Which of the following  $N^{3-}$ ,  $O^{2-}$ ,  $F^{-}$  is largest in size ?



D. All of these

**Answer: C**



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9. Which of the following is not a correct for iso - electronic ions ?

A. They have the same number of electrons around their nuclei

B. Higher the atomic number higher will be positive charge in a series of

isoelectronic ions of same period

C. Isoelectronic ions have same electric charge

D. An isoelectronic series may have both positively and negatively charged ions

**Answer: C**



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10. The radii of  $F$ ,  $F^-$ ,  $O$  and  $O^{2-}$  are in the order of

A.  $O^{2-} > O > F^- > F$

B.  $F^- > O^{2-} > F > O$

C.  $O^{2-} > F^- > O > F$

D.  $O^2 > F^- > F > O$

**Answer: C**



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11. Which of the following is correct ?

A.  $r_{\text{ionic}} \propto Z$

B.  $r_{\text{ionic}} \propto Z_{\text{eff}}$

C.  $r_{\text{ionic}} \propto \frac{1}{Z_{\text{eff}}}$

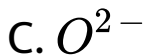
D.  $r_{\text{ionic}} \propto Z_{\text{eff}}^2$

**Answer: A**



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12. Which ion has the largest radius ?



**Answer: C**



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**13.** The electronic configuration of an element is  $1s^2 2s^2 2p^6 3s^2 3p^3$ . The atomic number of the

element which is just below the above element  
in the periodic table is

A. 36

B. 49

C. 33

D. 34

**Answer: D**



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14. Which of the following has the highest electron affinity?

A. I

B. Br

C. F

D. Cl

**Answer: C**



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15. The general valence shell electronic configuration of transition elements is

A.  $ns^1$

B.  $ns^2np^5$

C.  $ns^{0-2}(n-1)d^{1-10}$

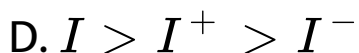
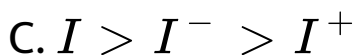
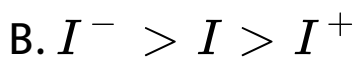
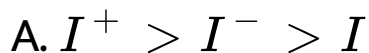
D.  $ns^2(n-1)d^{10}$

**Answer: B**



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16. Which one of the following is correct order of the size of iodine species ?



**Answer: D**



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17. The first ionisation potentials (eV) of  $Be$  and  $B$  respectively are

A. 8.29, 8.29

B. 9.32, 9.32

C. 8.29, 9.32

D. 9.32, 8.29

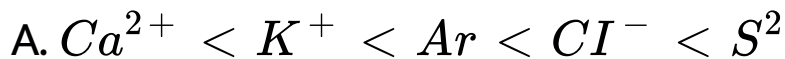
**Answer: A**



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18. Identify the correct order of the size of the following

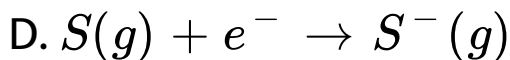
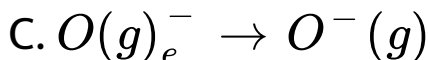
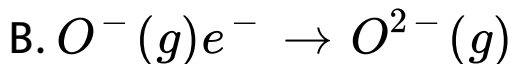
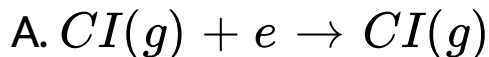


**Answer: B**



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19. Which of the following processes involves absorption of energy?



**Answer: A**



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20. *Eka*-aluminium and *eka*-silicon are known as

A. Gallium and Germanium

B. Aluminium and Silicon

C. Iron and Sulphur

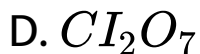
D. Boron and Technitium

**Answer: D**



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21. Which of the following oxides is not expected to react with sodium hydroxide ?



**Answer: B**



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22. The element with highest electron affinity will belong to

A. Period 2 , group 17

B. Period 3, group 17

C. Period 2, group 18

D. Period 2, group 1

**Answer: C**



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23. Energy required for the ionisation of 0.02 gram atom of magnesium is  $x$  kJ . The amount of energy required to ionise 1 atom of magnesium is

A.  $x$ kJ

B.  $\frac{x}{0.02N_A}$  J

C.  $\frac{xx10^3}{0.02N_A}$  J

D.  $xN_A$ kJ

**Answer: D**



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24. Which is mismatched regarding the position of the element as given below ?

A.  $X(Z = 89)$  –  $f$  block,  $6^{th}$  period

B.  $Y(Z=100)$  - $f$  block ,  $7^{th}$  period

C.  $Z(Z=115)$  - $d$  block ,  $7^{th}$  period

D. Both (1) & (3)

**Answer: C**



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25. Match the following regarding nature of the oxides

Column-I    ColumnII

a.  $N_2O$     (i) Basic

b.  $BaO$     (ii) Amphoteric

c.  $As_2O_3$     (iii) Acidic

d.  $Cl_2O_7$     (iv) Neutral

A. a (ii) , b(i) , c(iii) , d(iv)

B. a(iv) , b(i) , c(iii) , d(ii)

C. a(iv) , b(i) , c(ii) , d(iii)

D. a(ii) , b(i) , c(iv), d(iii)

**Answer: C**





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## Assignment Section B Objective Type Questions

1. The electronic configuration of the elements X, Y, Z and J are given below . Which element has the highest metallic character

A. X=2 , 8,4

B. Y = =2 ,8 ,8

C. Z=2,8,8,1

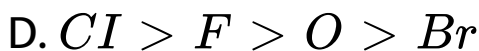
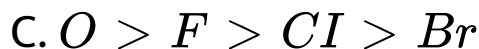
D. J=2,8,8,7

**Answer: C**



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2. The electronegativity follows the order

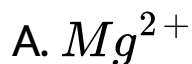


**Answer: A**



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3.  $Ca^{2+}$  is isoelectronic with



B. Kr

C. Ar



**Answer: C**



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4. An atom of an element has electronic configuration 2,8,1. Which of the following statement is correct ?

A. The valency of element is 7

B. The element exists as a triatomic molecule

C. The element is metalloid

D. The element forms basic oxid

**Answer: D**



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5. The symbol of element with atomic number

$Z = 109$

A. UnP

B. Uns

C. Uno

D. Une

**Answer: D**



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6. Pd has exceptional valence shell electronic configuration of  $4d^{10}5s^0$ . It is a member of-

- A.  $4^{th}$  period ,group 11
- B.  $5^{th}$  period ,group 10
- C.  $6^{th}$  period ,group 9
- D.  $3^{rd}$  period ,group 16

**Answer: B**



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7. All elements in the third period have

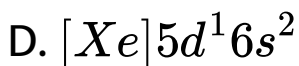
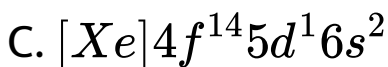
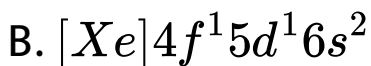
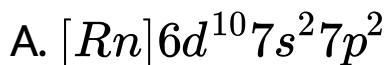
- A. Three complete shells
- B. Three complete subshells
- C. Three valence electrons
- D. Three electrons less than octet .

**Answer: B**



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8. Which of the following belongs to d-block element?



**Answer: D**





9. The order of screening effect of electrons of  $s$ ,  $p$ ,  $d$  and  $f$  orbitals of a given shell of an atom on its outer shell electrons is:

A.  $s > p > d > f$

B.  $s < p < d > f$

C.  $s < p < d < f$

D.  $s > p < d < f$

**Answer: A**



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10. Which of the following sequences contain atomic numbers of only representative elements ?

A. 55 ,12 ,48 ,53

B. 13,23,54,83

C. 3,33,53,87

D. 22,33,55,66

**Answer: C**



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11. Which of the following pairs of atomic numbers represents elements belonging to the same group?

A. 11 and 20

B. 12 and 30

C. 13 and 31

D. 14 and 33

**Answer: C**



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12. Which of the following statements is incorrect ?

A. The ionization potential of nitrogen is greater than of oxygen

B. The electron affinity of fluorine is greater than of chlorine .

C. The ionization potential of Mg is greater than aluminium

D. The electronegativity of fluorine is greater than that of chlorine

**Answer: B**



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**13.** Total number of elements present in 5<sup>th</sup> period of modern periodic table is

A. 2

B. 8

C. 18

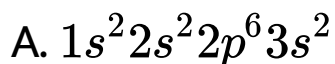
D. 32

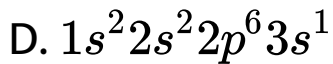
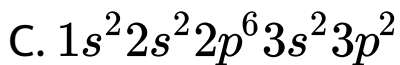
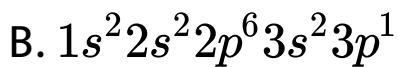
**Answer: C**



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**14.** The electronic configuration of the atom having maximum difference in first and second ionization enthalpies is





**Answer: D**



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**15.** Increase in atomic size down the group is due to

A. increases in number of orbit

B. increases in number of protons and  
neutrons

C. increase in number of protons

D. increase in number of protons neutrons  
and electrons

**Answer: A**



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16. In which of the following pairs the radii of second species is greater than of first ?

A. K, Ca

B. H, He

C.  $Mg^+$ ,  $Mg^{2+}$

D.  $O^{2-}$ ,  $O^-$

**Answer: B**



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17. The successive ionization energies for element X is given below

$$IE_1 : 250 \text{ kJ mol}^{-1}$$

$$IE_2 : 820 \text{ kJ mol}^{-1}$$

$$IE_3 : 1100 \text{ kJ mol}^{-1}$$

$$IE_4 : 1400 \text{ kJ mol}^{-1}$$

Find out the number of valence electrons for the elements X.

A. 3

B. 4

C. 2

D. 1

**Answer: D**



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**18.** If you are given Avogadro's number of atoms of a gas X . If half of the atoms are converted into  $X_g^+$  by energy  $\Delta H$  . The IE of X is

A.  $\frac{2\Delta H}{N_A}$

B.  $\frac{2N_A}{\Delta H}$

C.  $\frac{\Delta H}{2N_A}$

D.  $\frac{N_A}{\Delta H}$

**Answer: A**



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**19.** Find the formula of halide of a metal whose successive ionization enthalpies are  $x$ ,  $2x$ ,  $5x$ ,  $100x$   $\text{kJ mol}^{-1}$  respectively

A.  $MX$

B.  $MX_2$

C.  $MX_3$

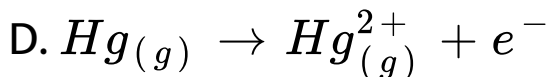
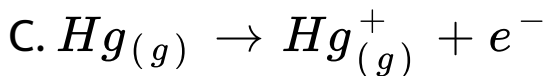
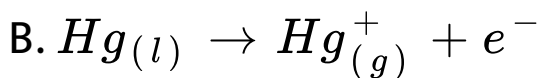
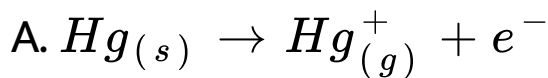
D.  $M_2X$

**Answer: C**



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**20.** Which of the following equation represents first enthalpy of ionization ?



**Answer: C**



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**21.** The energy required to convert all atoms present in 1.2 g. magnesium to  $Mg^{2+}$  ions if IE

and  $IE_2$  of magnesium are  $120 \text{ kJ mol}^{-1}$  and  $240 \text{ kJ mol}^{-1}$  respectively

A. 18 kJ

B. 36 kJ

C. 360 kJ

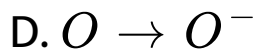
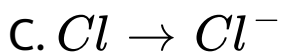
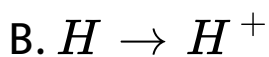
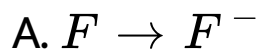
D. 24 kJ

**Answer: A**



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22. The process requiring absorption of energy is



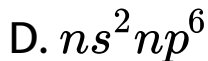
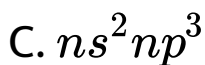
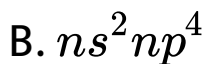
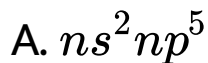
**Answer: B**



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23. The least electronegative element has the following electronic configuration



**Answer: D**



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24. Arrange the following elements in the increasing order of metallic character:

*Si, Be, Mg, Na, P.*

A.  $P < Si < Be < Na < Mg$

B.  $P < Si < Be < Mg < Na$

C.  $Na > Be > Mg > Be > P$

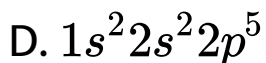
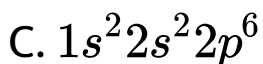
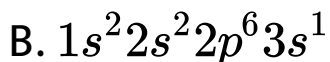
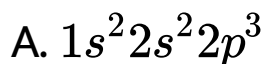
D.  $Na > Si > Mg > Be > P$

**Answer: B**



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25. With which of the following electronic configuration of an atom has the lowest ionization enthalpy:



**Answer: B**



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# Assignment Section C Previous Year Question Paper

1. In which of the following options order of arrangement does not agree with the variation of property indicated against it?

A.  $Li < Na < K < Rb$  ( Increasing metallic radius )

B.  $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$  ( increasing ionic size )

C.  $B < C < N < O$  ( increasing first ionisation enthalpy )

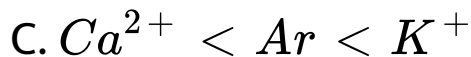
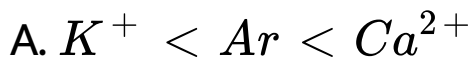
D.  $I < Br < Cl < F$  ( increasing electron gain enthalpy )

**Answer: C::D**



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2. The species  $Ar$ ,  $K^+$  and  $Ca^{2+}$  contain the same number of electrons. In which order do their radii increase ?

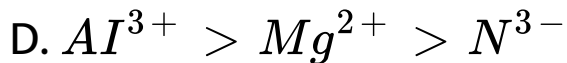
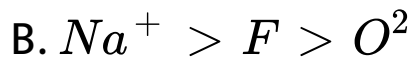


**Answer: D**



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**3. Which of the following orders of ionic radii is correctly represented ?**



**Answer: C**



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**4. Identify the wrong statement in the following**

A. Atomic radius of the elements increases as one moves down the first group of the periodic table

B. Atomic radius of the elements decreases as one moves across from left to right in the 2<sup>nd</sup> period of the periodic table

C. Amongst isoelectronic species smaller the positive charge on the cation smaller is the ionic radius



D. Amongst isoelectronic species greater the negative charge on the anion larger is the ionic radius

**Answer: C**



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5. The first ionisation potential of  $Na$  is  $5.1eV$ .

The value of electrons gain enthalpy of  $Na^+$

will be

A.  $+ 2.55eV$

B.  $+ 10.2eV$

C.  $- 5.1eV$

D.  $- 10.2 eV$

**Answer: C**



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6. Which of the following represents the correct order of increasing electron gain

enthalpy with negative sign for the elements

O, S, F and Cl?

A.  $Cl < F < O < S$

B.  $O < S < F < Cl$

C.  $F < S < O < Cl$

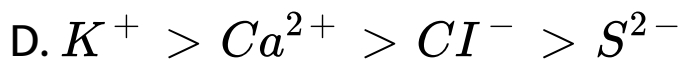
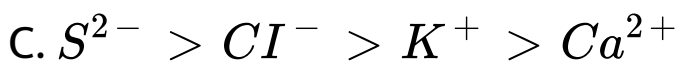
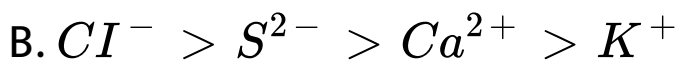
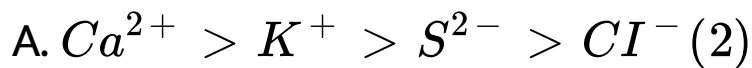
D.  $S < O < Cl < F$

**Answer: B**



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7. The correct order of decreasing ionic radii among the following isoelectronic species is

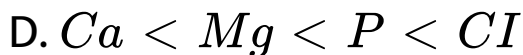
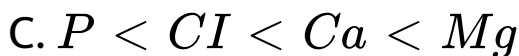
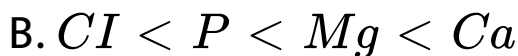
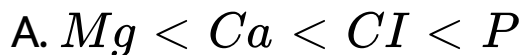


**Answer: C**



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8. Among the following Ca, Mg, P and Cl the order of increasing atomic radius is

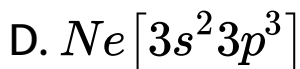
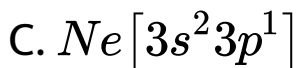
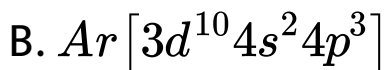
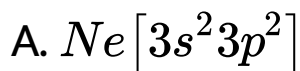


**Answer: B**



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9. Amongst the following elements (whose electronic configuration an given below) the one having highest ionization energy is

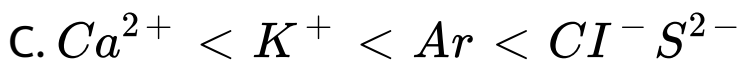
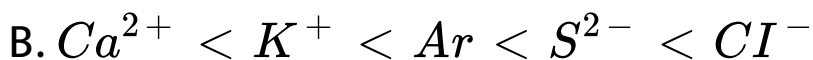


**Answer: D**



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10. The correct order of the size is

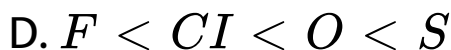
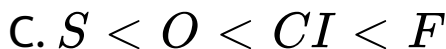
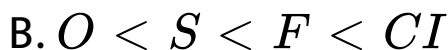
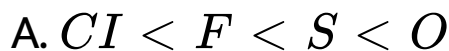


**Answer: C**



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11. Which one of the following arrangements represents the correct order of electron gain enthalpy of the given atomic species?



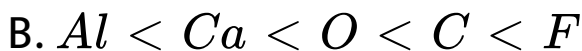
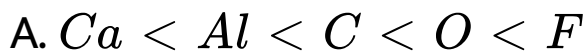
**Answer: B**



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12. Which one of the following arrangement represents the correct order of least negative to most negative electron gain enthalpy for C , Ca , Al , F and O ?



**Answer: A**



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13. The electronic configuration of an element is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$ . What is the atomic number of the element which is just below the above element in the periodic table?

A. 36

B. 49

C. 50

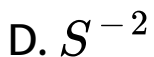
D. 54

**Answer: C**



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**14.** Which of the following ion is the largest in size ?



**Answer: D**



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**15.** The electronic configuration of inner transition elements is

A.  $ns^1$

B.  $ns^2 np^5 nd^{10}$

C.  $ns^{0-2}(n-1)d^{1-10}(n-2)f^{1-14}$

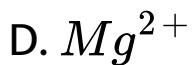
D.  $ns^2(n-1)d^{0-1}(n-2)f^{1-14}$

**Answer: D**



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**16.** Which of the following has the smallest size ?

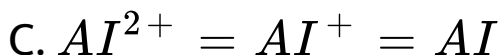
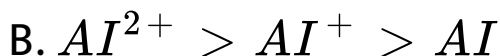


**Answer: A**



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**17.** Which of the following is correct order of the size of aluminium species ?



D. All of these

**Answer: A**



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**18.** The first ionization potential (eV) of N and P respectively are

A. 8.29, 8.29

B. 11.32, 11.32

C. 8.29, 11.32

D. 11.32, 8.21

**Answer: D**



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**19.** Correct order of 1st ionisation potential (IP) among following elements Be, B, C, N, O is

A.  $B < Be < C < O < N$

B.  $B < Be < C < N < O$

C.  $Be < B < C < N < O$

D.  $Be < B < C < < O < N$



**Answer: A**



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**20.** An atom has electronic configuration  $1s^2 2s^2 2p^6 3s^2 3P^6 3d^3 4s^2$  . In which group would it be placed ?

A. Fifth

B. Fifteenth

C. Second

D. Third

**Answer: A**



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**21. Ionic radii are**

A. Inversely proportional to effective nuclear charge

B. Inversely proportional to square of effective nuclear charge

C. Directly proportional to effective nuclear charge

D. Directly proportional to square effective nuclear charge

**Answer: A**



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**22.** Four successive members of the first row transition elements are listed below with their atomic number. Which one of them is

expected to have the highest third ionisation enthalpy ?

A. Vanadium (  $Z= 23$  )

B. Chromium (  $Z= 24$  )

C. Manganese (  $Z=25$  )

D. Iron (  $Z=26$  )

**Answer: C**



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23. The element with highest electronegativity will belong to

A. Period 2, group 17

B. Period 3, group 17

C. Period 2, group 18

D. Period 2, group 1

**Answer: A**



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24. The first second and third ionisation energies of Al are 587 , 1817 and 2745 kJ mol<sup>-1</sup> respectively . Calculate the energy required to convert all the atoms of Al to  $Al^{+3}$  present in 270 mg of Al vapours

- A. 5149kj
- B. 51.49 kj
- C. 2745 kj
- D. 514.9 kj

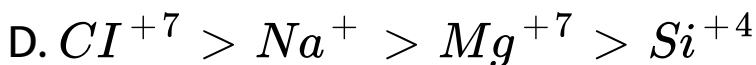
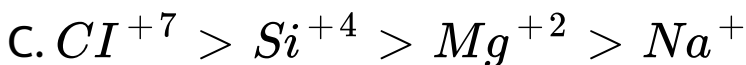
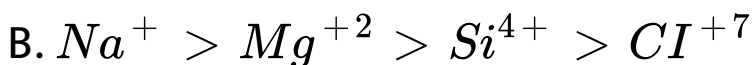
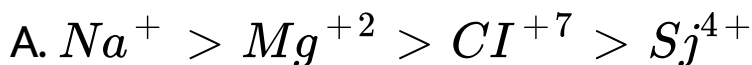
**Answer: B**





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25. The size of ionic species is correctly given in the order



**Answer: B**



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26. Match the following regarding nature of the oxides

Column-I

Column- II

a.  $H_2O$

(i) Basic

b.  $Na_2O$

(ii) Amphoteric

c.  $ZnO$

(iii) Acidic

d.  $SO_3$

(iv) Neutral

A. a(ii) , b(i) , c(ii) , d(iv)

B. a(iv) , b(i) , c(ii) , d(ii)

C. a(iv) , b(i) , c(ii) , d(iii)

D. a(ii) , b(i) , c(iv) d(iii)

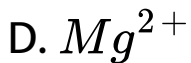


**Answer: C**



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27.  $Be^{2+}$  is isoelectronic with which of the following ions ?



**Answer: B**



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## Assignment Section D Assertion Reason Type Question

1. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A: Be and Al show diagonal relationship .

R: Be and Al are diagonal to each other in the periodic table .

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: B**



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2. Assertion: The first ionisation energy of aluminium is lower than that of magnesium.

Reason: The ionic radius of aluminium is smaller than that of magnesium.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: B**



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**3. Assertion (A) :** He and Be have similar outer shell electronic configuration of type  $ns^2$ .

**Reason (R ) :** Both are chemically inert.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: C**



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4. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A : Electron affinity of oxygen is higher than sulphur.

R : Number of valence orbitals containing electrons are different.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .



B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: D**



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5. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A: Ionization enthalpy decreases on moving down the group .

R: Force of attraction between nucleus and electrons decreases on moving down the group.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: A**



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6. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A : Atomic radii decreases in a period upto halogen .

R : van der Waal radii of Cl is larger than its covalent radii.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: B**



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7. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A : Lanthanum ( Z: 57) is lanthanoid .

R : Valence electrons are present in 4 f orbital.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation

of the assertion then mark (2)

C. If Assertion is true statement but

Reason is false then mark (3)

D. If both Assertion and Reason are false

statements then mark (4)

**Answer: D**



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8. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A :  $Na_2O$  is more basic than  $Al_2O_3$  .

R : Sodium is less electropositive than aluminium.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .



B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: C**



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9. In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A : F is most electronegative element of periodic table.

R : Cl is having highest electron affinity.

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion then mark (2)

C. If Assertion is true statement but Reason is false then mark (3)

D. If both Assertion and Reason are false statements then mark (4)

**Answer: B**



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**10.** In the following questions a statement of assertion (A) is followed by a statement of reason ( R)

A : Cu, Ag, Au are known as coinage metal.

R: Coinage metals are d-block metals .

A. If Both Assertion & Reason are true and the reason is the correct explanation of the assertion then mark (1) .

B. If both Assertion & Reason are true but the reason is not the correct explanation

of the assertion then mark (2)

C. If Assertion is true statement but

Reason is false then mark (3)

D. If both Assertion and Reason are false

statements then mark (4)

**Answer: B**



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