CHEMISTRY

BOOKS - MODERN PUBLISHERS CHEMISTRY (HINGLISH)

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Example

1. What would be the IUPAC name and symbol of 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. Elements with $Z = 107, 108$ and 109 have been made recently. Indicate the groups to which they belong.

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

$Si, Be, Mg, Na, P.$

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5. 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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6. (a) Elements, A, B, C and D have atomic numbers $12, 19, 29 \text{ and } 36$ respectively. On the basis of electronic configuration, write to which group of the periodic table each element belongs.

(b) Predict the blocks to which these elements can be classified. Also predict their periods and groups.

(c) Which of these are representative elements ?

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7. The electronic configurations of some elements are given below:

(i) $1s^2 2s^2 2p^6 3s^1$

(ii) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3s^1$

(iii) $1s^2 2s^2 2p^3$

(iv) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

(v) $1s^2 2s^2 2p^6 3s^2 3p^5$

(vi) $1s^2 2s^2 2p^6 3s^2 3p^3$

(vii) $1s^2 2s^2 2p^6$

(viii) $1s^2 2s^2 2p^6 3s^2 3p^4$

Name the elements. Out of these which

1. is an alkaline earth metal

2. has lowest chemical reactivity

3. belong to group 15 of the periodic table

4. is a transition element

5. is halogen

6. belong to p-block

7. belong to second period.

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8. 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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9. (a) What do you understand by isoelectronic species ? Give the formula of a species that will be isoelectronic with the following atoms or ions :

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

(b) Which of the following species are isoelectronic ?

$(i) F^-, (ii) Mg^{2+}, (iii) Na, (iv) F, (v) Cl^-$

$(vi) Al^{3+}, (vii) Ne, (viii) S^{2-}$

$(ix) Ca^{2+} (x) K$

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

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11. Which of the following atoms and ions are isoelectronic ?

$(i)Al^{3+}$ $(ii)F$ $(iii)Cl^{-}$

$(iv)O^{2-}$ $(v)Na$ $(vi)Mg^{2+}$

Arrange the isoelectronic ions in the decreasing order of their size.

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12. Arrange the following ions in the increasing order of their size: $Be^{2+}, CI^{-}, S^{2-}, Na^{+}, Mg^{2+}, Br^{-1}$?

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13. Which of the following pair would have larger size?

a.K or $K^{\oplus}$

b.Br or $Br^{\ominus}$

c.O^{2-} or $F^{\ominus}$

d.$Li^{\oplus}$ or $Na^{\oplus}$

e.P or As

f.$Na^{\oplus}$ or Mg^{2+}

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14. 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 $495 kJ \text{mol}^{-1}$ (Atomic mass of Na = 23)

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15. 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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16. The first ionization enthalpy $(\Delta_t H)$ values of the third period elements, Na, Mg and Si are respectively 496, 737 and $786 kJmol^{-1}$. Predict whether the first $\Delta_t H$ valye for Al will be more close to 575 or $760 kJmol^{-1}$? Justify your answer.

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17. 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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18. Which of the following pairs of elements would have a more negative electron gain enthalpy?

a. O or F, b.F or Cl

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19. 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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20. The amount of energy when million atoms of iodine are completely converted into I^- ions in the vapour state according to the equation,$I_{(g)} + e^-$ toI^- _ $((g))$ is $4.9X10^{-13}$ J.What would be the electron gain enthalpy of iodine in terms of KJ mol^{-1} and eV per atom?

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21. 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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22. Which of the following pairs would have a higher negative electron gain enthalpy ?

$(i) N \text{ or } O \quad (ii) F \text{ or } Cl$

$(iii) Br \text{ or } I \quad (iv) B \text{ or } Al$

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23. Which of the following will have the most nagative electron gain enthalpy and which the least negative ?

P, S, Cl, F

Explain your answer.

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24. 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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25. The oxidation state and valency of Al in $\left[AlCl(H_2O)_5\right]^{2+}$

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26. Show by a chemical reaction with water that Na_2O is a basic oxide and Cl_2O_7 is an acidic oxide.

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Practice Problems

1. Write the name and deduce the atomic numbers of the following atoms :

(i) The third alkali metal.

(ii) Second transition element.

(iii) The fourth noble gas.

(iv) Fourth element in the second period.

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2. The outer electronic configurations of some elements are :

$(i) 3s^2 3p^4 \quad (ii) 3d^{10} 4s^2$

$(iii) 3s^2 3p^6 4s^2 \quad (iv) 6s^2 4f^3$

State to which block in the periodic table each of these elements belong.

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3. How many element are present in the third period of the p-block elements ?

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4. Complete the following statements :

(a) The are ..... periods in the long form of the periodic table.

(b) The s block element having highest atomic mass is .....

(c) The elements Cu Ag and Au are called ..... metals.

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5. An element X belongs to the third period of the p- block elements. It has 4 electrons in the outermost shell. Name the element.

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6. Which family of elements has the electronic configuration ns^2np^4 ?

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

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8. Arrange the following elements in decreasing order of metallic character:

$K, Mg, B, Al.$

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

B, C, Si, N and $F.$

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10. $Rn(Z = 86)$ is the last noble gas discovered. Predict what wil be the atomic number of the next noble gas to be discovered. Write its symbol.

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11. Arrange the following in order of increasing radii:

$(i) I, I^+ I^-$ $(ii) N, O, P$ $(iii) F, ClBr$

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12. For each of the following pairs, state which one is large in size:

(a) Li, F

(b) O, Se

(c) Fe^{2+}, Fe^{3+}

(d) Br, Br^-

(e) Na^+, F^-

(f) K, K^+

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13. Account for the difference in size of $Na^{+}[0.095nm]$ and $mg^{2+}[0.065nm]$ both of which have the same noble gas configuration.

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14. Arrange each pair of ions in order of increasing ionic radius :

$(a)Mg^{2+}$ and $Al^{3+}(b)O^{2-}$ and $S^{2-}(c)O^{2-}$ and F^{-}

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15. A boy has reported the radii of Cu, Cu^{+} and Cu^{2+} as $0.096nm, 0.122nm$ and $0.072nm$ respectively. However, it has

been noticed that he interchanged the values by mistake. Assign the correct values to different species.

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16. Arrange the following ions in the order of increasing size :

$Be^{2+}, Cl^{-}, S^{2-}, Na^{+}, Mg^{2+}, Br^{-}$

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17. Which of the following species has the smallest size?

(a) $K^{\oplus}, Sr^{2+}, Ar$, (b) Si, P, Cl , (c) $O, O^{\ominus}, O^{2-}$

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18. The electronic configuration for some neutral atoms are given below.

A: $1s^2 2s^2$, B: $1s^2 2s^2 2p^3$

C: $1s^2 2s^2 2p^4$, D: $1s^2 2s^2 2p^6 3s^1$

In which of this electronic configuration would you expect to have highest (a) IE_1 and (b) IE_2.

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19. For each of the following pairs which has greater IE and why?

a. Li, $Li^{\oplus}$, b. K, Br , c. Br, I , d. $Na^{\oplus}$, Ne

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20. The ionisation potential of hydrogen is $13.60eV$. Calculate the energy required to produce one mole of $H^{\oplus}$ ion $\left(1eV = 96.3kJmol^{-1}\right)$.

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21. Among the elements Li, K,Ca, S and Kr , which one is expected to have the lowest first ionization enthalpy and which one has the highest first ionization enthalpy ?

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22. From each set, choose the element with highest ionization enthalpy and explain your answer.

B,Al,Ga

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23. Which of the following electronic configurations has the lowest value of ionisation energy? Explain.

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

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

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

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24. S has more negative electron gain enthalpy than O why ?

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25. S has more negative electron gain enthalpy than O why ?

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26. The electron gain enthalpies of halogens are as given below:

$F = -332, CI = -349, Br = -324, I = -295 kJmol^{-1}$

. The less negative value for F as compared to that of CI is due to:

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Conceptual Questions

1. On the basis of quantum numbers, justify that the fourth period of the Modern periodic table should have 18 elements.

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

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

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5. Give the general electronic configurations of

(i) p-block (ii) actinoids

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6. 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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7. What would be the IUPAC name and symbol for the element with atomic no .120 ?

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8. What is the name and symbol of the element with atomic number 112?

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9. What is the name and symbol of the element with atomic number 112?

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

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12. The electron gain enthalpies of halogens are as given below: $F = -332, CI = -349, Br = -324, I = -295 kJmol^{-1}$. The less negative value for F as compared to that of CI is due to:

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13. Magnesium loses electrons successively to form Mg^{+}, Mg^{2+} and Mg^{3+} ions . Which step will have the highest ionisation energy and why ?

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14. Out of Na and Mg which has higher second ionisation energy?

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15. Which is the smallest among $Na^{\oplus}, Mg^{2+}, Al^{3+}$, and why?

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16. Arrange the following in the order of increasing ionization potential

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17. The electronic configuration for the following neutral atoms are given for use in question.

(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) $1s^2 2s^2 2p^5$

(e) $1s^2 2s^2 2p^6$

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

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18. 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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19. 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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20. Identify the best choice in the list:

(i) Largest ionic size : $Mg^{2+}, Ca^{2+}, Ba^{2+}$

(ii) Smallest size : I^{+}, I^{-}, I

(iii) Highest negative electron gain enthalpy: Br, Cl, F

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

B, C, N, O

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22. Which of the following has highest ionization energy

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23. Arrange the following in the increasing order of the size . Cl^-, Cl, Cl^+.

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24. A student reported the radii of $Al^{3+}, Mg^{2+}, \text{ and } F^-$ as 136 pm, 65 pm and 50 pm respectively. Is the order correct ? Comment.

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25. Among the elements Li, K,Ca, S and Kr , which one is expected to have the lowest first ionization enthalpy and which one has the highest first ionization enthalpy ?

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26. The IE_1 and $IE_2\left(kJmol^{-1}\right)$ of three elements A, B and C are given below :

	A	B	C
IE_1	400	550	1150
IE_2	2650	1070	2090

Identify the elements which represent (a) an alkali metal, (b) an alkaline earth metal or (c) non-metal.

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27. Among the elements, B, Al, C and Si,

a) which element has the highest first ionisation enthalpy?

b) which element has the most metallic character? Justify your answer in each case,

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28. Which of the following species has the smallest size?

(a) $K^{\oplus}, Sr^{2+}, Ar$, (b) Si, P, Cl , (c) $O, O^{\ominus}, O^{2-}$

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29. The first (IE_1) and second (IE_2) ionisation enthalpies $\left(\mathrm{kJ\ mol^{-1}}\right)$ of a few elements designated by Roman numerals are shown below.

	IE_1	IF_2		IE_1	IE_2
I	2372	5251	II	520	7300
III	900	1760	IV	1680	3380

Which of the above element is likely to be:

a reactive non-metal

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30. 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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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 Mendeleev's periodic law and the Modern periodic law?

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4. On the basis of quantum numbers, justify that the fourth period of the Modern periodic table should have 18 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

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8. Why do elements in the same period have different physical and chemical properties? What about elements in the same group?

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

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10. How do atomic radius generally vary in a period and in a group for s-and $p-$ block elements ? 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.

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

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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 $-2.18 \times 10^{-18} J$. Calculate the ionisation enthalpy of atomic hydrogen in terms of $kJmol^{-1}$.

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 kJ mol^{-1}) of group 13 elements are:

B	Al	Ga	In	Tl
801	577	579	558	589

How would you explain this deviation from the general trend ?

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

a. O or F, b.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 :

$(i) ns^2np^4$ for $n=3$

(ii) $(n-1)d^2ns^2$ for $n=4$

(iii) $(n-2)f^7(n-1)d^1ns^2$ for $n=6$ in the periodic table.

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31. Identify the position of the elements having outer electronic configuration:

(a)ns^2np^5 for n = 3

(b) $(n-1)d^2ns^2$ for n = 4

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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. Aluminum 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.

Answer: C

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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-subshell.

B. The d-block has 8 columns, because a maximum 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.

Answer: B

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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.

Answer: C

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36. The size of isoelectronic species $F^{\ominus}$, Ne, and $Na^{\oplus}$ is affected by

A. nuclear charge (Z)

B. valence principal quantum number (n)

C. electron-electron interaction in the outer orbitals

D. none of the factors because their size is the same.

Answer: A

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37. Which one of the following statement is incorrect

A. Ionization enthalpy increases for each successive electron.

B. The greatest increase in ionization enthalpy is experienced on removal of electron from core noble gas

configuration.

C. End of valence electrons is marked by a big jump in ionization enthalpy.

D. Removal of electron from orbitals bearing lower n value is easier than from orbital having higher n values.

Answer: D

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

A. $B > Al > Mg > K$

B. $Al > Mg > B > K$

C. $Mg > Al > K > B$

D. $K > Mg > Al > B$

Answer: D

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39. Considering the elements B, C, N, F and Si, the correct order of their non-metallic character is ?

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

B. $Si > C > B > N > F$

C. $F > N > C > B > Si$

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

Answer: C

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40. Considering the elements F, Cl, O and N, the correct order of their chemical reactivity in terms of oxidising property is

A. $F > Cl > O > N$

B. $F > O > Cl > N$

C. $Cl > F > O > N$

D. $O > F > N > Cl$

Answer: B

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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 screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is

* Thinking process

To solve question, keep in mind that shielding effect represent the repulsive force felt by the valnece shell from the electrons presents in the inner shells.

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. $Na < Mg > Al < Si$

B. $Na > Mg > Al > Si$

C. $Na < Mg < Al < Si$

D. $Na > Mg > Al < Si$

Answer: A

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5. The electronic configuration of gadolinium (At. No 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 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 electrons 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

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. $F > Cl > Br > I$

B. $F < Cl > Br < I$

C. $F < Cl < Br > I$

D. $F < Cl < Br > I$

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 one of the following is correct order of the size of iodine 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. additional of electron in oxygen results in larger 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.

Answer: C

Watch Video Solution

12. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table The element with atomic number 57 belongs to

A. s-block

B. p-block

C. d-block

D. f-block

Answer: C

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13. 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

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

A. $7s^2 7p^6$

B. $5f^{14} 6d^{10} 7s^2 7p^6$

C. $4f^{14} 5d^{10} 6s^2 6p^6$

D. $4f^{14} 5d^{10} 6s^2 6p^4$

Answer: C

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14. In the modern period table, elements are arranged in order of increasing atomic number which is related to the electric configuration. Depending upon the type of orbitals receving the last electron, the elements in the periodic table have been diviced into four blocks viz s,p,d and f. The modern periodic table consists of 7 periods and 18 groups. Each period being with the filling of a new energy shell. In according with the Aufbua 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 lanthanodis and actionoids are placed at the bottom of the main body of the periodic table.

Which of the elements whose atomic numbers are given below,

cannot be accommodated in the present set up of the long form of the pariodic table?

A. 107

B. 118

C. 126

D. 102

Answer: C

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15. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table

have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table The electronic configuration of the element which is just above the element with atomic number 43 in the same group is

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 3s^2$

B. $1s^2 2s^2 2p^6 3s^2 2p^6 3d^5 4s^3 4p^6$

C. $1s^2 2s^2 2p^6 3s^2 3p^2 3d^6 4s^2$

D. $1s^2 2s^2 2p^8 3s^2 3d^1 4s^2$

Answer: A

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16. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table The elements with atomic numbers 35,53 and 85 are all

A. noble gases

B. halogens

C. heavy metals

D. light metals

Answer: B

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17. 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. $1s^2 2s^2 2p^6$

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

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

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

Answer: A

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Ncert File Ncert Exemplar Problems Mcqs Ii

1. Electronic configuratios of four elements A, B, C and D are given below:

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

Which of the following is the correct order of increasing tendency of gain electron:

A. $A < C < B < D$

B. $A < B < C < D$

C. $D < B < C < A$

D. $D < A < B < C$

Answer: B::C

Watch Video Solution

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

A. Be

B. P

C. S

D. B

Answer: A::C

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3. 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::D

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

A. $3, 3353, 87$

B. $2, 10, 22, 36$

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

D. $9, 35, 51, 88$

Answer: A::D

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5. Which of the following elements will gain one electron more readily in comparison to other elements of their group?

A. S (g)

B. Na (g)

C. O (g)

D. Cl (g)

Answer: A::C

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6. Which of the following statements are correct ?

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

B. Chlorine has less negative electron gain enthalpy that fluorine.

C. Meercury and bromine are liquid at room temperature.

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

Answer: B::C

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

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

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

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

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

Answer: B::C

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8. In which of the following options order of arrangement does not agree with the variating 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. $I < Br < Cl < K < Rb$ (increasing electron gain enthalpy)

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

Answer: B::C

View Text Solution

9. Which of the following have no unit?

A. Electronegativity

B. Electron gain enthalpy

C. Ionisation enthalpy

D. Metallic character

Answer: A::D

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10. 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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11. 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-metallic.

Answer: A::C

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Ncert File Ncert Exemplar Problems Short Answer Questions

1. Explain why the electron gain enthalpy of fluorine is less negative than that of chlorine.

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2. All transition elements are d-block elements, but all d-block elements are not transition elements. Which the following is true.

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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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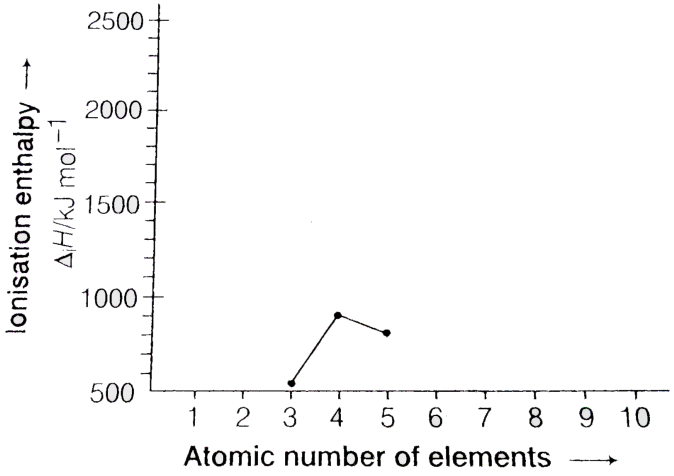
4. Ionisation enthalpies of elements of second period are given below Ionisation enthalpy/k cal mol^{-1}, 520,899,801,1086,1402,1314, 1681, 2080. Match the correct enthalpy with the elements and complete the graph given in

the figure. Also write symbols of elements with their atomic number.



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

a) which element has the highest first ionisation enthalpy?

b) which element has the most metallic character? Justify your answer in each case,

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6. Choose the correct order of atomic redii of flourine and neon (in pm) out of the options given below and justify your answer.

$(i) 72, 160 \quad (ii) 160, 160$

$(iii) 72, 72 \quad (iv) 160, 72$

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

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9. 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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10. p-block elements form acidic, basic and amphoteric oxides. Explain each property by giving two examples and also write the reactions of these oxides with water.

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

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13. 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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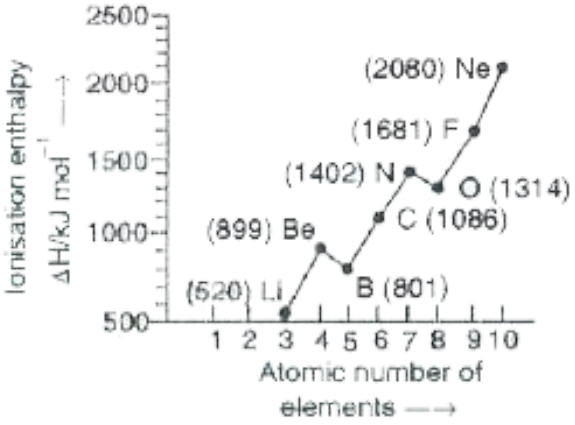
14. Explain the deviation in ionization enthalpy of some elements from the general trend by using Fig. 2.



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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 File Ncert Exemplar Problems Matching Type Questions

1. Match the correct radius with the element:

Element	*Atomic radius (pm)*
(*i*) Be	(A) 74
(*ii*) C	(B) 88
(*iii*) O	(C) 111
(*iv*) B	(D) 77
(*v*) N	(E) 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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Revision Exercise True Or False Question

1. The elemnts cerium $(Z = 58)$ and neptunium $(Z = 93)$ belong to f-block elements.

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2. The electron gain enthalpy of oxygen is _____ that of sulphur.

Watch Video Solution

3. 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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4. Chlorine is the most electronegative element in the periodic table.

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5. In isoelectronic species Cl^-, Ar, Ca^{2+} size differ due to

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6. The first ionization enthalpy of O is lower than that of N.

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

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8. Among O, O^-, O^{2-} select a species which has smallest radius and give reason.

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9. Why does phosphorous has higher ionization enthalpy than sulphur?

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10. S has more negative electron gain enthalpy than O why ?

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11. The electron gain enthalpies of noble gases are positive.

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12. Which of the following has the highest negative electron gain entahlpy ?

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Revision Exercise Fill In The Blanks Questions

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

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2. The element with highest electronegativity is

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

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4. All lanthanoids and actinoids belong to ..... Block of elements.

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5. During the addition of second electron to oxygen, energy is .....

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6. The outer electronic configuration of an element with atomic number 104 is ..... and it belongs to ..... block.

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7. The IUPAC name of undiscovered element with atomic number 122 is ..... and its symbol is.....

Watch Video Solution

8. The element having the configuratino : $(n-1)d^2ns^2$ for $n=4$ belonhgs to group ..... and period .....

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9. The p-block has .....columns and d-block has ..... Columns in the periodic table.

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Revision Exercise Assertion Reason Questions

1. Assertion: The first ionisation enthalpy of aluminium is lower than that of magnesium.

Reason : Ionic radius of aluminium is smaller than that of magnesium.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

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

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

Answer:

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2. Statement 1: N_2 and NO^+ are both dia-magnetic.

Statement 2: NO^+ is isoelectronic with N_2

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3. Assertion: F atom has a less negative electron affinity than CI atom.

Reason: Additional electrons are repelled more effectival by $3p$ electrons in CI atom than by $2p$ electrons in F atom.

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4. Assertion: The first ionization energy of Be is greater than that of B.

Reason: 2p-orbital is lower in energy than 2s-orbital.

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5. Assertion (A): The size decreases in the order $O^{2-} > Mg^{2+} > Al^{3+}$

Assertion (R): In isoelectronic ions, the size decreases with increase in nuclear charge.

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6. 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.

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7. 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.

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Revision Exercise Very Short Answer Questions

1. How many groups are there in p-block elements and d-block elements ?

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2. State Modern periodic law.

Watch Video Solution

3. How does ionisation enthalpy of the elements very as we move across the period from left to right ?

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4. Noble gase have zero electron gain enthalpy values. Explain.

Watch Video Solution

5. Which is large Na^+ or K^+ ? Why ?

Watch Video Solution

6. ELECTRON GAIN ENTHALPY

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7. Write the electronic configuration of an element with atomic number 17. To which block does this element belong ?

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8. What are transition elements ? Name two transition elements,

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

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10. What is similar about electronic structure of Li, Na and K ?

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11. How many elements are present in the first transition series ?

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12. Name two inner transition elements.

Watch Video Solution

13. Which of the following elements are transition elements ?

Ni, Ar, Ca, Fe, Cr, Pb

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

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16. Why does ionization energy decreases down the group?

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17. Write the IUPAC name and symbol for an element having atomic number 113.

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18. Name two species which are isoelectronic with Cl^-.

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Revision Exercise Very Short Answer Questions Carrying 2 Or 3 Marks

1. What is the basic difference in approach between the mendeleev's periodic law and the modern periodic law?

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

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

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4. How does atomic radius vary in a period and in a group? How do you explain the variation?

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

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6. Why the third period of Modern periodic table contains 8 elements and not 18?

Watch Video Solution

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

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8. What are transition elements ? Which of the following are not transition elements ?

$Cu(Z = 29), S(Z = 16), Ga(Z = 31), Pd(Z = 46), U(Z = 92).$

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9. Write the electronic configurations for the elements with atomic number 15, 21 and 37. To which blocks in the periodic table do these elements belong ?

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10. Predict the periods and blocks to which each of the following elements belongs ?

(i) $\_ (13)Al$

(ii) $\_(24)Cr$

(iii) $\_(29)Cu$

(iv) $\_(11)Na$

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11. What is ionization energy ? How does it change in a period as well as in a group ?

Watch Video Solution

12. Which element has the lowest first ionization energy?

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13. Which of the following electronic configurations has the lowest value of ionisation energy? Explain.

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

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

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

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

Watch Video Solution

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

number of valence electron is

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16. How would you explain the fact that the first ionization enthalpy of Lithium is lesser than that of Beryllium but its second ionization enthalpy is greater than that of Beryllium?

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

a. gains an electron

b. loses an electron

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

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

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20. 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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21. ELECTRON GAIN ENTHALPY

Watch Video Solution

22. How does atomic radius of an element vary across a period from left to right ?

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23. Statement-1: The atomic radii of the elements of the oxygen family are smaller than the atomic radii of the corresponding elements of the nitrogen family.

Statement-2: The members of the oxygen family are more electronegative and thus have lower values of nuclear charge than those of the nitrogen family.

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24. What are isoelectronic ions ? Account for the decrease in size of the following isoelectronic ions :

$O^{2-} - > F^{-} > Na^{+} > Mg^{2+}$

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25. Ionisation Enthalpy

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26. Fe^{2+} and Fe^{3+} can be distinguished by

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

a. O or F, b.F or Cl

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28. Write the electronic configuration of the element with atomic number of $9, 11, 21$ and 36. Predict the folloiwng from these configurations:

(a) Which of them has the lowest ionisation potential ?

(b) Which of them has the highest electron gain enthalpy ?

(c) Which of them are non-metals?

(d) Which of them has zero electron gain enthalpy ?

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29. What do you underrstand by negative value of electro-gain enthalpy of an element?

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30. Water is a compound and not a mixture. Justify the statement giving two reasons.

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31. The number of elements in the 4th period of periodic table is

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32. The number of valence electrons in Aluminium is

Watch Video Solution

33. Are some essential elements more important than others? Explain.

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34. Which has greater ionisation energy and why-S or P?

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

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36. For the second period elements the correct increasing order of first io0nization enthalpy is:

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37. Why are lanthanides and actinides place at the bottom of the periodic table?

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38. Why are cations smaller than neutral atom?

Watch Video Solution

39. Which of the following properties show gradual decrease with increase in atomic number across a period in the periodic table?

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

Watch Video Solution

41. Oxides formed by p-block elements may be

(i) basic

(ii) acidic

(iii) amphoteric

(iv) neutral

Watch Video Solution

42. 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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43. What do you understand by the terms

(i) Ionization enthalpy

(ii) Electron gain enthalpy?

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44. The ionization potential (I_1) of nitrogen $(Z = 7)$ is more than oxygen $(Z = 8)$. This is explained with

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45. Explain the term electron gain enthalpy. Discuss the factors which influence its value.

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

Watch Video Solution

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

Watch Video Solution

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

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49. 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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50. 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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51. 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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52. Why does ionization energy decreases down the group?

Watch Video Solution

53. The first ionization enthalpy of magnesium is higher than that of sodium. On the other hand, the second ionization enthalpy of sodium is very much higher than that of magnesium. Explain.

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54. 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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55. Explain the terms ionization enthalpy and electron gain enthalpy.

Watch Video Solution

56. Why are lanthanides and actinides place at the bottom of the periodic table?

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Revision Exercise Long Short Answer Questions

1. What is modern periodic law ? Discuss the main features of the long form of the periodic table. Give its important advantages and disadvantages.

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2. What is ionization enthalpy ? On what factors does it depend ? How does ionisation enthapy of the elements very as we move down a group and along a period ?

Watch Video Solution

3. The electronic configuration of few elements is given below. Mark the statement which is not correct about these elements.

(i) $1s^2 2s^2 2p^6 3s^1$

(ii) $1s^2 2s^2 2p^5$

(iii) $1s^2 2s^2 2p^6$

(iv) $1s^2 2s^2 2p^3$

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

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5. Which of the following elements has the most negative electron gain enthalpy?

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6. Among the elements of second period Li to Ne pick out the element:

a. with the highest first ionisation energy

b. with the highest electronegativity

c. with the largest atomic radius

d. that is most reactive non-metal

e. that is most reactive metal

f. with valency equal to 4.

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

	IE_1	IE_2
I	2370	5250
II	520	7300
III	900	1800
IV	1700	3400

Which of the above elements is likely to be :

a. A reactive metal

b. A reactive non-metal

c. a noble gas

d. A metal that forms a stable binary halide of the formula AX_2 ($X =$ the halogen).

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8. Among the elements of the third period (Na to Ar), pick out the element

with the highest first ionization enthalpy.

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9. Discuss the following terms and account for the variation in groups and periods of the Periodic Table :

(i) Electron gain enthalpy

(ii) Ionization enthalpy.

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Competition File Objective Type Questions A Mcqs

1. In the long form of the perodic table, physical and chemical properties of the elements are a periodic function of their _____ .

A. atomic size

B. atomic mass

C. electronegativity

D. atomic number.

Answer: D

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2. The maximum number of elements in 3^{rd} period is :

A. 8

B. 18

C. 32

D. between 8 and 18

Answer: A

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

A. $7, 15$

B. $6, 12$

C. $9, 17$

D. $3, 12$

Answer: D

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4. The transition elements have a general electronic configuration:

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

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

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

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

Answer: C

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5. The tendency to form complexes is maximum for

A. s-block elements

B. p-block elements

C. d-block elements

D. none of these

Answer: C

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6. A element with atomic number 112 has recently been named as compernicim. It is named in honour odf scientist astronomer Nicolaus Copernicus. Which of the following statement about this element is not correct ?

A. it belongs to d-block

B. Iht belongs to 12th group

C. Its electronic configuration in $[En]5f^{14}6d^{10}7s^2$

D. It belongs to 6th period

Answer: D

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

A. Carbon family and $[Rn]5f^{14}6d^{10}7s^27p^2$

B. Oxygen family and $[Rn]5f^{14}6d^{10}7s^27p^4$

C. Nitrogen family and $[Rn]5f^{14}6d^{10}7s^27p^6$

D. Halogen family and $[Rn]5f^{14}6d^{10}7s^27p^5$

Answer: A

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8. The fourth period of the p-block contains :

A. 6 elements

B. 8 elements

C. 10 elements

D. 18 elements

Answer: A

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9. Elements 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: $1s^2 2s^2 2p^6 3s^2 3p^2$

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?

A. A and D

B. C and D

C. A and B

D. A and D

Answer: C

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10. An element 'X' belongs to the third period of the p-block elements. It has four electrons in the outermost shell. The name of the element is

A. Aluminium

B. Silicon

C. Germanium

D. Sulphur

Answer: B

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11. Which of the following properties generally decrease along a period ?

A. atomic size

B. Negative electron gain enthalpy

C. Ionisation enthalpy

D. Atomic volume

Answer: A

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12. The correct order or radii of three species Ca, Ca^+ and Ca^{2+} is :

A. $Ca > Ca^+ > Ca^{2+}$

B. $Ca^{2+} > Ca^{+} > Ca$

C. $Ca^{+} > Ca > Ca^{2+}$

D. $Ca^{+} > Ca^{2+} > Ca$

Answer: A

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13. In the ions P^{3-}, S^{2-} and Cl, the increasing order of size is:

A. Cl^{-}, S^{2-}, P^{3-}

B. P^{3-}, S^{2-}, Cl^{-}

C. S^{2-}, Cl^{-}, P^{3-}

D. S^{2-}, P^{3-}, Cl^{-}

Answer: A

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14. In general, the properties that decrease and increase down a group in the periodic table, respectively, are :

A. Ionisation enthalpy

B. Eectronegativity

C. Reducing nature

D. Electron gain enthalpy

Answer: C

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15. The ionisation energy of nitrogen is more than that of oxygen because

A. greater attraction of nucleus for the electrons

B. the extra stability of half filled p-orbitals

C. smaller size of the nitrogen atom

D. more penetrating effect.

Answer: B

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16. The correct order of increasing radii of the elements Si, Al, Na and P is

A. Ai, Al, P, Na

B. Al, Si, P, Na

C. P, Si, Al, Na

D. Al, P, Si, Na

Answer: C

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17. Which of the following electronic configurations corresponds to the element with the highest electron affinity?

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

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

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

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

Answer: C

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18. In which of the following pairs, the first atom or ion is not larger than the second ?

A. K, K^+

B. S, O

C. Br, Br^-

D. N, O

Answer: C

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19. The family of elements with the highest ionisation enthalpy :

A. alkaline earth metals

B. halogens

C. noble gases

D. alkali metals

Answer: C

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20. Which of the following has largest negative electron gain enthalpy ?

A. F

B. Cl

C. Br

D. I

Answer: B

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21. The main anion O^- is isoelectronic with

A. N^{2-}

B. F^-

C. N^{3-}

D. Ne

Answer: A

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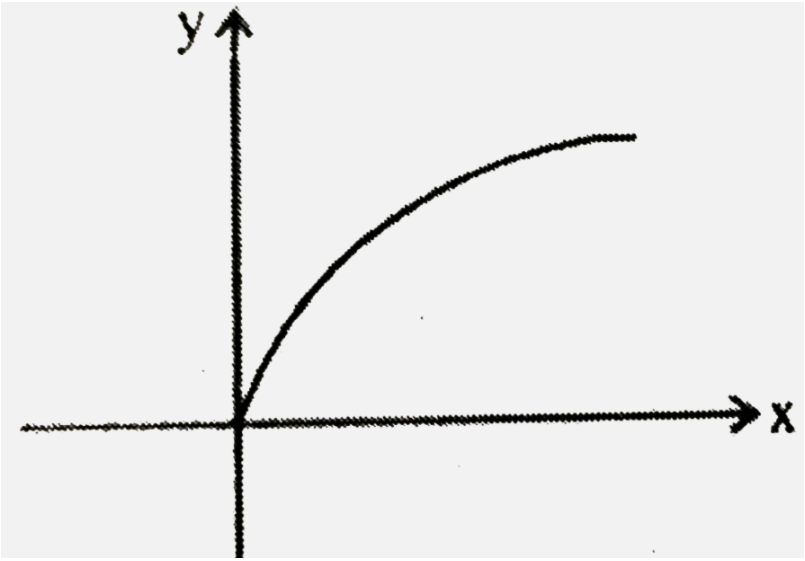
Competition File Objective Type Questions B Mcqs

1. 

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2. The set representing the correct order of ionic radius is

A. $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

B. $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$

C. $Li^{4+} > Na^+ > Mg^{2+} > Be^{2+}$

D. $Mg^{2+} > Be^{2+} > Li^+ > Na^+$

Answer: B

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3. Which of the following sets will have highest hydration energy and highest ionic radii

A. Na and Li

B. Li and Rb

C. K and Na

D. Cs and Na

Answer: B

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4. The first $(\Delta_i H_1)$ and second $(\Delta_i H_2)$ ionization enthalpies $\left(\text{in kJ mol}^{-1}\right)$ and the electron gain enthalpy $(\Delta_{eg} H)\left(\text{in kJ mol}^{-1}\right)$ of the elements I, II, III, IV and V are given below

Element	$\Delta_i H_1$	$\Delta_i H_2$	$\Delta_{eg} H$
I	520	7300	- 60
II	419	3051	-48
III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	+48

the least reactive non - metal and the most reactive metal of these are respectively

A. I and V

B. V and II

C. II and V

D. IV and V

Answer: C

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

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

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

C. $Al^{3+} Mg^{2+} > Na^{+} > f^{-} > O^{2-}$

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

Answer: B

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6. 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: B

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7. Which of the following is the largest in size ?

A. S^{2-}

B. Se^{2-}

C. O^{2-}

D. Te^{2-}

Answer: D

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8. An element belongs to group 15 and third period of the periodic table. Its electronic configuration will be

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

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

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

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

Answer: C

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9. Whicn one fo the following has the lowest ionisation enthalpy ?

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

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

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

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

Answer: B

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10. 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. $F > C > N > B > be$

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

Answer: C

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11. The correct order of decreasing electronegativity values among the element I-beryllium, II-oxygen, III-nitrogen and IV-magnesium is

A. $II > III > I > IV$

B. $III > IV > II > I$

C. $I > I > III > IV$

D. $I > Ii > IV > III$

Answer: A

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12. Considering the elements B, C, N, F and Si, the correct order of their non-metallic character is ?

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

B. $Si > C > B > NgF$

C. $F > N > C > B > Si$

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

Answer: D

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13. 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. $F > Cl > Br > I$

B. $Cl > F > Br > I$

C. $Br > Cl > I > F$

D. $I > Br > Cl > F$

Answer: B

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14. Among the following, the element with highest ionisation potential is

A. C

B. F

C. Be

D. N

Answer:

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

A. $F < N < C < O$

B. $C < N < O < F$

C. $C < O < N < F$

D. $F < O < N < C$

Answer: C

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16. 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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17. The ionic radii of $N^{3-} O^{2-}$, F^-, Na^+ follows the order

A. $N^{3-} > F^- > O^{2-}$

B. $O^{2-} > N^{3-} > F^-$

C. $O^{2-} > F^{-} > N^{3-}$

D. $N^{3-} > O^{2-} > F^{-}$

Answer: D

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

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

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

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

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

Answer: B

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19. Which one of the following sets of ions represents the collection of isoelectronic species?

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

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

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

D. $Na^+, Mg^{2+}, AL^{3+}, Cl^-$

Answer: C

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20. Which of the followng noble gases has the highest positive electron gain enthalpy ?

A. Helium

B. Krypton

C. Argon

D. Neon

Answer: D

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

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

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

Answer: D

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

A. $+2.55eV$

B. $-2.55eV$

C. $-5.1eV$

D. $-10.2eV$

Answer: C

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23. The successive ionization energies (in kJ/mol) for an element are shown below.

E_1	E_2	E_3	E_4	E_5
577	1820	2740	11600	14800

What is the electron configuration of this element?

A. P

B. Mg

C. Si

D. Al

Answer: D

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

A. B

B. Be

C. Mg

D. Al

Answer: B

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

A. $1.71, 1.40 \text{ and } 1.36$

B. $1.71, 1.36 \text{ and } 1.40$

C. $1.36, 1.40 \text{ and } 1.71$

D. $1.36, 1.71 \text{ and } 1.40$

Answer: A

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26. An element X belongs to the fourth period and the fifteenth group of the periodic table. Which one of the following is true regarding the outer electronic configuration of X? It has

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

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

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

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

Answer: D

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27. 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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28. 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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29. The order of electronegativities among N,C, Si and P is

A. $Si < P < C < N$

B. $Si < P < N < C$

C. $P < Si < N < C$

D. $P < Si < C < N$

Answer: A

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30. The group having isoelectronic species is

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

B. O^{-}, F^{-}, Na, Mg^{+}

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

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

Answer: A

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31. 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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32. What is the correct increasing order of ionic atomic radii in the following ?

A. $Si^{4+} < P^{5+} < S^{6+} < Cl^{7+}$

B. $P^{5+} < Si^{4+} < Cl^{7+} < S^{6+}$

C. $Cl^{7+} < S^{6+} < P^{5+} < Si^{4+}$

D. $S^{6+} < P^{5+} < Cl^{7+} < Si^{4+}$

Answer: C

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33. Which element has the highest first ionization potential ?

A. N

B. Ne

C. He

D. H

Answer: C

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34. Which of the following statements is not correct for the periodic classification of elements?

A. The properties of the elements are the periodic function of their atomic numbers.

B. Non-metallic elements are lesser in number than the 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-electrons are filled monotonically with increase in atomic number. (e) Both (c) and (d).

Answer: D

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35. the element with Z=120 (not yet discovered) will be an /a :

A. Inner-transition metal

B. Transition metal

C. Alkaline earth metal

D. Alkali metal

Answer: C

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36. The first ionization enthalpy of the following elements are in the order :

A. $C < N < Si < P$

B. $P < Si < N < C$

C. $P < Si < C < N$

D. $Si < P < C < N$

Answer: D

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37. In general, the properties that decrease and increase down a group in the periodic table, respectively, are :

A. electronegativity and electron gain enthalpy.

B. electronegativity and atomic radius.

C. atomic radius and electronegativity.

D. electron gain enthalpy and electronegativity.

Answer: B

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38. The group number, number of valence electrons, and valency of an element with atomic number 15, respectively, are :

A. 16, 5 and 2

B. 16, 6 and 3

C. 15, 5 and 3

D. 15, 6 and 2

Answer: C

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39. The IUPAC symbol for the element with atomic number 119 would be :

A. unh

B. uun

C. une

D. uue

Answer: D

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40. When the first electron gain enthalpy $\left(\triangle_{eg} H \right)$ of oxygen is $-141 kJ/mol,$ its second electron gain enthalpy is :

A. almost the same as that of the first

B. negative, but less negative than the first

C. a positive value

D. a more negative value than the first

Answer: C

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41. The size of the iso-electronic species Cl^-, Ar and Ca^{2+} is affected by :

A. Azimuthal quantum number of valence shell

B. Electron-electron interaction in the outer orbitals

C. Principal quantum number of valence shell

D. Nuclear charge.

Answer: D

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42. In comparison to B, Be has

A. lesser nuclear charge and greater first ionisation enthalpy

B. lesser nuclear charge and lesser first ionisation enthalpy

C. greater nuclear charge and greater first

D. greater nuclear charge and lesser first ionisation enthalpy.

Answer: A

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43. The element having greatest difference between its first and second ionization energies, is:

A. Ca

B. K

C. Ba

D. Sc

Answer: B

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44. The isoelectronic set of ions is:

A. N^{3-}, Li^{+}, Mg^{2+} and O^{2-}

B. Li^+, Na^+, O^{2-} and F^-

C. F^-, Li^+, Na^+ and Mg^{2+}

D. N^{3-}, O^{2-}, F^- and Na^+

Answer: D

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Competition File Objective Type Questions C Mcqs With More Than One Correct Answer

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

A. $P^{3-}, S^{2-}, Cl^-, K^+$

B. Na^+, K^+, Cl^-, F^-

C. $Ti^{4+}, Sc^{3+}, Cl^- Ar$

D. $O^{2-}, Na^{2+}, F^{-}, Ar$

Answer: A::C

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2. Which of the following statements are not correct ?

A. Germanium was earliner called eka-silicon

B. Moseley interduced the concept of atomic number as the basic of modern periodic law.

C. 14 elements of 5th period are called lanthanoids

D. 4th period begins with rubidium.

Answer: C::D

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3. Which of the following order is not correct for first ionisatin enthalpy ?

A. $C < N$

B. $O < S$

C. $N < O$

D. $Cl < F$

Answer: B::C

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4. Which of the following trend is/are correct?

A. $Na < K < Rb$

B. $I^+ < I^- < I$

C. $Fe^{2+} < Fe^{2+} < Fe$

D. $F < O < N$

Answer: B::C

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5. In which of the following arrangements, the order is correct according to the property indicated aganst it: a)Increasing size: $Al^{3+} > Mg^{2+} > Na^+ > F^-$ b)Increasing $I.E._1$: $B < C < N > O$ c)Increasing $E.A._1$: $I > Br > F > Cl$ d)Increasing metallic radius : $Li > Na > K > Rb$

A. $C < N < O$ Ionization enthalpy

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

C. $Br < F < Cl$ Incrasing negative electron gain enthalpy

D. $Na < K < Rb$ Increasing atomic radius

Answer: A::B

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

A. $[Xe]5d^1 6s^2$

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

C. $[Rn]5f^4 6d^1 7s^2$

D. $[Ar]3d^{10} 4s^1$

Answer: B::C

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7. Which of the following properties is a periodic property?

A. Atomic size

B. Ionisation enthalpy

C. Electron gain enthalpy (negative)

D. Ionic size

Answer: B::C

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8. Which of the following is the correct order of ionisation enthalpy ?

A. $F < Cl < Br$

B. $C < O < N$

C. $B < Al < Ga$

D. $O < S < Se$

Answer: B::D

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Competition File Objective Type Questions C Mcqs Based On The Given Passage Compreshension

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.

The outermost electronic configuration of the most electronegative elements is:

A. N

B. P

C. O

D. C

Answer: A

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2. The properties of the elements such as atomic or ionic radii ionisation enthalpy, electron gain enthalpy and electronegativity are directly or indirectly related to their electronic configuration and are called periodic properties. A part the periodic table is given below :

$$\begin{array}{cccc} C & N & O & F \\ & P & S & Cl \\ & & Se & Br \\ & & & I \end{array}$$

Bromine belongs to period

A. third

B. fourth

C. fifth

D. second

Answer: B

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3. The properties of the elements such as atomic or ionic radii ionisation enthalpy, electron gain enthalpy and electronegativity are directly or indirectly related to their electronic configuration and are called periodic properties. A part the periodic table is given below :

$$\begin{array}{cccc} C & N & O & F \\ & P & S & Cl \\ & & Se & Br \\ & & & I \end{array}$$

The highest negative electron gain enthalpy is of

A. F

B. N

C. S

D. Br

Answer: A

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4. The properties of the elements such as atomic or ionic radii ionisation enthalpy, electron gain enthalpy and electronegativity are directly or indirectly related to their electronic configuration and are called periodic properties. A part the periodic table is given below :

C	N	O	F
	P	S	Cl
		Se	Br
			I

Which of the following has the largest size ?

A. N

B. O

C. S

D. P

Answer: D

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5. The properties of the elements such as atomic or ionic radii ionisation enthalpy, electron gain enthalpy and electronegativity are directly or indirectly related to their

electronic configuration and are called periodic properties. A part the periodic table is given below :

$$\begin{array}{cccc} C & N & O & F \\ & P & S & Cl \\ & & Se & Br \\ & & & I \end{array}$$

The highest ionisation enthalpy is of

A. P

B. O

C. N

D. S

Answer: C

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6. 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. Electron size :$N > O < F$

B. Ionization enthalpy : $N < O > F$

C. Ionization enthalpy : $N > O > F$

D. Ionic size: $N^{3-} > O^{2-} > F^{-}$

Answer: B

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7. In the modern period table, elements are arranged in order of increasing atomic number which is related to the electric configuration. Depending upon the type of orbitals receving the last electron, the elements in the periodic table have been

diviced into four blocks viz s,p,d and f. The modern periodic table consists of 7 periods and 18 groups. Each period being with the filling of a new energy shell. In according with the Aufbua 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 lanthanodis and actionoids are placed at the bottom of the main body of the periodic table.

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

A. $5f^{14}6d^{10}7s^{2}7p^{0}$

B. $4f^{14}5d^{10}6s^{2}6p^{4}$

C. $4f^{14}6d^{10}6s^{2}6p^{6}$

D. $7s^{2}7p^{6}$

Answer: C

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8. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids,

are placed at the bottom of the main body of the periodic table

The element with atomic number 57 belongs to

A. f-block

B. d-block

C. p-block

D. s-block

Answer: B

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9. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table

have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table The elements with atomic numbers 35,53 and 85 are all

A. halogens

B. heavy metals

C. light metals

D. noble gases

Answer: A

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10. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table The electronic configuration of the element which is just above the element with atomic number 43 in the same group is

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$

B. $1s^2 2s^2 2p^6 3p^6 3d^6 4s^2$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^{204p^6}$

D. $1s^2 2s^2 2p^6 3p^6 3d^5 4s^2$

Answer: D

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11. In the modern periodic table, elements are arranged in order of increasing atomic numbers, which is related to the electornic configuration. Depending upon the type of orbitals receiving the last electron, the elements in the periodic table have been divided into four blocks, viz, 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 principal, 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 lanthanoids and actinoids, are placed at the bottom of the main body of the periodic table Which of the element whose atomic numbers are given below, cannot be accommodated in the present set up of the long form of the periodic table ?

A. 118

B. 107

C. 102

D. 126

Answer: D

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Competition File Matrix Match Type Questions

1. Column-I and Column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II. Each entry of column-I may have the matching with one or more than one entries of column-II.

Column-I	Column-II
(A) Mond's process	(P) $Cr_2O_3 + 2Al \xrightarrow{\Delta} 2Cr + Al_2O_3$
(B) van Arkel process	(Q) $TiCl_4 + 2Mg \xrightarrow{\Delta} Ti + 2MgCl_2$
(C) Thermite process	(R) $Ni(CO)_4 \xrightarrow{\Delta} Ni + 4CO$
(D) Kroll's process	(S) $ZrI_4 \xrightarrow{\Delta} Zr + 2I_2$

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2. Column-I and Column-II contains four entries each. Entries of column-I are to be matched with some entries of column-II. Each entry of column-I may have the matching with one or

more than one entries of column-II.

Column-I		Column-II
(A) Metal which occur in the native state in nature is	(P)	Hg
(B) The oxides of metal that can be commercially reduced by Aluminothermic reduction process is	(Q)	Ti
(C) van Arkel method is used for preparing ultrapure metal of	(R)	Cr
(D) Auto reduction process is employed for the sulphide ore of	(S)	Ag

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3. Column-I and Column-II contains four entries each. Entries of Column-I are to be matched with some entries of Column-II. One or more than one entries of Column-I may have the matching with the same entries of Column-II and select the correct answer using the code given below the Columns

Column-I		Column-II	
(A)	Reversible cooling of an ideal gas at constant volume	(p)	$w = 0; q < 0; \Delta U < 0$
(B)	Reversible isothermal expansion of an ideal gas	(q)	$w < 0; q > 0; \Delta U > 0$
(C)	Adiabatic expansion of non-ideal gas into vaccum	(r)	$w = 0; q = 0; \Delta U = 0$
(D)	Reversible melting of sulphur at normal melting point	(s)	$w < 0; q > 0; \Delta U = 0$

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Unit Practice Test

1. Why is the electron gain enthalpy of O or F less than that of S or Cl?

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

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

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

Answer: D

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2. Assertion: Nitrogen has higher ionization enthalpy than oxygen.

.Reason: Oxygen has stable half filled configuration .

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

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

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

Answer: B

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3. Which of the following is correct set of ionisation enthalpy ?

A. $Si < S < P$

B. $F < Cl > Br$

C. $B < C > N$

D. $N > O < F$

Answer: A

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4. Which of the following electronic configuration has highest negative electron gain enthalpy ?

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

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

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

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

Answer: A

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5. The correct set of decreasing ionic size is

A. $Be^{2+} > Mg^{2+} > S^{2-} > Cl^-$

B. $S^{2-} > Cl^- > Na^+ > Mg^{2+}$

C. $Cl^- > S^{2-} > Mg^{2+} > Be^{2+}$

D. $S^{2-} > Cl^- > Mg^{2+} > Na^+$

Answer: B

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6. The size of species I, I^+ and $I^{\ominus}$ decrease in the order.

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7. Arrange the elements: B, Al, Mg and K in the decreasing order of metallic character.

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8. 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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9. 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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10. Set of elements having one electron in their valence shell is : —

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11. Consider the ground state electronic configuration given below:

$A: 1s^2 2s^2 2p^5$

$B: 1s^2 2s^2 2p^4$

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

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

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

Which of the above configuration corresponds to element having

(A) largest atomic size.

(B) having highest ionisation enthalpy.

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

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

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