CHEMISTRY

BOOKS - PRADEEP CHEMISTRY (HINGLISH)

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Sample Problem

1. (a) Write the electronic configurations of the elements given below:

A (At. No=9), B(At. N=12) , C (At. No=29), D(At.No=54) , and E(At. No=58).`

(b) Also predict the period group number and block to which they belong.

(C) Classify them as representative elements , noble gases, transition and inner transition elements.

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2. What is the position of the element in the periodic table satisfying the electronic configuration $(n-1)d^1ns^2$ for n = 4?

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3. Element A, B, C, D and E have the following electronic configurations

A: $1s^2 2s^2 2p^1$

$B: 1s^2 2s^2 2p^6 3s^2 3p^1$

$C: 1s^2 2s^2 2p^6 3s^2 3p^3$

$D: 1s^2 2s^2 2p^6 3s^2 3p^5$

$E: 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

Which among these will belong to the same group in the periodic table ?

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4. Calculate the energy required to convert all the atoms of magnesium to magnesium ions present in 24 mg of magnesium vapours. First and

second ionization enthalpies of Mg are 737.76 and 1450.73 kJ mol^1 respectively.

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5. The electronic configuration for the following neutral atoms are given for use in questions

(a)

$1s^2, 2s^2, 2p^6, 3s^2, (b)1s^2, 2s^2, 2p^6, 3s^1, (c)1s^2, 2s^2, 2p^4, (d)1s^2, 2s^22p^5, (e)1s$

(i) List the above configuration in order of increasing ionization enthalpy.

(ii) Which of the electronic configuration given above would you expect to have the lowest ionization enthalpy.

(iii) Which of the electronic configuration given above would you expect for the noble gas ?

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6. The first (IE_1) and second (IE_2) ionisation energies $\left(kJmol^{-1}\right)$ of a new element designated by roman numericals are shown below:

	(IE_1)	(IE_2)
I	2372	5251
II	520	7300
III	900	1760
IV	1680	3380

Which of these elements is likely to be (a) a reactive metal, (b) a reactive non-metal, (c) a noble gas and (d) a metal that forms a binary halide of the formula, AX_2.

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7. The electron gain enthalpy of chlorine is $-349kJmol^{-1}$. How much energy in kJ is released when 3.55 g of chlorine is converted completely into Cl^{-1} ion in the gaseous state?

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8. Which element will have the greatest negative electron gain enthalpy ? Give reasons.

$(a)[Ne]3s^23p^2$ $(b)[Ne]3s^23p^4$

$(c)[Ne]3s^23p^5\_$ $(d)[Ne]3s^23p^64s^13d^5$

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9. Which of the following pairs of elements would have more negative electron gain enthalpy ? Explain (i) N or O (ii) s or O (iii) C or Si

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10. Predict the formulae of the stable binary compounds that would be formed by the following pairs of elements (a) silicon and oxygen (b) aluminium and bromine (c) calcium and iodine (d) element 114 and fluorine (e) element 120 and oxygen.

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Curiosity Questions

1. Eka-aluminium and eka- silicon were the names given by Mendeleev for the then unknowns elements. What is its atomic number? Write its group

number, electronic configuration, IUPAC and official names.

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2. Elements have been classified as as s-,p-, d- and f-block elements of the basis of the types of orbital which receives the last electron. Are there any exceptions to this generalization ? Comment.

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3. On the basis of symmetry (n-a) d^4ns^2 and $(n-1)d^9ns^2$ configurations are less stable and immediately change over to the corresponding more stable (n-1) d^5ns^1 and $(n-1)d^{10}ns^1$ configurations .Are there any exceptions to this generalization ? Comment

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4. Electron gain enthalpy usually becomes less negative from top to bottom in a group. Is there any exception to this generalization ? Comment.

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5. Normally no two elements have the same value of electron gain enthalpy. But there are two inert gases which have the same value of electron gain enthalpy. Name them.

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Problems For Practice

1. Write the names and atomic numbers of the following elements :

(i) The fourth alkali metal

(ii) The third alkaline earth metal

(iii) The fifth element of the first transition series

(iv) The first inner transition element and

(v) The sixth noble gas.

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2. The outer electronic configuration of some elements are given below :

(i) $3s^2 3p^3 (ii) 3d^5 4s^1 (iii) 3s^2 3p^6 4s^2 (iv) 5d^1 6s^2 (v) 4f^1 5d^1 6s^2$

State of which block of the periodic table each of the these elements belongs

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3. An element X with $Z = 112$ has been recently discovered. What is the electronic configuration of the element? To which group and period will it belong?

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4. Arrange the following elements in the increasing order of metallic character : B ,Al, Mg, K.

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5. Write the electronic configuration and the block to which an element with Z= 90 belongs

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6. How do the electronic configuration of the elements with Z= 107 - 109 differ from one another

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7. Which one of the following pairs would have a larger size ? Explain

$(i) K$ or $K^+ (ii) Br$ or $Br^- (iii) O^{2-}$ or $F^- (iv) Li^+$ or $Na^+ (v) F$

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8. Arrange the following in order of increasing radii ? (i) I, $I^+, I^-(ii)C, N, Si, P(iii)O^2, N^{3-}, S^{2-}, F^-$

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9. Select from each group the species which has the smallest radius stating appropriate reason

$(a)O, O^-, O^{2-}(b)K^+, Sr^{2+}, Ar(C)Si, P, Cl$

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10. Calculate the energy in joules required to convert all the atoms of sodium to sodium ions present in 2.3 mg of sodium vapours? Ionization enthalpy of sodium is $495kJ\text{mol}^{-1}$ (Atomic mass of Na = 23)

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11. The ionization potential of hydrogen is 13.60 eV. Calculate the energy in kJ required to produce 0.1 mole of H^+ ions. Given, $1eV = 96.49kJmol^{-1}$.

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12. The first and second ionization potentials of helium atoms are 24.58 eV and 54.4 eV respectively. Calculate the energy in kJ required to produce 1 mole of He^{2+} ions.

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13. Arrange the following in the order of increasing ionization enthalpy :

$(i)1s^2 2s^2 2p^6 3s^2 (ii)1s^2 2s^2 2p^6 3s^1 (iii)1s^2 2s^2 2p^6 (iv)1s^2 2s^2 2p^2 (v)1s^2 2s^2 2p^3$

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14. The electron configuration of some neutral atoms are given below :

$(i)1s^2 2s^2 (ii)1s^2 2s^2 2p^1 (iii)1s^2 2s^2 2p^4 (iv)1s^2 2s^2 2p^3$

Which of these electronic configuration would be expected th have the highest

$(a)\Delta_i H_1 (b)\Delta_i H_2 (c)\Delta_i H_3 (d)\Delta_i H_4$

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15. Which one among the following elements has the lowest first ionisation enthalpy and which of the has highest first ionisation enthalpy ? Li, K , Ca , S and Kr.

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16. Which of the following pairs of elements would you expect to have lower first ionisation energy?

a.Cl or F

b.Cl or S

c.K or Ar

d.Kr or Xe

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17. For each of the following pairs predict which one has lower first ionization enthalpy ?

(i) N or O (ii) Na or Na^+ (iii) Ba^+ or $Mg^{2+}(iv)$ or I^-

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18. Predict which atom in each of the following pairs has the greater first ionization enthalpy and explain your answer (a) B and C (b) N and O (c) F and Ne

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19. From each set, choose the atom which has the largest ionization enthalpy :

(a) F, O, N (b) Mg, P, Ar (c) B, Al, Ga

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20. The electron affinity of bromine is 3.36 eV . How much energy in kcal is released when 8g of bromine is completely converted to Br^- ions in the gaseous state ? (1eV =23. 06 kcal mol^{-1})

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21. The amount of energy released when one million atoms of iodine are completely converted into I^- ions in the vapour state according to the equation I(g) $+e^- \rightarrow I^-(g)$ is $4.9 \times 10^{-13} J$

Calculate the electron affinity of iodine in (i) Kj/mol and (ii) in eV per atom.

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22. Arrange the elements with the following electronic configuration in order of increasing electron gain enthalpy

$(i)1s^2 2s^2 2p^5 (ii)1s^2 2s^2 2p^4 (iii)1s^2 2s^2 2p^3 (iv)1s^2 2s^2 2p^6 3s^2 3p^4$

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23. Arrange the following in the decreasing negative electron gain enthalpy :

B, C, N, O

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24. Which one (atom / ion) in the following pairs has highest electron gain enthalpy ?

(i)$O^- S (ii) O, S^- (iii) O^-, S^- (iv) N^- P$

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25. The electron gain enthalpies of halogens decrease in the order $F > CI > Br > I$. Comment upon the statement

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26. Predict the formulae of the stable binary compounds that would be formed by the following pairs of elements

(a) calcium and oxygen (b) aluminium and carbon.

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27. Predict the formulae of the stable binary compound formed by the following pairs of elements : (a) element with Z= 116 and hydrogen (b) element with Z= 113 and fluorine (c) Uup and sulphur (d) Use and Uus

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Advanced Problems

1. From the following elements:

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

(i) Select the element having one electron in the outermost shell.

(ii) Two elements of the same group. Write the formula and mention the nature the compound formed by the union of 19K and element X (2,8, 7).

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

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

Using the above table , answer the following questions :

(a) Which element will form only covalent compounds ?

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

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

(d) Out of D and E which one has a bigger atomic radius and why ?

Write common name for the family of elements C and F.

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3. Four elements A ,B ,C and D along with their electonic configuration are given below :

Elements : A B C D

Electronic configuration : 2,1 2,8 2,8,1 2,8,8

Now answer the following questions :

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

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

(iii) Which two elements belong to the 18th group ?

(iv) Which element out of A and C is more reactive and why ?

(v) Which element out of A and B forms the maximum number to compounds ?

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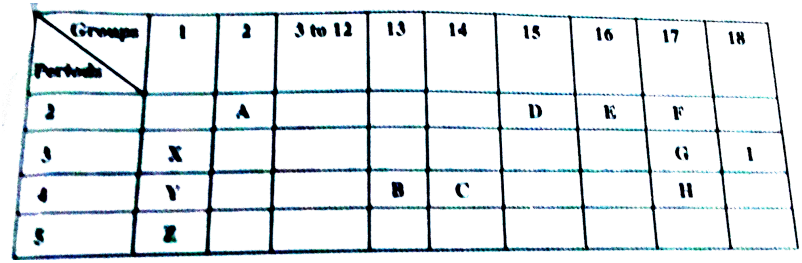
4. A part of the Periodic Table is given below :



Groups / Periods	1	2	3 to 12	13	14	15	16	17	18
2		A				D	E	F	
3	X							G	I
4	Y			B	C			H	
5	Z								

Now answser the following questions

(i) The most reactive metal and non-metal

(ii) the element which is called alkaline earth metal.

(iii) The elements for which gaps were left by Mendeleev in his periodic table

(iv) the gases which are present in the atmosphere.

(v) Name the family of elements represented by elements F, G and H

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5. An element X has same number of electrons in the first and the fourth shell as well as in the second and the third shell.

(a) Write down the electronic configuration of the element.

(b) Write down the group number and the period to which it belongs

(c) What is the valency of the element ?

(d) Will it form ionic or covalent compound with the element Y (2,8,6) ?

(e) What is the nature of the oxides of X and Y ?

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Test Your Grip Multiple Choice Questions I

1. The atoms of elements beloning to the same group of periodic table have the same

A. same number of protons

B. same number of electrons in the valence shell

C. same number of neutrons

D. same number of electrons

Answer: B

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2. Eka-aluminium and Eka -silicon are known as :

A. Gallium and germanium

B. Aluminium and silicon

C. Iron and sulphur

D. Proton and silicon

Answer: A

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3. Lanthanoids are

A. 14 elements in the sixth period (atomic no= 90 to 103) that are filling 4f- sublevel

B. 14 elements in the seventh period (atomic no= 90 to 103) that are filling 5f-sublevel

C. 14 element in the sixth period (atomic no = 58 to 71) that are filling 4f- sublevel

D. 14 elements in the seventh period (atomic no = 58 to 71) that are filling 4f- sublevel

Answer: C

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4. Element with valence shell electronic configuration as (n-1) d^5ns^1 is placed in which of the following group and block of element ?

A. 1,s - block

B. 16 , s- block

C. 7, s- block

D. 6, d- block

Answer: D

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5. Of the following pairs, the one containing examples of metalloid elements in the periodic table is:

A. Na and K

B. F and CI

C. Cu and Hg

D. Si and Ge

Answer: D

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6. Arrange the following in proper order of size

A. Mg $< Si < A1 < P$

B. $P > A1 > Mg > Si$

C. $A1 < Mg < Si < P$

D. $Mg > A1 > Si > P$

Answer: D

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7. Which one of the following groups represent a collection of isolectronic species ? (At.no $Cs = 55, Br = 35$)

A. $Ca^{2+}, Cs^{+}Br$

B. $Na^{+}Ca^{2+}, Mg^{2+}$

C. N^{3-}, F^{-}, Na^{+}

D. $Be, A1^{3+}CI^{-}$

Answer: C

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8. Which one of the following ions has the highest value of ionic radius? a

A. Li^+

B. B^{3+}

C. O^{2-}

D. F^-

Answer: C

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9. Correct order of 1st ionisationpotential (IP) among following elements

Be, B, C, N, O is

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

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

C. $Be < B < C < NO$

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

Answer: A

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

A. $1s^2, 2s^2 2p^6, 3s^1$

B. $1s^2, 2s^2 2p^6, 3s^2 3p^1$

C. $1s^2, 2s^2 2p^6, 3s^2 3p^2$

D. $1s^2, 2s^2 2p^6, 3s^2$

Answer: D

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11. The formation of the oxide ion $O^{2-}_{(g)}$ requires first an exothermic and then an endothermic step as shown below.

$O_{(g)} + e^- = O^-_{(g)} \Delta H^\circ = -142 kJmol^{-1}$

$O^-_{(g)} + e^- = O^{2-}_{(g)} \Delta H^\circ = 844 kJmol^{-1}$ This is because of :

A. Oxygen is more electronegative

B. Oxygen has high electron affinity

C. O^- will tend to resist the addition of another electron

D. O^- ion has comparatively larger size oxygen atom.

Answer: C

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12. The highly metallic will have the configuration of

A. 2, 8, 7

B. 2,8,8,5

C. 2,8,81

D. 2,8,2

Answer: C

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13. The correct order regarding the electronegativity of hybrid orbitals of carbon is ?

A. $sp < sp^2 > sp^3$

B. $sp < sp^2 < sp^3$

C. $sp > sp^2 < sp^3$

D. $sp > sp^2 > sp^3$

Answer: D

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14. Valence electron in the element A are 3 and that in element B are 6. Most probable compound formed from A and B is

A. A_2B

B. AB_2

C. A_6B_3

D. A_2B_3

Answer: D

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15. (a),(b) and (c) are elements in the second short period. Oxide of (a) is ionic, that of (b) is amphoteric and of (c) of gaint molecule. (a),(b) and (c) have atomic number in the order-

A. $A < B < C$

B. $C < B < A$

C. $A < C < B$

D. $B < A < C$

Answer: A

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Test Your Grip Fill In The Blanks Ii

1. s- and p- Block element are collectively called ..... elements.

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2. Give general electronic configuration of d-block elements.

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3. All the lanthanoids in actioniods belong to group ..... Of the periodic table.

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4. The chemical name and symbol of the atom with atomic number 112 are ..... And ..... Respectively

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5. The electronic configuration of the element with atomic number 58 is ..... And it belong ..... Block elements.

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6. Elements having three incomplete outermost subshells called .....

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7. The cation is _____ and the anion is _____ than the parent atom.

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8. The ..... Radius of chlorine is 99 pm while its ..... Radius is 180 pm.

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9. An isoelectronic species having larger size than CI^- is .....

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10. The first ionization enthalpy of oxygen is ..... Than than of nitrogen while second ionization enthalpy of nitrogen is ..... than that of oxygen.

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11. In the periodic table the element having the highest first ionization enthalpyis .....

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12. The energy released when an electron is added to a neutral gaseous atom is called. . . . . ..of atom

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13. Among the halogens the element having the most negative electron gain enthalpy is .....

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14. The EN of the elements C, N, Si and P increases in the order of _____ .

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15. An element of group 13 which forms basic oxide is.....

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Conceptual Questions

1. Would you regard $Zn(Z=30)$, $Cd(Z=48)$ and `Hg (Z=80) as d- block elements ? Give reasons for your answer.

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2. The number of elements that can be accommodated in the present set up of the long form of the periodic table is (upto 7^{th} period).

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3. Can an element with atomic number 126, if discovered be accommodate in the present set up of the long form of the periodic tabel ?

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4. What would be the atomic number of the next (i) alkali metal (ii) alkaline earth metal (ii) halogen and (iv) inert gas If discovered in future ?

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5. What would be the IUPAC names and symbols for elements with atomic numbers 122, 127, 135 149 and 150 ?

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6. The element 119 has not been discovered . What could be the IUPAC name and symbol for This element ? On the basis of the periodic table , predict the electronic configuration of this element and also the formula of its most stable chloride and oxide.

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7. Why is the zero group present at the right hand side of the periodic table?

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8. The first ionization enthalpy of carbon is greater than that of boron, whereas the reverse is true for second ionization enthalpy. Explain.

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9. Arrange the elements of second period in order of increasing second ionization enthalpies.

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10. The Compound M-O-H can act both as an acid or base depending upon the ionization enthalpy of the element M. Justify by taking elements (M)

of the third period of the periodic table .

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Ncert Questions And Exercise Ncert Intext Solved Questions

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

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2. How would you justify the presence of 18 elements in the $5th$ period of the periodic table?

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3. 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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4. 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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5. Which of the following species will have the largest and the smallest size Mg, Mg^{2+}, Al, Al^{3+}?

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6. The first ionisation enthalpy $\left(\Delta_i H^{o-}\right)$ values of the third period elements, Na, Mg and Si are respectively $496, 737$ and $786 kJmol^{-1}$.

Predict whether the first $\Delta_i H^{o-}$ value for Al will be more close to 575 or $760 kJ mol^{-1}$? Justify your answer.

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7. 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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8. Using the perodic table, perdict 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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9. Are the oxidation state and covalency of Al in $\left[AlCl(H_2O)_5\right]^{2+}$ same ?

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10. 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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Ncert Questions And Exercise Ncert Exercises

1. What is the basic theme of organisation in the periodic table?

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2. Which important property did Mendeleev use to classify the elements in his periodic table and did he stick to that?

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3. What is the basic difference in approach between the Mendellev's peridic law and the Modern periodic law?

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4. On the basis of quantum number, justify that the sixth period of the periodic table should have 32 elements.

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5. In terms of period and group where would you locate the element with $Z = 144$?

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

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7. Which element do you think would have been named by (a) Lawrence Berkeley laboratory and (b) Seaborg's group?

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8. Why do elements in the same group have similar physical and chemical properties

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9. What do atomic radius and ionic radius really mean to you?

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10. How do atomic radii vary in a period and in a group ? How do you explain the variation ?

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11. What do you understand by isoelectronic species ? Name a species that will be isoelectronic with each of the following atoms or ions.

$(i) F^-$ $(ii) Ar$ $(iii) Mg^{2+}$ $(iv) Rb^+$

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12. Consider the following species:

$N^{3-}, O^{2-}, F^{\ominus}, Na^{\oplus}, Mg^{2+}$ and Al^{3+}

a. What is common in them?

b. Arrange them in the order of increasing ionic radii.

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13. Explain why cations are smaller and anions larger in radii than their parent atoms?

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14. What is the significance of the terms-'isolated gaseous atom' and 'ground state' while defining the ionisation enthalpy and electron gain enthalpy?

Hint: Requirements for comparison purposes.

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15. Energy of an electron in the ground state of the hydrogen atom is $-2.18 \times 10^{-18} J$. Callate the ionisation enthalpy of atomic hydrogen in terms of $Jmol^{-1}$.

Hint: Apply the idea of mole concept to derive the answer.

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16. Among the second period elements the actual ionisation enthalpies are in the order $Li < B < Be < C < O < N < F < Ne$.

Explain why (a) Be has higher $\Delta_i H$ than B and (b) O has lower $\Delta_i H$ than N and F?

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17. How would you explain the fact that the first ionisation enthalpy of sodium is lower than that of magnesium but its second ionisation enthalpy is higher than that of magnesium?

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18. What are the various factors due to which the ionisation enthalpy of the main group elements tends to decrease down a group?

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19. The first ionization enthalpy values (in $Kjmol^{-1}$) of group 13 elements are :

B	$A1$	Ga	In	Ti
801	577	579	558	589

How will you explain deviation from the general trend ?

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20. Which of the following pairs of elements would have a negative electron gain enthalpy ?

(i) O or F (ii) F or Cl

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21. Would you expect the second electron gain enthalpy of O as positive, more negative or less negative than the first? Justify your answer.

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22. What is the basic difference between the terms electron gain enthalpy and electronegativity?

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23. How would you react to the statement that the electronegativity of N on Pauling scale is 3.0 in all the nitrogen compounds?

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24. Describe the theory associated with the radius of an atom as it

a. gains an electron

b. loses an electron

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25. Would you expect the first ionisation enthalpies for two isotopes of the same element to be the same or different? Justify your answer.

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26. What are the major differences between metals and non-metals?

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27. Use the periodic table to answer the following questions.

a. Identify an element with five electrons in the outer subshell.

b. Identify an element that would tend to lose two electrons.

c. Identify an element that would tend to gain two electrons.

d. Identify the group having metal, non-metal, liquid as well as gas at the room temperature.

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28. The increasing order of reactivity among group 1 elements is $Li < Na < K < Rb < Cs$ whereas that among group 17 elements is $F > Cl > Br > I$. Explain.

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29. Write the general outer electronic configuration of $s-$,$p-$,$d-$ and $f-block$ elements.

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30. Assign the position of the element having outer electronic configuration (i) ns^2np^2f or $n=2$ (ii) $(n-1)d^5ns^1$ for $n=4$, and (iii) $(n-2)f^{14}(n-1)d^0ns^2$ for $n=6$ in the Modern periodic table.

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31. The first (Δ_iH_1) and second (Δ_iH_2) ionisation enthalpies $\left(\text{in}kJmol^{-1}\right)$ and the $\left(\Delta_{eg}H^{\ominus}\right)$ electron gain enthalpy $\left(\text{in}kJmol^{-1}\right)$ of a few elements are given below:

Elements	(Δ_iH_1)	(Δ_iH_2)	$\Delta_{eg}H^{\ominus}$
I	520	7300	-60
II	419	3051	-48
III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	$+48$
VI	738	1451	-40

Which of the above elements is likely to be

a. the least reactive element.

b. the most reactive metal.

c. the most reactive non-metal.

d. the least reactive non-metal.

e. the metal which can form a stable binary halide of the formula MX2 (X=halogen).

f. the metal which can form a predominantly stable covalent halide of the formula MX(X=halogen).

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32. Predict the formula of the stable binary compounds that would be formed by the combination of the following pairs of elements.

a.Lithium and oxygen

b. Magnesium and nitrogen

c. Aluminium and iodine

d. Silicon and oxygen

e. Phosphorus and fluorine

f. Element 71 and fluorine

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33. In the modern periodic table, the period indicates the value of

a. atomic number

b.atomic mass

c.principal quantum number

d.azimuthal quantum number

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

a.The p-block has 6 columns, because a maximum of 6 electrons can occupy all the orbitals in a p-shell.

b.The d-blocks has 8 columns, because a maximum of 8 electrons can occupy all the orbitals in a d-subshell.

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

d.The block indicates value of azimuthal quantum number (l) for the last subshell that received electrons in building up the electronic configuration.

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35. Anything that influences the valence electrons will affect the chemistry of the element . Which one of the following factors does not affect the valence shell ?

(a) Valence principal quantum number (n) (b) Nuclear charge (Z)

(c) nuclear mass (d) Number of core electrons.

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36. The size of isoelectronic species $-F^{-}$, Ne and Na^{+} is affected by

(a) nuclear charge (Z) (b) valence principal quantum number (n)

(c) electron- electron interaction in the outher orbital

(d) none of the factors bacause their size is the same .

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37. Which one of the following statements is incorrect in relation to ionization enthalpy ?

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38. Considering the elements B, $A1$, Mg and K, the correct order of their metallic character is :

$(a) B > A1 > Mg > K (b) A1 > Mg > B > K (c) Mg > A1 > K > B (d)$

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39. Consider a reaction $A(g) \xrightarrow{k=0.1M\ \min^{-1}} 2B(g)$. If initial concentration of A is 0.5 M then select correct graph.

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40. $ABCD$ is a parallelogram and $E\ and\ F$ are the centroids of triangles $ABD\ and\ BCD$ respectively, then $EF =$ AE (b) BE (c) CE (d) DE

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Ncert Exemplar Problems Multiple Choice Questions I

1. Consider the isoelectronic species, Na^+, Mg^{2+}, F^- and O^{2-}. The correct order of increasing length of their radii is:

A. $F^- < O^{2-} < Mg^{2+} < Na^+$

B. $Mg^{2+} < Na^+ < F^- < O^{2-}$

C. $O^{2-} < F^- < Na^+ < Mg^{2+}$

D. $O^{2-} < F^- < Mg^{2+} < Na^+$

Answer: B

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2. Which of the following is not an actinoid ?

A. Curium (Z =96)

B. Californium (Z=98)

C. Uranium (Z= 92)

D. Terbium (Z=65)

Answer: D

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3. The order of screeing 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. $f > d > p > s$

C. $p < d < s > f$

D. $f > p > s > d$

Answer: A

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

A. $Na > Mg < A1 < Si$

B. $Na > Mg > A1Si$

C. $Na > Mg < A1 < Si$

D. $Na > Mg > A1 < Si$

Answer: A

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5. The electronic configuration of gadolinium (atomic number 64) is:

A. $[Xe]4f^{3}5d^{5}6s^{2}$

B. $[Xe]4f^{7}5d^{2}6s^{1}$

C. $[Xe]4f^{7}5d^{1}6s^{2}$

D. $[Xe]4f^{8}5d^{6}6s^{2}$

Answer: C

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6. The statement that is not correct for periodic classification of element isA)The properties of elements are periodic function of their atomic numbers B)Non-metallic elements are less in number than metallic elements C)For transition elements, the 3d-orbitals are filled with electron after 3p-orbitals and before 4s-orbitals D)The first ionisation enthalpies of elements generally increase with increase in atomic number as we go along a period

A. The properties of element are periodic function of their atomic numbers.

B. Non metallic elements are less in number than metallic elements

C. For transition elements the 3d-orbitals are filled with electrons after 3p- orbitals and before 4s-orbitals

D. The first ionisation enthalpies of elements generally increases with increase in atomic number as we go along a period.

Answer: C

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7. Among halogens, the correct order of amount of energy released in electron gain (electron gain enthalpy) is:

A. $F > C1 > Br > I$

B. $F > C1 < Br > I$

C. $F < C1 > BrI$

D. $F < C1 < Be < I$

Answer: C

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8. The period number in the long form of the periodic table is equal to

A. magnetic quantum number of any element of the period.

B. atomic number of any element of the period .

C. maximum Principal quantum number of any element of the period.

D. maximum Azimuthal quantum number of any element of the period.

Answer: C

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9. The elements in which electrons are progressively filled in 4f-orbitals are calleD:

A. actinoids

B. transition elements

C. lanthanoids

D. halogens

Answer: C

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10. Which of the following is the correct order of size of the given species?

A. $I > I^- > I^+$

B. $I^+ > I^- > I$

C. $I > I^+ > I^-$

D. $I^- > I > I^+$

Answer: D

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11. The formation of oxide ion $O^{2-}(g)$ from oxygen atom requires first an exothermic and then an endothermic step as shown below

$O(g) + e^- \rightarrow O^-(g), \Delta H^- = -141 kjmol^{-1}$

$O^-(g) + e^- \rightarrow O^{2-}(g), \Delta H^- = +780 kjmol^{-1}$

Thus, process of formation of O^{2-} in gas phase is unfavourable even through O^{2-} is isoelectronic with neon. It is due to the fact that A) oxygen is more electronegative B) addition of electron in oxygen results in larget size of the ion C) electron repulsion outweights the stability gained by achieving noble gas configuration D) O^- ion has comparatively smaller size than oxygen atom

A. oxygen is more electronegative

B. addition of electron in oxygen results in larger size of the ion.

C. electron repulsion outweiths the stability gained by achieving noble gas configuration.

D. O^- ion has comparatively smaller size than oxygen atom.

Answer: C

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12. Comprehension given below is followed by some multiple choice questions. Each question has one correct option. Choose the correct option.

In the modern periodic table, elements are arranged in order of increasing atomic numbers which is related to the electronic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz s, p, d and f.

The modern periodic table consists of 7 periods and 18 groups. Each, period begins with the filling of a new energy shell. In accordance with

the Aufbau principle, the seven periods (1 to 7) have 2, 8, 8, 18, 18, 32 and 32 elements respectively.

The seventh period is still incomplete. To avoid the periodic table being too long, the two series of f-block elements, called lanthonoids and actinoids are placed at the bottom of the main body of the periodic table

(iv) The electronic configuration of the element which is just above the element with atomic number 43 in th same group is .....

A. (i) The element with atomic number 57 belongs to

(i) s-block

(b) p-block

(c) d- block

(d) f- block

B. (ii) The last element of the p-block in 6th period is represented by the outermost electronic configuration.

$(a) 7s^2 7p^6$

$(b) 5f^{14} 6d^{10} 7s^2 7p^0$

$(c) 4f^{14}5d^{10}6s^26p^6$

$(d) 4f^{14}5d^{10}6s^26p^4$

C. (iii) Which of the elements whose atomic numbers are given below , cannot be accommodated the present set up of the long form of the periodic table ?

(a) 107

(b) 118

(c) 126

(d) 102

D. (iv) the elecronic configuration of the element which is just above the element with atomic number 43 in the same group is .....

$(a) 1s^22s^22p^63s^23p^63d^54s^2$

$(b) 1s^22s^22p^63s^23p^63d^54s^34p^6$

$(c) 1s^22s^22p^63s^23d^64s^2$

$(d) 1s^22s^22p^63s^23p^63d^64s^2$

Answer: A::B::C

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13. Electronic configuration of four elements A, B ,C and D are given below

A) $1s^2, 2s^2, 2p^6$

B) $1s^2, 2s^2, 2p^4$

C) $1s^2, 2s^2, 2p^6, 3s^1$

D) $1s^2, 2s^2, 2p^5$

Which of the following is the correct order of increasing tendency to gain electron?

A. $A < C < B < D$

B. $A < B < C < D$

C. $D < B < C < A$

D. $D < A < B < C$

Answer: A

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Ncert Exemplar Problems Multiple Choice Questions Ii

1. Which of the following elements can show covalency greater than 4?

A. Be

B. P

C. S

D. B

Answer: B::C

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2. Those elements impart colour to the flame on heating in it, the atoms of which require low energy for the ionisation (i.e., absorb energy in the

visible region of spectrum). The elements of which of the following groups will impart colour to the flame?

A. 2

B. 13

C. 1

D. 17

Answer: A::C

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

A. $3, 33, 53, 87$

B. $2, 10, 22, 36$

C. $7, 17, 25, 37, 48$

D. $9, 35, 51, 88$

Answer: A::D

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4. Which of the following elements will gain one electron more readily comparison to other elements of their groups? a)$S(g)$ B)$Na(g)$ C)$O(g)$ D)$CI(g)$

A. S (g)

B. Na (g)

C. O (g)

D. C1(g)

Answer: A::D

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5. Which of the following statements are correct ?

A. Helium has highest first ionisation enthalpy in the periodic table.

B. Chlorine has less negative electron gas enthalpy than fluorine .

C. Mercury and bromine are liquids at room temperature .

D. In any period atomic radius of alkali metal the highest .

Answer: A::C

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6. Which of the following sets contain only isoelectronic ions?

A. $Zn^{2+}, Ca^{2+}, Ga^{3+}, A1^{3+}$

B. $K^{+}, Ca^{2+} Sc^{3+}, C1^{-}$

C. $P^{3-}, S^{2-}, C1^{-}, K^{+}$

D. $Ti^{4+}, Ar, Cr^{3+}, V^{5+}$

Answer: B::C

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7. In which of the following options order of arrangement does not agree with the variation of property indicated against it ? A) $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ (increasing ionic size) B) $B < C < N < O$ (increasing first ionisation enthalpy) C) $I < Br < Cl < F$ (increasing electron gain enthalpy) D) $Li < Na < K < Rb$ (increasing metallic radius)

A. $A1^{3+} < Mg^{2+} < Na^{+} < F^{-}$ (increasing ionic size)

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

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

D. $Li < Na < K < Rb$ (increasing metallic radius)

Answer: B::C

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8. Which of the following have no unit ?

A. Electronegativity

B. Electron gain enthalpy

C. Ionisation enthalpy

D. Atomic radii

Answer: A

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9. Ionic radii vary in

A. inverse proportion to the effective nuclear charge

B. inverse proportion to the square of effective nuclear charge

C. direct proportion to the screening effect

D. direct proportion to the square of screening effect.

Answer: A::C

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10. An element belongs to 3rd period and group 13 of the periodic table. Which of the following properties will be shown by the element ?

A. Good conductor of electricity

B. Liquid , metallic

C. solid metallic

D. Solid non metalic

Answer: A::C

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Ncert Exemplar Problems Short Answer Questions

1. Electron gain enthalpy of fluorine is less than that of chlorine. Why?

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2. All transition element are d- block element but all d- block element are not transition elements Explain.

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3. Identify the group nad valency of the elements having atomic number 119. Also predict the outermost electronic configuration and write the general formula of its oxide.

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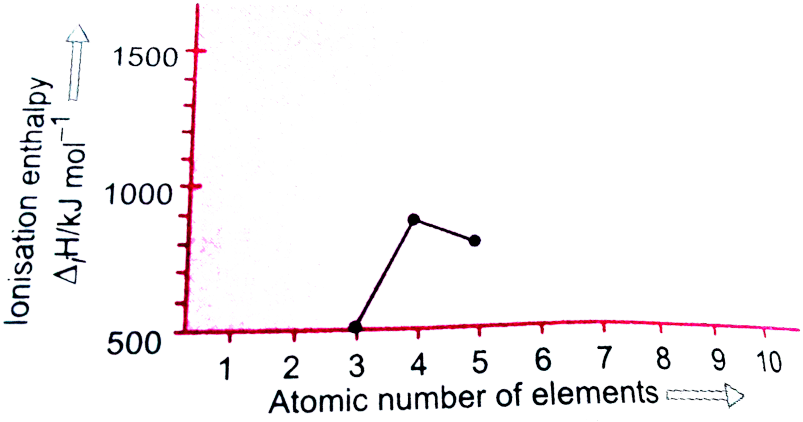
4. Ionisation enthalpies of element of second period are given below :

Ionisation enthalpy / k cal mol^{-1}

520 , 899 , 801 , 1086 , 1402 , 1314 , 1681 2080

Match the correct enthalpy with the elements and complete the graph given in Figure 3.14 .Also write symbols of elements with atomic number .



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5. Among the elements B, AI, C and Si,

(i) Which elements has the highest first ionisation enthaloy?

(ii) When element has the most metallic character? Justify your answer in each case.

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6. Write four characteristic properties of p- block elements

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7. Choose the correct order of atomic radii of fluorine and neon (in pm) out of the options given below and justify your answer.

$(i) 72, 160 (ii) 160, 160 (iii) 72, 72 (iv) 160, 72$

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8. Illustrate by taking examples of transition elements and non-transition elements that oxidation states of elements are largely based on electronic configuration.

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9. Nitrogen has positive electron gain enthalpy whereas oxygen has negative. However, oxygen has lower ionisation enthalpy than nitrogen.

Explain.

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10. First member of each group of representative elements (i.e., s and p-block elements) shows anomalous behaviour. Illustrate with two examples.

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11. p-Block element form acidic basic and amphoteric oxides .

Explain each property by giving one example

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12. How would you explain the fact that the first ionisation enthalpy of sodium is lower than that of magnesium but its second ionisation enthalpy is higher than that of magnesium?

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13. What do you undestand by exothermic reaction and endothermic reaction? Give one example of each type.

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14. Arrange the elements N, P, O and S in the order of

i) increasing first ionisation enthalpy.

ii) increasing non-metallic character.

Give reason for the arrangement assigned.

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15. Explain the following

a) Electronegatively of elements increase on moving from left to right in the periodic table.

b) Ionisation enthalpy decrease in a group from top to bottom.

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16. How does the metallic and non-metalic character vary on moving from left to right in a period?

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17. The radius of Na^+ cation is less than that of Na atom. Give reason.

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18. Among alkali metals which element do you expect to be least electronegative and why?

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Ncert Exemplar Problems Matching Type Questions

1. Match the correct atomic radius with the element.

Element	Atomic radius (pm)
Be	74
C	88
O	111
B	77
N	66

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2. Match the correct ionisation enthalpies and electron gain enthalpies of the following elements

	Elements		ΔH_1	ΔH_2	$\Delta_{eg}H$
(i)	Most reactive non metal	$A.$	419	3051	-48
(ii)	Most reactive metal	$B.$	1681	3374	-328
(iii)	Least reactive element	$C.$	738	1451	-40
(iv)	Metal forming binary halide	$D.$	2372	5251	$+48$

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3. Electronic configuration of some element of given in column I and their electron gain enthalpies are given in column II. Match the electronic configuration with electron gain enthalpy.

	Column I	Column II
(i)	$1s^2 2s^2 2p^6$	$(A)-53$
(ii)	$1s^2 2s^2 2p^6 3s^1$	$(B)-328$
(iii)	$1s^2 2s^2 2p^5$	$(C)-141$
(iv)	$1s^2 2s^2 2p^4$	$(D)+48$

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Ncert Exemplar Problems Assertion And Reason Type Question

1. Assertion: (A) Generally, ionsiation enthalpy increases from left to right in a period.

Reason (R) When successive electrons are added to the orbitals in the same principle quantum level, the shielding effect of inner core of electrons does not increase very much to compensate for the increased attraction of the electrons to the nucleus.

A. Assertion is correct statement and reason is wrong statement.

B. Assertion and reson both are correct statement and reason is correct explanation of assertion

C. Assertion and reason both are wrong statement .

D. Assertion is wrong statement and reason is correct statement.

Answer: B

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2. Assertion: Boron has a smaller first ionisation enthalpy than beryllium.

Reason: The penetration of a $2s$ electron to the nucleus is more than the $2p$ electron, hence $2p$ electorn is more shielded by the inner core of electrons than the 2s electrons.

A. Assertion and reason both are correct statement but reason is not correct explanation for assertion

B. Assertion is correct statement but reason is wrong statement.

C. Assertion and reason both are correct statement and reason is correct explanation for assertion

D. Assertion is reason both are wrong statements.

Answer: C

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3. Assertion: Electron gain enthalpy always becomes less negative as we go down a group in Modern periodic table.

Reason: The size of the atom increase on going down the group in Modern periodic table and the added electron would be farther from the nucleus.

A. Assertion and reason both are correct statement but reason is not correct explanation for assertion.

B. Assertion and reason both are correct statement and reason is correct explanation for assertion

C. Assertion and reason both are wrong statement.

D. Assertion is wrong statement but reason is correct statement .

Answer: B

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Ncert Exemplar Problems Long Answer Questions

1. Discuss the factors affecting electron gain enthalpy and the trend in its variation in the periodic table.

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2. Define ionisation enthalpy .Discuss the factors affecting ionisation enthalpy of the element and its trends in the periodic table.

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3. Justify the given statement with suitable examples- " the Properties of the elements are a periodic function of their atomic numbers."

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4. Write down the outermost electronic configuration of alkali metals . How will you justify their placement in group 1 of the periodic table ?

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5. Write the drawbacks in Mendeleef's periodic table that let to its modification.

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6. Discuss and compare the trend in ionisation enthalpy of the elements of group 1 with those of group 17 elements.

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Additional Question Very Short Answer Question

1. Nitrogen (14.0 u) , phosphorus (31.0 u) and arsenic (74.9 u) have similar properties . Do the they form a Dobereiner 's triad ? Comment .

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2. Which one of the following elements posed a challenge to Newlands 's law of octaves ?

$Li, Be, B, C, N, O, F, Ne, Na$

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3. Which important property did Mendeleev use to classify the element in his periodic table ?

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4. The basis for the classification of elements in the modern periodic table is

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5. State the modern periodic law.

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6. What are horizontal rows and vertical columns of the periodic table called ?

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7. Which two elements of the following belong to the same period ? A1 , Si , Ba and O.

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8. What is the IUPAC name official name and symbol of the element with atomic number 110 ?

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9. What are super heavy elements?

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10. What are the atomic number of the elements which constitute f- block (lanthanoids and actinoids) ?

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11. Lanthanoids and actinoids are placed in separate rows at the bottom of the periodic table, Explain the reason for this arrangement.

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12. Why Ar (argon) (at, wt. $= 39.94$) has been placed before K (at. Wt. $= 39.10$) in the periodic table?

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13. In terms of electronic configuration, what the elements of a given period and a group have in common ?

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14. Name the groups of elements classified as s- ,p - and d- blocks.

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15. To Which block (s,p , d or f) does the element with atomic number 50 belong ?

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16. Which among the following is a transition element?

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17. Which has a larger radius : (i) Mg or Ca (ii) S or Si

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18. Compare the size of (a) Na atom with Na^+ ion (b) Cl atom with Cl^- ion

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19. Give four examples of species which are isoelectronic with Ca^{2+}

Watch Video Solution

20. Arrange the following ions in order of decreasing ionic radii : Li^{2+}, He^{+}, Be^{3+}

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21. A1 atom loses electrons successively to form $A1^{+}$, $A1^{2+}$ and $A1^{3+}$ ions. Which step will have highest ionization enthalpy ?

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22. Which one among the following elements has the lowest first ionisation enthalpy and which of the has highest first ionisation enthalpy ? Li, K , Ca , S and Kr.

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23. Name the element in the table which has the highest and lowest first ionization enthalpy.

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24. From amongst Be, B and C, Choose the element with highest and lowest first ionization enthalpy.

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25. Why is first ionization enthalpy of nigtrogen greater than that of oxygen ?

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26. Why are electron gain enthalpies of Be and Mg positive ?

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27. Which of the following elements has most positive electron gain enthalpy ? Fluorine nitrogen neon.

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Additional Question Short Answer Question

1. What is the need for the classification of elements ?

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2. Define Modern Periodic law . .

Watch Video Solution

3. What is the cause of periodicity in properties of the elements ? Explain with two example

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4. Predict the density of Cs from the density of the following elements.

$K = 0.86 g/cm^3$ $\mathrm{Ca} = 1.548 g/cm^3$ $\mathrm{Sc} = 2.991 g/cm^3$

$Rb = 1.532 g/cm^3$ $\mathrm{Sr} = 2.63 g/cm^3$ $\mathrm{Y} = 4.34 g/cm^3$

$Cs = ?$ $\mathrm{Ba} = 3.51 g/cm^3$ $\mathrm{La} = 6.16 g/cm^3$

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5. Describle the main feature of the long form of the periodic table.

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6. (a) state the modern periodic law.

(b) Describe in brief the main features of the long form of the periodic table.

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7. Explain briefly Groups and Periods' Transition and Normal elements in the long form of the periodic table.

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8. On the basis of electronic configuration justify that the second and third periods contain 8 elements each 4th and 5th periods contain 18 elements each and the 6th period 32 elements.

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9. Account for the fact that 4th period has eighteen and not eight elements.

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10. Elements A, B, C and D have atomic numbers 12, 19, 29 and 36 respectively . On the basis of electronic configuration write to which group of the periodic table each element belongs.

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11. What do you understand by Representative elements ? Name the groups whose elements are called representative elements.

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12. What are transition elements ? Why are they so called ? Name the different transition series.

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13. Which elements are called inner transition elements ? Name the different inner transition series. Why are they so named ?

Watch Video Solution

14. Describe the main characteristic properties of s, p, d and f-block elements.

Watch Video Solution

15. Name the different blocks of elements in the periodic table. Give the general electronic configuration of each block.

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16. Though copper silver and gold atoms have completely filled sets of d-orbitals yet they are called transition metals .Why ?

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17. What do you understand by periodic properties of elements ? Name any three such properties.

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18. How do atomic sizes vary in a group and in a period? Give reason for the variations.

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19. What is meant by atomic and ionic radii ? Explain giving reason Why the size of $C1^-$ ion is bigger than that of $C1$ atom whereas size Na^+ ion is smaller than that of Na atom ?

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20. The size of an anion is larger than that of its parent atom. Give reason.

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21. The size of a cation is smaller that than of its parent atom .Give reasons.

Watch Video Solution

22. Mg^{2+} is smaller than O^{2-} in size, throgh both have same electronic configuration. Explain?

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23. What are isoelectronic species ? Give example to illustrate your answer.

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24. Arrange the following as stated: Increasing order of ionic size

$N^{3-}, Na^{\oplus}, F^{\ominus}, O^{2-}, Mg^{2+}$

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25. Define the term ionization enthalpy ? How does it vary along a period and along a group ?

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26. What do you understand by the term successive ionization enthalpies ? Explain why second ionization enthalpy is always enthalpy than the first ionization enthalpy ?

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27. Define ionization enthalpy . What are its units ? What is the principle of its measurement ?

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28. Discuss briefly the various factors on which ionization enthalpy depends.

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29. Why does the first ionisation energy increase as we go from left to right along a given period of periodic table?

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30. Why does ionization energy decreases down the group?

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31. The five successive energies of an element are $800, 2427, 3658, 25024$ and $32824 kJmol^{-1}$ respectively. The number of valence electron is

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32. Explain the following :

(i) Ionization enthalpy of Mg is more than that of Na and A1.

(ii) Ionization enthalpy of nitrogen is more than that of B ? Explain.

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33. Why is ionization enthalpy of Be more than that of B? Explain.

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34. If we consider ionization enthapies of elements in the second period from Li , they ordinarily increase but Be and N have higher ionization enthalpies than B and O respectively which succeed them. Why is it so ?

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35. Explain the terms ionization enthalpy and electron gain enthalpy.

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36. What do you mean by successive electron gain enthalpies ? Why is the second electron gain enthalpy of an atom positive .

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37. Explain term electron gain enthalpy ? How does it vary along a group and across a period.

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38. Halogens have very high negative electron gain enthalpies. Explain.

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39. Electron gain enthalpy of fluorine is less than that of chlorine. Why?

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40. Electron gain enthalpy of noble gases in positive . Explain.

Watch Video Solution

41. Define electronegativity ? How does is vary along a period and along a group .

Watch Video Solution

42. What is the basic difference between the terms electron gain enthalpy and electronegativity?

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43. The valence of representative elements is either equal to the number of the valence electrons or eight minus this number. What is the basis of this rule ?

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44. Discuss briefly the anomalous behaviour of elements of second period.

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45. The first element of each group differs significantly from rest of the elements of the same group. Give reasons.

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46. Periodic Trends and Chemical Reactivity

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Additional Question Long Answer Question

1. Describe the main features of the long form of the periodic table. In what respects is it superior to Mendeleev's table ?

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2. Name the different blocks of elements in the periodic table. Give the general electronic configuration of each block.

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3. Explain what you understand by covalent radius van der Waals radius , ionic radius and atomic radius How do they vary in a period and in a group ?

Watch Video Solution

4. Define electron gain enthalpy .

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Analytical Question And Problems With Answers Solutions

1. Classify the elements having atomic numbers $(9, 12, 16, 34, 53, 56)$ into three separate pairs on the basis of similar chemical properties.

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2. Which element has

(a) two shells, both of which are completely filled with electrons?

(b) the electronic configuration 2, 8, 2?

(c) a total of three shells, with four electrons in its valence shell?

(d) a total of two shells, with three electrons in its valence shell?

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

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3. In the Modern Periodic Table, calcium (atomic number 20) is surrounded by elements with atomic numbers 12, 19, 21 and 38. Which of these have physical and chemical properties resembling calcium?

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4. What is the electronic configuration of the element with $(i) Z = 57$. Is it a d- or f- block element ?

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5. Write the electronic configuration of gadlonium with Z= 64 and predict the sum of the spins of unpaired electrons.

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6. Write the electronic configuration of element with atomic numbers 89 and 90 and predict whether they are d- or f- block elements .

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7. Which of the elements Na, Mg, Si and P have the greatest difference between first and second ionization enthalpies? Briefly explain your answer.

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8. The first $(\Delta_i H_1)$ and the second $(\Delta_i H_2)$ ionization enthalpies $\left(kjmol^{-1}\right)$ of three element I, II, III, are given below :

	I	II	II
$\Delta_i H_2$	403	549	1142
$\Delta_i H_2$	2640	1060	2080

Identify the element which is the likely to be (a) non- metal (b) an alkali metal (c) alkaline earth metal.

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9. Arrange the following ions in order of their inceasing radii : $Na^+, Mg^{2+}, K^+, Al^{3+}$

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10. Arrange the following in decreasing order of their van der Waals radii :

Cl, H , O, N`

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11. Arrange the following elements in the increasing order of non- metallic character:

B, C, Si, N and F.

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12. Although fluorine is more electronegative than chlorine but chlorine can be converted into chloride ion more easily as compared to fluoride ion from fluorine . Explain.

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Analytical Question And Problems Problems

1. A monoatomic anion of unit charge contain 45 neutrons and 36 electrons. What is the atomic mass number of element and in which group of periodic table does it lie? Write your answer as 1002 if answer is 10,2.

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2. Give the name and atomic number of the inert gas atom in which the total number of d-electrons is equal to the difference in number to the p- and $-s$-electrons.

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3. The effective nuclear charge of an element with three valence electrons is 2.60. What is the minimum atomic number of the element?

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4. Electronic confriguration of a transition element X in +3 oxidation states is $[Ar]3d^5$.

What is its atomic number?

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5. The $\Delta_i H_1)$ and $\Delta_i H_2$ of Mg (g) are 740 and 1450 kJ mol^{-1} . Calculate the percentage of Mg^+ (g) and Mg^{2+} (g) if 1 g of Mg (g) absorbs 50 kj of energy .

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Competition Focus Jee Main And Advanced Medical Entrance Multiple Choice Question I

1. According to the Periodic Law of elements, the Variation in properties of elements is related to their ?

A. nuclear neutron - proton number radius

B. atomic masses

C. nuclear masses

D. atomic numbers

Answer: D

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

A. Ununbium

B. Unnibium

C. Unnilunium

D. Ununtrium

Answer:

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3. An element X belongs to fourth period and fifteen group of the periodic table . Which of the following statements is true ?

A. It has a completely filled s- orbital and a partially filled d- orbital

B. It has completely filled s- orbital and a partially filled d- orbital

C. It has completely filled s- and p- orbitals and a half filled d- orbital

D. It has a half filled p- orbital and completely filled s- and d- orbitals .

Answer: D

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4. Which statement (s) is are false for the periodic classification of element ?

A. The properties of the element are the perioic functions of the their atomic number .

B. Non- metallic element are leasser in number than thte metallic elements

C. the first ionization energies of the elements along a period do not vary in a regular manner with increase in atomic number

D. For transition elements the d- elements are filled monotonically with increase in atomic number

Answer: D

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5. The general outer electronic configuration of transition metals is

A. ns^2nd^{1-10}

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

C. $ns^2np^6(n-1)d^{1-1}$

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

Answer: D

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6. Which pair of atomic numbers represent s-block elements?

A. $7, 15$

B. $6, 12$

C. 9.17

D. $4, 12$

Answer: D

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7. The element with atomic number 56 belongs to which block ?

A. s

B. p

C. d

D. f

Answer: A

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8. Europium is

A. s-black element

B. p-block element

C. d- block element

D. f- block element

Answer: D

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9. Gadolinium belongsd to 4f series. It's atomic number is 64. which of the following is the correct electronic configuration of gadolinium ?

A. $[Xe]4f^9 5s^1$

B. $[Xe]4f^7 5d^1 6s^2$

C. $[Xe]4f^6 5d^2 6s^2$

D. $[Xe]4f^8 6d^2$

Answer: B

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10. The electronic configuration of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are:

A. $[Xe]4f^6 5d^1 6s^2 [Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^8 5d^1 6s^2$

B. $[Xe]4f^7 6s^2 [Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^9 5s^2$

C. $[Xe]4f^7 6s^2 [Xe]4f^8 6s^2$ and $[Xe]4f^8 5d^1 6s^2$

D. $[Xe]4f^6 5d^1 6s^2$, $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^9 6s^2$

Answer: B

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11. The outer electronic configuration of Gd (At.No. 64) is

A. $4f^3 5d^3 6s^2$

B. $4f^8 5d^0 6s^2$

C. $4f^4 5d^4 6s^2$

D. $4f^7 5d^1 6s^2$

Answer: D

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12. Gd (64) has .....unpaired electrons with sum of spin .....

A. 7,3.5

B. 8,3

C. 6,3

D. 8,4

Answer: D

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13. The electronic configuration of Gd^{2+} is :

A. $[Xe]4f^7$

B. $[Xe]4f^75d^1$

C. $[Xe]4f^8$

D. $[Xe]4f^75d^16s^2$

Answer: B

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14. The atomic number of cerium (Ce) is 58. The correct electronic confguration of Ce^{3+} ions is :

A. $[Xe]4f^1$

B. $[Kr]4f^1$

C. $[Xe]4f^{13}$

D. $[Kr]4d^1$

Answer: A

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15. The element with atomic number 113 has recently been discovered . Its electronic configuration is similar of that of

A. Si

B. Ga

C. Bi

D. At

Answer: B

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16. An element with atomic number 106 has been discovered recently. Which of the following electronic configurations will it possess?

A. $[Rn]5f^{14}6d^46d^47s^2$

B. $[Rn]5d^{14}6d^{5}7s^{1}$

C. $[Rn]5f^{14}6d^{6}7s^{0}$

D. $[Rn]5f^{14}6d^{1}7s^{2}7p^{3}$

Answer: A

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17. The element $Z = 114$ has been discovered recently. It will belong to which of the family / group and electronic configuration?

A. Carbon family $[Rn]5f^{14}6f^{10}7s^{2}7p^{2}$

B. Oxygen family $[Rn]5f^{14}6d^{10}7s^{2}7p^{6}$

C. Nitrogen family , $[Rn]5f^{14}6d^{10}7s^{2}7p^{6}$

D. Halogen family , $[Rn]5f^{14}6d^{10}7s^{2}7p^{5}$

Answer: A

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18. The element with atomic number 117 if discovered would be placed in

A. noble gas family

B. alkali family

C. alkaline earth family

D. halogen family

Answer: D

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19. Which of the following pairs contain metalloid elements in the periodic table ?

A. Na and K

B. F and C1

C. Ca and Mg

D. As and Si

Answer: D

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20. Among the elements from atomic number 1 to 36 the number of elements which have an unpaired electron in the s- subshell is

A. 4

B. 7

C. 6

D. 9

Answer: C

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21. The number of d-electrons in Fe^{2+} (Z=26) is not equal to the number of electrons in which one of the following ?

A. d- electrons in Fe (Z= 26)

B. p- electrons in Ne (Z = 10)

C. s-electrons in Mg (Z= 12)

D. p -electrons in C1 (Z =17)

Answer: D

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22. The atom of smallest atomic radius among the following is

A. Na

B. K

C. Br

D. Li

Answer: C

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23. Among the elements Ca,Mg,P and Cl the order of decreasing atomic radii is

A. $Mg < Ca < C1 < P$

B. $C1 < P < Mg < Ca$

C. $P < C1 < Ca < Mg$

D. $Ca < Mg < P < C1$

Answer: B

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24. Identify the wrong statement in the following ?

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

B. Amongs isoelectronic species greater the negative charge on the anion larger is the ionic radius

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

D. Atomic radius of the elements decreases as one moves across from left to right in the 2nd period on the periodic table .

Answer: A

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25. The ionic radii of N^{3-} , O^{2-} and F^{-} are respectively given by:

A. 1.71 , 1.40 and 1.36

B. 1.71 .1.36 and 1.40

C. 1.36 , 1.40 and 1. 71

D. 1.36 . 1.71 and 1.40

Answer: A

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

A. $Ca^{2+}, < K^+ < Ar$

B. $K^+, < Ar < Ca^{2+}$

C. $Ar < K^+ < Ca^{2+}$

D. $Ca^{2+} < Ar < K^+$

Answer: A

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27. Which of the following sets of ions represents a collection of isoelectronic species ?

A. $K^+, C1^-, Mg^{2+}, Sc^{3+}$

B. $Na^+, Ca^{2+}, Sc^{3+}, F^-$

C. $K^+, Ca^{2+}, Sc^{3+}, C1^-$

D. $Na^+, Mg^{2+}, A1^{3+}, C1^-$

Answer: C

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28. The size of the following species increases in the order

A. $Mg^{2+} < Na^+ < F^- < A1$

B. $F^- < A1 < Na^+ < Mg^{2+}$

C. $A1 < Mg^{2+} < F^- lg Na^+$

D. $Na^+, < A1 < F^- < Mg^{2+}$

Answer: A

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29. For Na^+, Mg^{2+}, F^- and O^{2-}, the correct order of increasing ionic radii is :

A. $Mg^{2+} < Na^+ < F^- < O^{2-}$

B. $O^{2-} < F^- < Na^+ lg Mg^{2+}$

C. $Na^+ < Mg^{2+} < F^- < O^{2-}$

D. $Mg^{2+} < O^{2-} < Na^+ < F^-$

Answer: A

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

A. $K^+ < Ca^{2+} > C1^- > S^{2-}$

B. $Ca^{2+} > K^+ > S^{2-} > C1^-$

C. $C1^- > S^{2-} > Ca^{2+} > K^+$

D. $S^{2-} > C1^- > K^+ > Ca^{2+}$

Answer: D

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31. The increasing order of the ionic radii of the given isoelectronic species is :-

A. $S^{2-}, C1^-, Ca^{2+}, K^+$

B. $Ca^{2+}, K^+, C1^-, S^{2-}$

C. $K^+, S^{2-}, Ca^{2+}, C1^-$

D. $C1^-, Ca^{2+}, K^+ S^{2-}$

Answer: B

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32. The correct sequence which shows decreasing order of the ionic radii of the element is

A. $O^{2-} > F^{-} > Na^{+} > Mg^{2+} > A1^{3+}$

B. $A1^{3+} > Mg^{2+} > Na^{+} > F^{-} > O^{2-}$

C. $Na^{+} > Mg^{2+} > A1^{3+} > O^{2-} > F^{-}$

D. $Na^{+} > F^{-} > Mg^{2+} > O^{2-} > A1^{3+}$

Answer: A

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33. The correct arrangement for the ions in the increasing order of their radii is

A. $Na^{+}, C1^{-}, Ca^{2+}$

B. Ca^{2+}, K^{+}, S^{2-}

C. $Na^{+}, A1^{3+}, Be^{2+}$

D. $C1^{-}, F^{-}, S^{2-}$

Answer: B

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34. which among the following species has the same number o f electrons in its outermost as well as penultimate shell ?

A. Mg^{2+}

B. O^{2-}

C. F^{-}

D. Ca^{2+}

Answer: D

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35. The ionic radius of Cr is minimum in which of the following compounds ?

A. K_2CrO_4

B. CrF_3

C. CrO_2

D. $CrC1_3$

Answer: A

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36. In the crystals of which of the following ionic compounds would you expect maximum distance between the centres of the cations and anion?

A. CsF

B. CsI

C. LiI

D. LiF

Answer: B

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37. Which of the following species will have the largest and the smallest size Mg, Mg^{2+}, Al, Al^{3+}?

A. Mg, $A1^{3+}$

B. $A1^{3+}$, Mg

C. Mg^{2+}, $A1$

D. $A1$, Mg^{2+}

Answer: A

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38. Among the following which has the highest cation to anion size ratio ?

A. CsI

B. CsF

C. LiF

D. NaF

Answer: B

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39. Which one of the following has minimum value of size of cation/anion ratio ?

A. $NaCI$

B. KCI

C. $MgC1_2$

D. CaF_2

Answer: C

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40. Which of the following has the largest size?

A. S^{2-}

B. Se^{2-}

C. O^{2-}

D. Te^{2-}

Answer: D

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41. Identify the least stable ion amongst the following:

A. Li^-

B. Be^-

C. B^-

D. C^-

Answer: B

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42. Which of the following transitions involves maximum amount of energy?

A. $M^-(g) \rightarrow M(g)$

B. $M(g) \rightarrow M^-(g)$

C. $M^+(g) \rightarrow M^2(g)$

D. $M^{2+}(g) \rightarrow M^{3+}(g)$

Answer: D

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43. If the IP of Na is 5.48 eV, the ionsation potential of K will be

A. same as that of Na

B. 4.34 eV

C. 5.68 eV

D. 10.88 eV

Answer: B

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44. The first ionisation potential of Na ,Mg and Si are respectively 496,737 and 786 $Kjmol^{-1}$ the ionisation potential of Al will be closer to

A. 760 kJ mol^{-1}

B. $575kJmol^{-1}$

C. $801 kJ mol^{-1}$

D. $419 kJ mol^{-1}$

Answer: B

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

A. $8.29, 9.32$

B. $9.32, 8.29$

C. $9.32, 9.32$

D. $8.29, 8.29$

Answer: B

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46. In the following, the element with the highest ionization energy is

A. $[Ne]3s^2 3p^1$

B. $[Ne]3s^2 3p^3$

C. $[Ne]3s^2 3p^2$

D. $[Ne]3s^2 3p^4$

Answer: B

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47. Which electronic configuration will show the highest first ionization enthalpy ?

A. $1s^2 2s^2 2p^1$

B. $1s^2 2s^2 2p^5$

C. $1s^2 2s^2 2p^3$

D. $1s^2 2s^2$

Answer: B

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48. The increasing order of the first ionization enthalpy of the elements B, P, S and F (lowest first) is

A. $B < P < S < F$

B. $b < S < P < F$

C. $F < S < P < B$

D. $P < S < B < F$

Answer: B

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

A. $1s^2 2s^2 2p^6$

B. $1s^2 2s^2 2p^5$

C. $1s^2 2s^2 2p^3$

D. $1s^2 2s^2 2p^6 3s^1$

Answer: D

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50. The correct order of ionisation energy of C, N, O and F is

A. $F < N < \ < C < O$

B. $C < N < O < N$

C. $C < O < N < F$

D. $F < O < N < C$

Answer: C

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51. Which of the following orders about ionization energy is correct ?

A. $N > O > F$

B. $N < O < F$

C. $N > O < F$

D. $N < O > F$

Answer: C

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52. Among the following, the third ionisation energy is highest for

A. Magnesium

B. Boron

C. Beryllium

D. Aluminium

Answer: C

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53. Which of the element is expected to have lowest first ionisation enthalpy

A. Sr

B. As

C. Xe

D. S

Answer: A

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54. Which of the following atoms has the highest first ionisation energy ?

A. Rb

B. Na

C. K

D. Sc

Answer: D

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55. Generally, the first ionisation energy increases along a period. But there are some exceptions one which is not an exception is

A. N and O

B. Na and Mg

C. Mg and A1

D. Be and B

Answer: B

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56. The correct decreasing order of first ionisation enthalpies of five elements of second period is

A. $Be > B > C > N > F$

B. $N > F > C > B > Be$

C. $F > N > C > Be > B$

D. $N > F > B > C > Be$

Answer: C

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57. Which of the following represents the correct order of increasing first ionization enthalpy for Ca, Ba, S , Se and Ar ?

A. $Ca < Ba < S < Se < Ar$

B. $Ca < SlgBa < Se < Ar$

C. $SlgSe < Ca < Ba < Ar$

D. $Ba < Ca < Se < S < Ar$

Answer: D

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58. Screening effect is not observed in :

A. He^+

B. Li^{2+}

C. Be^{3+}

D. in all the three

Answer: D

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59. In which case, effective nuclear charge is minimum ?

A. Be

B. Be^{2+}

C. Be^{3+}

D. all have the same effective nuclear charge

Answer: A

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60. The effective nuclear charge of an element with three valence electrons is 2.60. What is the minimum atomic number of the element?

A. 1

B. 2

C. 3

D. 4

Answer:

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61. which of the following configurations represents atoms of the elements having the higest second ionisation energy?

A. $1s^2 2s^2 2p^4$

B. $1s^2 2s^2 2p^6$

C. $1s^2 2s^2 2p^6 3s^1$

D. $1s^2 2s^2 2p^6 3s^2$

Answer: C

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

A. $1s^2 2s^2 2p^6 3s^1$

B. $1s^2 2s^2 2p^6 3s^2 3p^1$

C. $1s^2 2s^2 2p^6$

D. $1s^2 2s^2 2p^6 3s^2$

Answer: D

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63. The five successive energies of an element are $800, 2427, 3658, 25024$ and $32824 kJ mol^{-1}$ respectively. The number of valence electron is

A. 3

B. 5

C. 4

D. 2

Answer: D

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64. For one of the element various successive ionization enthalpies (in $Kjmol^{-1}$) are given below :

1st	2nd	3rd	4th	5th
577·5	1810	2750	11,580	14,280

The element is

A. P

B. Mg

C. Si

D. A1

Answer: D

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65. The following table shows the successive molar ionization energy $\left(kJmol^{-1}\right)$ of five elements A to E

Element	Ionization energy (kJ mol^{-1})			
	1st	2nd	3rd	4th
A	2080	4000	6100	9400
B	500	4600	6900	9500
C	740	1500	7700	10500
D	580	1800	2700	11600
E	420	3100	4400	5900

Which of two elements are most likely to be in the same group of the periodic table ?

A. C and D

B. D and E

C. B and D

D. B and E

Answer: D

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66. One mole of magnesium in the vapor state absored $1200kJmol^{-1}$ of enegry. If the first and second ionization energies of Mg are 750 and $1450kJmol^{-1}$, respectively, the final composition of the mixture is

A. $31\,\%\,Mg^{+} + 69\,\%\,Mg^{2+}$

B. $69\,\%\,Mg^{+} + 31\,\%\,Mg^{2+}$

C. $86\,\%\,Mg^{+} + 14\,\%\,Mg^{2+}$

D. $14\,\%\,Mg^{+} + 86\,\%\,Mg^{2+}$

Answer: B

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67. Amongest Be, B, Mg and Al, the second ionization potential is maximum for

A. B

B. Be

C. Mg

D. A1

Answer: A

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68. The second ionization energies of Li, Be, B and C are in the order

A. $Li > C > B > Be$

B. $Li > B > C > Be$

C. $B > C > Be > Li$

D. $Be > C > B > Li$

Answer: A

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

A. $C1 + e^- \rightarrow C1^-$

B. $O^- + e^- \rightarrow O^{2-}$

C. $O + e^- \rightarrow O^-$

D. $S + e^- \rightarrow S^-$

Answer: B

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70. Electron affinity is positive when

A. O changes into O^-

B. O^- changes into O^{2-}

C. O changes into O^+

D. electron affinity is always negative

Answer: A

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71. How does the electron gain enthalpies vary across a period and down a group ?

A. More positive across period and less positive down a group

B. More negative across a period and less negative down a group

C. Less positive across a period and less negative down a group

D. More positive across a period and less negative down a group

Answer: B

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72. The first ionisation potential of Na is $5.1eV$. The value of electrons gain enthalpy of Na^+ will be

A. $+2.55eV$

B. $-2.55eV$

C. $-5.1eV$

D. $-10.2eV$

Answer: C

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73. 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. $S < O < C1 < F$

B. $C1 < F < O < Si$

C. $O < S < F < C1$

D. $F < S < O < Si$

Answer: C

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74. The order of decreasing negative electron gain enthalpy of O. S, Se, is

A. $O > S > Se$

B. $S > O > Se$

C. $Se > O > S$

D. $S > Se > O$

Answer: D

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75. the correct order of electron gain enthalpy with negative sign of F, Cl, Br and I, having atomic number $9, 17, 35$ and 53 respectively is

A. $I > Br > C1 > F$

B. $F > C1 > Br > I$

C. $C1 > F > Br > I$

D. $Br > C1 > I > F$

Answer: C

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76. Which of the following atom should have the highest negative first electron gain enthalpy ?

A. F

B. O

C. N

D. C

Answer: A

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77. The element with positive electron gain enthalpy is

A. hydrogen

B. sodium

C. oxygen

D. fluorine

Answer:

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78. Which of the following species has the highest electron affinity ?

A. F^-

B. O

C. O^-

D. Na^+

Answer: B

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79. The highest electron affinity is shown by

A. O^-

B. F^-

C. $C1_2$

D. F_2

Answer: A

Watch Video Solution

80. The electronegativity of the following elements increases in the order

A. $C < N < Si < P$

B. $N < Si < C < P$

C. $Si < P < C < N$

D. $P < Si < N < C$

Answer: C

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81. The correct order of electronegativities of N,O, F and P is

A. $F > N > P > O$

B. $F > O > P > N$

C. $F > O > N > P$

D. $N > O > F > P$

Answer: C

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82. Which of the configuration of most electronegative elements is

A. $[He]2s^1$

B. $[He]2s^2$

C. $[Xe]6s^1$

D. $[Xe]6s^2$

Answer: C

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83. Electronic configuration of most electronegative element is

A. $1s^2 2s^2 2p^6 3s^1$

B. $1s^2 2s^2 2p^6 3s^2 3p^5$

C. $1s^2 2s^2 2p^5$

D. $1s^2 2s^2 2p^6 3s^2 3p^6$

Answer: C

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84. Among Me_3N, C_5H_5N and Me CN (Me= methyl group) , the electronegativity of N is the order

A. $MeCN > C_5H_5N > Me_3N$

B. $C_5H_5N > Me_3N > MeCN$

C. $Me_3N > MeCN > C_5N_5N$

D. electronegativity is same in all

Answer: A

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85. Considering the elements B, Al, Mg and K, the correct order of their metallic character is

A. $B < A1 < Mg < K$

B. $B < Mg < A1 < K$

C. $K < Mg < A1 < B$

D. $Mg < A1 < B < K$

Answer: A

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86. The electronic configuration of two elements X and Y are given below:

$X = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ and $Y = 1s^2 2s^2 2p^6 3s^2 3p^5$ The formula of the ionic compound can be formed between these elements is

A. XY

B. XY_2

C. X_2Y

D. XY_3

Answer: B

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87. In the periodic table, the basic character of oxides

A. increases from left to right and decreases from top to bottom

B. decreases from right to left and increases from top to bottom

C. decreases from left to right and increases from top to bottom

D. decreases from left to right and increases from bottom to top

Answer: C

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88. The first ionisation potential of Li is 5.4 e V and the electron affinity of Cl is 3.6 eV . Calculate ΔH in kcal mol^{-1} for the reaction

$Li(g) + Cl(g) \rightarrow Li^{+} + Cl^{-}$

Carried out at such low pressures that resulting ions do not combine with each other.

A. 70

B. 100

C. 170

D. 270

Answer: C

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89. Which of the following remains unchanged in descending in a group in the periodic table?

A. Valence electrons

B. Atomic size

C. Density

D. Metallic character

Answer: A

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90. Point out the wrong statement

In a given period of the periodic table the s-block element has, in general, a lower value of

A. electronegativity

B. atomic radius

C. ionization energy

D. electron affinity

Answer: B

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91. Following statements regarding the periodic trends of chemical reactivity of the alkali metals and the halogens are given. Which of these statements gives the correct picture: A)In alkali metals the reactivity increases but in the halogens it decreases with increase in atomic number down the group B)The reactivity decreases in the alkali metals but increases in the halogens with increases in atomic number down the group. C)In both the alkali metals and the halogen the chemical reactivity decreases with increases in atomic number down the group D)Chemical reactivity increases with increases in atomic number down the group in both the alkali metals and halogens.

A. Chemical reactivity increases with increases in atomic number down the group in both the alkali metals and haloges

B. In alkali metals the reactivity increases but in the halogens it decreases with increases in atomic number down the group .

C. The reactivity decreases in the alkali metals but increases in the halogens with increases in atomic number .

D. In both the alkali metals and the halogens the chemical reactivity decreases with increases in atomic number down the group.

Answer: B

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92. Aqueous solution of two compounds $M_1 - O - H$ and $M_2 - O - H$ are prepared in two different beakers . If electronegativity of $M_1 = 3.4, M_2 = 1.2, 0 = 3.5$ and $H = 2.1$, then the nature of two solution will be respectively

A. acidic , acidic

B. acidic basic

C. basic , basic

D. basic acidic

Answer: B

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Competition Focus Jee Main And Advanced Medical Entrance Multiple Choice Question Ii With One Or More Than One Correct Answer

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

A. $I < Na < C1 < F$ (increasing electron gain enthalpy)

B. $Li < Na < K < Rb$ (increasing metallic radius)

C. $A1^{3+} < Mg^{2+} < Na^{+} < F^{-}$ (inreasing ionic size)

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

Answer: A::D

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2. The elements which are radioactive and have been named after the name of planet are

A. Hg

B. Np

C. Pu

D. Ra

Answer: B::C

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3. Which of the following are not d- block elements ?

A. $[Xe]5d^16s^2$

B. $[Rn]6d^16s^2$

C. $[Xe]4f^15d^16s^2$

D. $[Rn]5d^27s^2$

Answer: C::D

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4. In which of the following pairs both the species have nearly the same size ?

A. K^+F^-

B. Rb^+, O^{2-}

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

D. $Mg^{2+}, A1^{3+}$

Answer: A::B::C

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5. Consider the following ionization steps:

$M(g) \rightarrow M^+(g) + e^-, \Delta H = +100eV$

$M(g) \rightarrow M^{2+}(g) + 2e^-, \Delta H = +250eV$

Select correct statement(s):

A. $\Delta_i H_1$ of Mg (g) is 100 eV

B. $\Delta_i H_1$ of $Mg^+(g)$ is 150 eV

C. $\Delta_i H_2$ of $M(g)$ is 250 eV

D. $\Delta_i H_2$ of M (g) is 150 eV

Answer: A::B::D

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6. Which of the following process do not involve absorption of energy?

A. $S(g) + e^- \rightarrow S^-(g)$

B. $O^-(g) + e^- \rightarrow O^{2-}(g)$

C. $C1(g) + e^- \rightarrow O^{2-}(g)$

D. $O(g) + e^- \rightarrow O^0(g)$

Answer: A::C::D

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Competition Focus Jee Main And Advanced Medical Entrance Multiple Choice Question Iii Based On The Given Passage Comprehension Comprehension 1

1. The properties of the elements (atomic/ionic radii, electron gain enthalpy, ionization enthalpy, electronegativity, valence, oxidising/reducing power, acid/base character, etc.) which are directly or indirectly related to their electronic configirations are called periodic properties. These properties show a regular gradation on moving from left to right in a period or form top to bottom in a group. Down a group, the atomic/ionic radii, metallic character and reducing character increase while ionization enthalpy and electronegativity decrease. Along a period from left to right, atomic/ionic and metallic character decrease while ionization enthaloy, electronegativity, non-metallic character and oxiding power increase. However, electron gain enthalpy becomes less negative down a group butmore negative along a period. In contrast, inert gases have positive electron gain enthalpies which do not show may regular trend.

If the ionic radii of K^+ and F^- are about 1.34Å each, then the expected value of atomic radii of K and F should be respectively:

A. 2.31 and 0.64 Å

B. 2.31 and 1.34 Å

C. $0.64 \text{ and } 2.31\text{Å}`$

D. $1.34 \text{ and } 1.34\text{Å}`$

Answer: A

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2. The properties of the elements (atomic/ionic radii, electron gain enthalpy, ionization enthalpy, electronegativity, valence, oxidising/reducing power, acid/base character, etc.) which are directly or indirectly related to their electronic configirations are called periodic properties. These properties show a regular gradation on moving from left to right in a period or form top to bottom in a group. Down a group, the atomic/ionic radii, metallic character and reducing character increase

while ionization enthalpy and electronegativity decrease. Along a period from left to right, atomic/ionic and metallic character decrease while ionization enthaloy, electronegativity, non-metallic character and oxiding power increase. However, electron gain enthalpy becomes less negative down a group butmore negative along a period. In contrast, inert gases have positive electron gain enthalpies which do not show may regular trend.

Which of the following isoelectronic ions has the lowest first ionization enthalpy?

A. K^+

B. Ca^{2+}

C. $C1^-$

D. S^{2-}

Answer: D

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3. The properties of the elements (atomic/ionic radii, electron gain enthalpy, ionization enthalpy, electronegativity, valence, oxidising/reducing power, acid/base character, etc.) which are directly or indirectly related to their electronic configirations are called periodic properties. These properties show a regular gradation on moving from left to right in a period or form top to bottom in a group. Down a group, the atomic/ionic radii, metallic character and reducing character increase while ionization enthalpy and electronegativity decrease. Along a period from left to right, atomic/ionic and metallic character decrease while ionization enthaloy, electronegativity, non-metallic character and oxiding power increase. However, electron gain enthalpy becomes less negative down a group butmore negative along a period. In contrast, inert gases have positive electron gain enthalpies which do not show may regular trend.

Tick the correct order of second ionization enthalpy in the following:

A. $[Ne]3s^2 3p^1$

B. $[Ne]3s^2 3p^3$

C. $[Ne]3s^2 3p^2$

D. $[Ar]3d^{10}4s^2 4p^3$

Answer: B

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4. The properties of the elements (atomic/ionic radii, electron gain enthalpy, ionization enthalpy, electronegativity, valence, oxidising/reducing power, acid/base character, etc.) which are directly or indirectly related to their electronic configirations are called periodic properties. These properties show a regular gradation on moving from left to right in a period or form top to bottom in a group. Down a group, the atomic/ionic radii, metallic character and reducing character increase while ionization enthalpy and electronegativity decrease. Along a period from left to right, atomic/ionic and metallic character decrease while ionization enthaloy, electronegativity, non-metallic character and oxiding power increase. However, electron gain enthalpy becomes less negative down a group butmore negative along a period. In contrast, inert gases

have positive electron gain enthalpies which do not show may regular trend.

Tick the correct order of second ionization enthalpy in the following:

A. $F > O > N > C$

B. $O > F > N > C$

C. $O > N > FC$

D. $C > N > O > F$

Answer: B

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5. The properties of the elements (atomic/ionic radii, electron gain enthalpy, ionization enthalpy, electronegativity, valence, oxidising/reducing power, acid/base character, etc.) which are directly or indirectly related to their electronic configirations are called periodic properties. These properties show a regular gradation on moving from left to right in a period or form top to bottom in a group. Down a group,

the atomic/ionic radii, metallic character and reducing character increase while ionization enthalpy and electronegativity decrease. Along a period from left to right, atomic/ionic and metallic character decrease while ionization enthaloy, electronegativity, non-metallic character and oxiding power increase. However, electron gain enthalpy becomes less negative down a group butmore negative along a period. In contrast, inert gases have positive electron gain enthalpies which do not show may regular trend.

The outermost electronic configuration of the most electronegative elements is:

A.

B.

C.

D.

Answer:

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Competition Focus Jee Main And Advanced Medical Entrance Multiple Choice Question Iv Matching Type Question

1. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four options (a) , (b) , (c) ,(d) given at the end of each questions.

Column I	Column II
$(A) F$	(p) Maximum ionization enthalpy
$(B) C1$	(q) Maximum atomic radius
$(C) He$	(r) Maximum electronegativity
$(D) Cs$	(s) Maximum negative electron gain enthalpy

A. $A-q, B-s, C-r, D-p$

B. $A-r, B-s, C-p, D-q$

C. $A-r, B-p, C-q, D-s$

D. $A-q, B-p, C-s, D-r$

Answer: B

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2. Column I (Ionization enthalpy in Kj mol^{-1}) Column II (Electron gain enthalpy in kJ mol^{-1})

(A)	2080	$(p)-328$
(B)	1314	$(q)+116$
(c)	1402	$(r)-141$
(D)	1681	$(s)+31$

A. $A-q, B-s, C-r, D-p$

B. $A-q, B-r, C-s, D-p$

C. $A-p, B-q, C-s, D-r$

D. $A-r, B-s, C-q, D-p$

Answer: B

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3.

	Column I	Column II
(A)	Noble gas	$(p)[Xe]5d^16s^2$
(B)	Representiative elemetn	$(q)[Rn]6d^27s^2$
(C)	Transition element	$(r)1s^2$
(D)	Inner transition element	$(s)[Kr]5s^2$

A. $A - r, B - s, C - p, D - q$

B. $A - r, B - s, C - p: D - p$

C. $A - s, B - r, C - p, D - q$

D. $A - s, B - p, C - r, D - q$

Answer: A

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	Column I	Column II
(A)	He, Ne , Ar	(p) Representative elements
4. (B)	Fr, Ra	(q) Lanthanoids
(c)	Ce, Gd, Yb	(r) Noble gases
(D)	Rb, Ga, C1	(s) Radioactive elements

A. $A - s, B - p, C - q, D - r$

B. $A - q, B - s, C - r, D - p$

C. $A - r, B - s, C - q, D - p$

D. $A - r, B - p, C - r, D - q$

Answer: D

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Competition Focus Jee Main And Advanced Medical Entrance Matrix Match Type Question V

1. Match the enteries of column I with appropriate entries of column II

Each entry in column I may have one or more than one correct option

from column II .

	Column I	Column II
(A)	C1 ,Br, I	(p)Ionization enthalpy increases
(B)	B,C,O	(q)Negative elecron gain enthalpy decreases
(C)	O^{2-},O^{-},O^{-}, O	(r) Atomic size decreases
(D)	C1 ,F ,P	(s)Belong to the same group

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2. Match the enteries of column I with appropriate entries of column II

Each entry in column I may have one or more than one correct option

from column II .

	Column I	Column II
(A)	Magnesium	$(p) p-$ Block
(B)	Aluminium	(q) Metal
(c)	Arsenic	(r) s- Block
(D)	Iodine	(s) Metalloid

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Competition Focus Jee Main And Advanced Medical Entrance Integer Type Question Vi

1. The answer to each of the following questions is a single digit integer ranging from 0 to 9.:

How many period are present in the Long form of the periodic table

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2. The answer to each of the following questions is a single digit integer ranging from 0 to 9. It the correct answers to the questions numbers A, B, C and S (say) are 4, 0,9 and 2 respectively thent the correct darkening of

bubbles should be us shown on the side :

Total number of elements present in the 2nd short period is

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3. The answer to each of the following questions is a single digit integer ranging from 0 to 9. It the correct answers to the questions numbers A, B, C and S (say) are 4, 0,9 and 2 respectively thent the correct darkening of bubbles should be us shown on the side :

The number of groups which constitute p- block elements is / are

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4. The answer to each of the following questions is a single digit integer ranging from 0 to 9. It the correct answers to the questions numbers A, B, C and S (say) are 4, 0,9 and 2 respectively thent the correct darkening of bubbles should be us shown on the side :

How many of the following elements are s- block elements

$Rb, A1, B, K, S, Cd, Zn, Th, Sr.$

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5. The answer to each of the following questions is a single digit integer ranging from 0 to 9. It the correct answers to the questions numbers A, B, C and S (say) are 4, 0,9 and 2 respectively thent the correct darkening of bubbles should be us shown on the side :

How many series of elements constitute f- block elements

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6. The answer to each of the following questions is a single digit integer ranging from 0 to 9.

On the Pauling scale the electronegativity of fluorine is.

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Competition Focus Jee Main And Advanced Medical Entrance Assertion Reason Type Question Type I

1. For the following questions enter the correct numerical value (in decimal -notation , truncated / rounded - off to the second decimal place e.g., 6.25 , 7.00 -0.33,- 30,30.27 , - 127 .30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

The amount of energy released when 1×10^{10} atoms of chlorine in vapour state are converted to $C1^-$ ions according to the equation,

$C1(g) + e^-$ to $C1^-$ (g) " is $57.86 \times 10^{-1} J$

Calculate the electron gain enthalpy of chlorine atom in terms of eV per atom.

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2. The questions given below contain statement -1 (Assertion) and statement -2 (Reason) . It has four options (a), (b) , (c) and (d) out of which ONLY ONE is correct . Choose the correct option as.

Statement -1 . Sixth period is the longest period in the periodic table.

Statement -2 . Sixth period involves the filling of all the orbitals of the sixth energy level

A. Statement -1 is True Statement -2 is True , Statement -2 is 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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3. The questions given below contain statement -1 (Assertion) and statement -2 (Reason) . It has four options (a), (b) , (c) and (d) out of which ONLY ONE is correct . Choose the correct option as.

Statement - 1 . The elements having $1s^2 2s^2 2p^6 3s^2$ and $1s^2 2s^2$

configuration belong to the same group

Statement -2 . Both have same number of electrons electrons in the valence shell.

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

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4. Assertion: The ionic size of O^{2-} is bigger than that of F^{-} ions.

Reason: O^{2-} and F^{-} are isoelectronic ions.

A. Statement -1 is True Statement -2 is True , Statement -2 is 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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5. The questions given below contain statement -1 (Assertion) and statement -2 (Reason) . It has four options (a), (b) , (c) and (d) out of which ONLY ONE is correct . Choose the correct option as.

Statement -1. The ionic radii follows the order : $I^- < I < I^+$

Statement -2 . Smaller the value of z/e larger the size of the species .

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

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6. The questions given below contain statement -1 (Assertion) and statement -2 (Reason) . It has four options (a), (b) , (c) and (d) out of which ONLY ONE is correct . Choose the correct option as.

Statement -1 . Of all the elements helium has the highest value of first ionization enthalpy

Statement-2 Helium has the most positive electron gain enthalpy of all the element s.

A. Statement -1 is True Statement -2 is True , Statement -2 is correct explanation for Statement -5

B. Statement -1 is True Statement -2 is True , Statement -2 is not a correct explanation for Statement -5

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

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

Answer: C

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Competition Focus Jee Main And Advanced Medical Entrance Assertion Reason Type Question Type Ii

1. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion .Helium and beryllim have similar outer electronic configuration

of the type ns^2

Reason . both are chemcially inert .

A. Statement -1 is True Statement -2 is True , Statement -2 is correct explanation for Statement -5

B. If both assertion and reason are true but reason is not the true explanation of the assertion

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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2. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion. The element with electronic configuration $[Xe]^{54}4f^15d^16s^2$ is

d- block element

Reason . the last electron enters the d-orbital.

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3. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion . When the atoms of first transition series ionize the 4s- orbital electrons are ionized before the 3d- orbital electrons .

Reason . The energy of 3d- orbital electron is lower than that of 4s-orbital electronic .

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4. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion Na^+ and $A1^{3+}$ are isoelectronic but the magnitude of the

ionic radius of $A1^{3+}$ is less than that of Na^{+}

Reason . The magnitude of effective nuclear charge of the outer shell electrons in $A1^{3+}$ is greater than in Na^{+}

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5. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion .The ionization of s- electron requires more energy than ionization of p- electron of the same shell

Reason. s- electrons are closer to the nucleus than p- electrons and hence are more strongly attracted by the nuclues .

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6. Assertion: The first ionisation enthalpy of aluminium is lower than that of magnesium.

Reason : Ionic radius of aluminium is smaller than that of magnesium.

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7. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion . The first ionization energy of Be is greater than that of B.

Reason . 2p- Orbitals is lower in energy than 2s- orbital.

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8. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion. First ionization energy for nitrogen is lower than that of oxygen .

Reason . Across a period effective nuclear charge decreases.

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9. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion . F atom has less negative electron gain enthalpy than C1 atom.

Reason . Additional electrons are repelled more effectively by 3p-electrons in C1 than by 2p- electrons in F atom

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10. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion . Noble gases have positive electron gain enthalpy.

Reason. Noble gases have stable closed shell electronic configuration .

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11. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion .F is more electronegative than C1 .

Reason . F has higher electron affinity than C1.

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12. In each of the following questions a Statement of Assertion (A) is given followed by a corresponding statement of Reason (R) Just below it . Of the statement mark the correct answer as

Assertion . The highest oxidation state of Os is + 8.

Reason . Osmium is a 5d- block element .

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