CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

PERIODIC PROPERTIES

Level I Eamcet Exercise I

1. Which of the following pair of elements are from the same group of the periodic table

A. Mg,Cs

B. Mg,Sr

C. Mg,Cl

D. Na,Cl

Answer: B

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2. Elements of a vertical group have

A. Same atomic number

B. Same electronic configuration

C. Same number of valency electrons

D. Same number of core electrons

Answer: C

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3. The general electronic configuration of elements of carbon family

A. ns^2np^4

B. ns^2np^3

C. ns^2np^1

D. ns^2np^2

Answer: D

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4. Outer shell 'octet' configuration is observed for the elements of the group

A. 2

B. 8

C. 18

D. 32

Answer: C

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5. The starting element of fifth period is

A. K

B. Rb

C. Kr

D. Xe

Answer: B

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6. Element with atomic number 15 and mass number 31 is present in

A. group 5 and period 4

B. group 5 and period 3

C. group 15 and period 3

D. group 15 and period 4

Answer: C

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7. In the periodic table, the elements are arranged in the periods following the

A. Hund's rule of maximum multiplicity

B. Pauli's exclusion principle

C. Aufbau principle

D. Both (1) and (2)

Answer: C

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

A. 11,20

B. 12,30

C. 13,31

D. 14,33

Answer: C

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9. As per the modern periodic law, the physical and chemical properties of elements are periodic functions of their

A. atomic number

B. electronic configuration

C. atomic weight

D. atomic size

Answer: B

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

A. 4

B. 3

C. 2

D. 1

Answer: A

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

A. First group

B. Third group

C. Fifth group

D. Seventh group

Answer: C

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12. The number of periods present in the long form of the periodic table

A. 6

B. 7

C. 8

D. 18

Answer: B

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13. The electronic configuration of group III elements is

A. ns^2np^3

B. ns^2np^5

C. ns^2np^1

D. ns^2np^2

Answer: C

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14. The total number of gaseous elements are

A. 8

B. 9

C. 10

D. 11

Answer: D

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15. In a period, elements are arranged in strict sequence of

A. Decreasing charges in the nucleus

B. Increasing charges in the nucleus

C. Constant charges in the nucleus

D. Equal charges in the nucleus

Answer: B

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16. The general electronic configuration of d-block elements is

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

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

C. $ns^{1-2}(n-1)d^{1-9}$

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

Answer: A

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17. Identify the correctly matched set among the following

A. Scandium-d-block-representative element

B. Lanthanum-d-block-innertransition element

C. Cerium-f-block-transition element

D. Actinium-d-block-transition element

Answer: D

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18. The representative elements get the nearest inert gas configuration

A. losing electrons

B. gaining electrons

C. sharing electrons

D. losing or gaining or sharing electrons

Answer: D

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19. In transition elements, the shells that are incompletely filled

A. Ultimate shell only

B. Penultimate shell only

C. Both ultimate and penultimate shells

D. Outermost three shells

Answer: C

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20. The characteristic properties of transition elements are due to

A. Unpaired electrons in d-subshell

B. d-orbitals have five fold degeneracy

C. Presence of 2 nodal planes for d-orbital

D. Because they belong to d-block

Answer: A

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21. Rare earths are generally

A. Actinides

B. f-Block elements

C. Inner transition elements

D. Lanthanides

Answer: D

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22. Lanthanum element with z = 57 belongs to

A. s-block

B. p-block

C. d-block

D. f-Block

Answer: C

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23. In the periodic table transition elements begin with

A. Scandium

B. Zinc

C. Copper

D. Mercury

Answer: A

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24. Inert gas element which has a different valence shell configuration

A. Xe

B. Ne

C. Kr

D. He

Answer: D

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25. Atomic numbers of actinides are

A. 57 to 71

B. 80 to 103

C. 58 to 71

D. 90 to 103

Answer: D

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Level I Eamcet Exercise Ii

1. Which of the following set contains pair of elements that do not belong to same group but show chemical resemblance ?

A. Hf,Zr

B. K,Rb

C. Be,Al

D. B,Al

Answer: C

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2. The size of species I, $I^{\oplus}$ and $I^{\ominus}$ decreases in the order

A. $I^{\oplus} > I^{\ominus} > I$

B. $I^{\ominus} > I > I^{\oplus}$

C. $I^{\ominus} > I^{\oplus} > I$

D. $I > I^{\oplus} > I^{\ominus}$

Answer: B

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3. The correct order of increasing radii are

A. $Be^{2+}, Mg^{2+}, Na^{\oplus}$

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

C. $O^{2-}, F^{\ominus}, N^{3-}$

D. S^{2-}, O^{2-}, As^{3-}

Answer: A

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4. Atomic radii of fluorine and neon (Å) respectively are given as

A. 0.72,1.60

B. 1.60 , 1.60

C. 0.72, 0.72

D. 1.60,0.72

Answer: A

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5. Consider the isoelectronic series $K^{\oplus}, S^{2-}, Cl^{\ominus}, Ca^{2+}$, the radii of the ions decrease

A. $Ca^{2+} > K^{\oplus} > Cl^{\ominus} > S^{2-}$

B. $Cl^{\ominus} > S^{2-} > K^{\oplus} > Ca^{2+}$

C. $S^{2-} > Cl^{\ominus} > K^{\oplus} > Ca^{2+}$

D. $K^{\oplus} > Ca^{2+} > S^{2-} > Cl^{\ominus}$

Answer: C

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6. Among the isoelectronic species the correct order of ionic size is

A. $Mg^{2+} < Na^{+} < O^{2-} < N^{3-}$

B. $N^{3-} < Na^{+} < O^{2-} < Mg^{2+}$

C. $O^{2-} < Mg^{2+} < N^{3-} < Na^{+}$

D. $Mg^{2+} < Na^{+} < N^{3-} < O^{2-}$

Answer: A

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7. Among the following, atomic radius is highest for

A. La

B. Ce

C. Eu

D. Lu

Answer: C

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8. Among the following pairs, in which one from first species to second species decrease in radius is maximum

A. C^{4-}, N^{3-}

B. C,N

C. Ti,V

D. Ce,Pr

Answer: A

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9. In which of the following pairs size of 1^{st} element is higher as compare to India?

A. Sc,Zn

B. Sc,La

C. Cu,Ag

D. Hf,La

Answer: A

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10. If the ionic radii of $M^{\oplus}$ and $X^{\ominus}$ are about 135 pm, then expected values of metallic radii of M and X should be respectively

A. 65 and 230 pm

B. 230 and 60 pm

C. 230 and 135 pm

D. 135 and 135 pm

Answer: B

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11. In which of the following pairs, both species have not nearly the same size ?

A. Mg^{2+}, Al^{3+}

B. $K^{\oplus}, F^{\ominus}$

C. $Li^{\oplus}, Mg^{2+}$

D. $Rb^{\oplus}, S^{2-}$

Answer: A

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12. Among the elements A, B, C and D having atomic numbers 7,8,9 and 12 the element having smallest size is _____

A. A

B. B

C. C

D. D

Answer: C

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

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

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

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

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

Answer: A

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

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

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

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

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

Answer: A

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15. The correct arrangement of increasing atomic radius among Na, K, Mg, Rb

A. $Mg < K < Na < Rb$

B. $Mg < Na < K < Rb$

C. $Mg < Na < Rb < K$

D. $Na < K < Rb < Mg$

Answer: B

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16. Ionic radii of

A. $Ti^{4+} < Mn^{7+}$

B. $.^{35}Cl^{-} < .^{37}Cl^{-}$

C. $K^{+} > Cl^{-}$

D. $P^{3+} > P^{5+}$

Answer: D

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17. The atomic radius of F, Br, and I are 64, 114, and 138 pm respectively. From this information (and not your book) estimate a reasonable atomic radius of Cl.

A. 53 pm

B. 89 pm

C. 126 pm

D. 169 pm

Answer: B

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18. The elements in which of the following have most nearly the same atomic radius

A. Be,B,C,N

B. Ne,Ar,Kr,Xe

C. Mg,Ca,Sr,Ba

D. Cr,Mn,Fe,Co

Answer: D

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19. Which of the following best helps to account for the fact that the F ion is smaller than the O^{2-} ion?

A. F^- has a larger nuclear mass than O^{2-}

B. F^- has a larger nuclear charge than O^{2-}

C. F^- has greater charge than ion O^{2-}

D. F^- has more electrons than O^{2-}

Answer: C

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20. Use the periodic table to predict which element has the largest atomic radius.

A. H

B. He

C. Fr

D. Rn

Answer: C

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Level I Eamcet Exercise Iii

1. Configuration of the element with the highest ionisation energy is

A. $[Ne]3s^1$

B. $[Ne]3s^23p^3$

C. $[Ne]3d^{10}4s^24p^3$

D. $[Ne]3s^23p^4$

Answer: B

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2. When Lithium vapour is taken in a discharge tube and the potential difference between the electrodes is 5.4 ev, there is a sudden increase in the flow of current. The ionisation energy of Lithium is

A. 54 ev

B. 520 kJ mol^{-1}

C. $54\mathrm{kJ}\ \mathrm{atom}^{-1}$

D. 5.4 ev atom^{-1}

Answer: D

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3. Which of the following transition involves maximum amount of energy?

A. $M_{(g)}^{-} \rightarrow M_{(g)}$

B. $M_{(g)} \rightarrow M^{+}_{(g)}$

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

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

Answer: D

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4. The first ionisation potential is maximum for

A. Lithium

B. Uranium

C. Iron

D. Hydrogen

Answer: D

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5. The lowest first ionization energy would be associated with which of the following configurations.

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

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

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

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

Answer: A

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6. The maximum tendency to form unipositive ion is for the element with the electronic configuration

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

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

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

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

Answer: B

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7. As one moves along a given row in the periodic table, ionisation energy

A. Remains same

B. Increasing from left to right

C. First increases and then decreases

D. decreases from left to right

Answer: B

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8. First four ionisation energy values of an element are 191, 578, 872 and 5972 K.Cals The number of valence electrons in the element is

A. 4

B. 3

C. 1

D. 2

Answer: B

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9. Ionisation potential values of Li, Be and B are respectively in kJ mol^{-1}

A. 801, 899, 520

B. 520, 801, 899

C. 899, 801, 520

D. 520, 899 , 801

Answer: D

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10. Screening effect is not common for the elements of the period

A. 7

B. 3

C. 1

D. 4

Answer: C

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11. Electron affinity is

A. Energy required to take out an electron from an isolated gaseous atom

B. The tendency of an atom to attract an electron towards itself

C. Energy absorbed when an electron is added to an isolated atom in gaseous state

D. Energy released when an electron is added to an isolated atom in the gaseous state

Answer: D

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12. The property of an element that is not normals determined directly but is obtained indirectly using Born-Haber cycle

A. Ionisation potential

B. Electron affinity

C. Electronegativity

D. Metallic character

Answer: B

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13. Electron affinity is measured in

A. No units

B. kcal mol^{-1}

C. kJ mol^{-1}

D. Both (2) and (3)

Answer: D

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14. Which of the following is an endothermic process?

A. First electron affinity of chlorine

B. Second electron affinity of oxygen

C. Formation of NaCl from gaseous ions

D. Hydration of $MgCl_2$

Answer: B

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15. In a period from left to right, electron affinity

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: A

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16. Configuration that shows the highest energy released when an electron is added to the atom

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

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

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

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

Answer: C

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17. Electron affinity of Fluorine is less than that of Chlorine because

A. Electronegativity of Fluorine is more

B. 2p sub shell of F is smaller

C. Chlorine is a stronger oxidant

D. Bond dissociation energy of F_2 is less

Answer: B

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18. Among chalcogens electron affinity is highest for

A. O

B. S

C. Se

D. Te

Answer: B

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19. The element with highest electron affinity is

A. Fluorine

B. Cesium

C. Helium

D. Chlorine

Answer: D

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20. Incorrect statement is

A. Fluorine has the highest electron affinity

B. Greater the nuclear charge, greater is the electron affinity

C. The electron affinity of Nitrogen is positive (energy is absorbed)

D. Chlorine has highest electron affinity

Answer: A

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21. Pauling's electronegativity is based on

A. Electron affinity

B. Ionisation potential

C. Both IP and EA

D. Bond energies

Answer: D

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22. Pauling's electronegativity values for elements are useful in predicting

A. Polarity of the molecules

B. Position in the E.M.F. series

C. Coordination numbers

D. Dipole moments

Answer: A

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23. Correct relation among X_A, X_B, and Δ, where X_A, and X_B are the electronegativities of elements A and B.

A. $X_A + X_B = 0.208\sqrt{\Delta}$

B. $\sqrt{X_A - X_B} = 0.208x\Delta$

C. $X_A - X_B = 0.208\sqrt{\Delta}$

D. $X_A - X_B = \sqrt{0.208x\Delta}$

Answer: C

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24. Reference element for Pauling's electronegativity is

A. H

B. C

C. Cl

D. He

Answer: A

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25. Electronegativity of an element is the average of its ionisation energy and electron affinity according to

A. Pauling

B. Rutherford

C. Bohr

D. Mulliken

Answer: D

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26. The electronegativity values according to Mulliken scale are ____ times to those in Pauling scale

A. 0.208

B. 2

C. 2.8

D. 544

Answer: C

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27. Electronegativity on Mulliken scale is limited to

A. Monovalent atoms

B. bivalent atoms

C. Both monovalent and bivalent atoms

D. All multivalent atoms

Answer: A

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28. If I and E are ionisation energy and electron affinity of an element in kJ mole^{-1} electronegativity is given as

A. $\frac{I+E}{2}$

B. $\frac{I+E}{5.6}$

C. $\frac{I+E}{129}$

D. $\frac{I+E}{544}$

Answer: D

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29. In a period electronegativity is highest for

A. Chalcogen

B. Halogen

C. Inert gas

D. Alkali metal

Answer: B

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30. The values that are useful in writing chemical formulae and in calculation of oxidation states are

A. Ionisation potential

B. Electron affinity

C. Electronegativity

D. Metallic character

Answer: C

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Level I Eamcet Exercise Iv

1. The stable oxidation state of Thallium, a IIIA group element is

A. $+1$

B. $+3$

C. -3

D. $+5$

Answer: A

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2. Maximum oxidation state (+8) is exhibited by

A. Co & Ni

B. Ru & Os

C. Cl & I

D. Te & I

Answer: B

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3. An element has nine positive charges in its nucleus. Its common oxidation state is

A. $+7$

B. $+5$

C. -1

D. $+1$

Answer: C

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4. An element with electronic arrangement as 2, 8, 18, 1 will exhibit the following stable oxidation states

A. $+2$ & +4

B. $+1$ & +2

C. $+2$ only

D. $+1$ only

Answer: B

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5. Basic nature of the oxides of a period from left to right

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: B

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6. Oxide that is most acidic

A. Cl_2O_7

B. SO_3

C. P_4O_{10}

D. N_2O_5

Answer: A

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7. Generally the nature of the non-metal oxides is

A. Basic

B. Acidic

C. Amphoteric

D. Neutral

Answer: B

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8. The outermost electronic configuration of most electropositive element is

A. ns^1

B. ns^2np^2

C. ns^2np^3

D. ns^2np^5

Answer: A

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9. The most electropositive element is

A. I

B. Mg

C. Cs

D. Li

Answer: C

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10. The tendency of an element to lose an electron is called

A. Electronegativity

B. Non-metallic character

C. Electropositive character

D. Electron affinity

Answer: C

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11. Nature of Sb_4O_6 is

A. Acidic

B. Neutral

C. Basic

D. Amphoteric

Answer: D

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12. Chemical similarity between B and Al is due to

A. Diagonal relationship

B. Both belong to same period

C. Similar outer electronic configuration

D. Inert pair effect

Answer: C

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13. Pair of ions with similar ionic radii

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

B. Li^+, Na^+

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

D. Mg^{2+}, K^+

Answer: A

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14. Among the following pairs of elements, the pair that is different from others is

A. Lithium and Magnesium

B. Nitrogen and Phosphorus

C. Beryllium and Aluminium

D. Boron and Silicon

Answer: B

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15. Some statements are given regarding nature of oxides

(i) In second period, nitrogen form strongest acidic oxide

(ii) In third period, sodium forms strongest basic oxide

(iii)Oxides of metalloids are generally amphoteric in nature

A. I and II are correct

B. II and III are correct

C. I and III are correct

D. I, II and III are correct

Answer: D

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16. When an atom of an electronegative element becomes anion, which of the following occurs?

A. It acts as a reducing agent

B. It loses electrons

C. Its ionic radius becomes larger

D. It accepts electrons

Answer: C

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17. On going down a main subgroup in the periodic table (example Li to Cs in IA or Be to Ra in IIA) the expected trend of change in atomic radius is a

A. Continuous increase

B. Continuous decrease

C. An increase followed by decrease

D. An decrease followed by increase

Answer: A

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18. Identify the correct statement

A. Filling of 5d orbital begins with Hf in 5th period

B. Filling of 4f orbital begins with Ce in 6th period

C. Filling of 5d orbital begins with La in 5th period

D. Filling of 4f orbital begins with La in 6th period

Answer: B

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19. Identify the correct order in which the ionic radius of the following ions increases:

(I) F^- , (ii) Na^+ , (III) N^{3-}

A. III,I,II

B. I,II,III

C. II,III,I

D. II,I,III

Answer: D

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20. The atomic radius decreases in a period due to

A. Increase in nuclear attraction

B. Decrease in nuclear attraction

C. Increase in number of electrons

D. Decrease in number of electrons

Answer: A

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21. Among the following, the number of elements showing only one non-zero oxidation state is O,Cl,F,N,P,Sn,Tl,Na and Ti.

A. 1

B. 3

C. 2

D. 4

Answer: C

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Level I Main Exercise I

1. The triad not present in Group VIII of Mendeleeff's table

A. Li, Na, K

B. Fe, Co, Ni

C. Ru, Rh, Pd

D. Os,Ir,Pt

Answer: A

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2. In the periodic table, inversion of atomic weights took place in this pair

A. Argon - Potassium

B. Boron - Scandium

C. Hydrogen - Helium

D. Beryllium - Boron

Answer: A

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3. The period that contains only gaseous elements is

A. 1

B. 2

C. 3

D. 4

Answer: A

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4. The element which belong to 3rd period and IVA group of periodic table is

A. Silicon

B. Carbon

C. Germanium

D. Tin

Answer: A

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5. Assertion: According to Mendeleeff, periodic properties of elements is a function of their atomic masses.

Reason : Atomic number is equal to number of protons

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. Both (A) and (R) are true and (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Answer: B

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6. Pair of elements with the following atomic numbers have the same chemical properties

A. 13 & 22

B. 3 & 11

C. 4 & 24

D. 2 & 1

Answer: B

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7. The sub-shells filled one by one for 4th period elements are

A. 3d,4s and 4p

B. 4s, 4p and 4d

C. 4s, 3d and 4p

D. 3d, 4p and 4s

Answer: C

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8. The starting element and last element in the largest period in modern periodic table are

A. Rb and Xe

B. Cs and I

C. Cs and Rn

D. Fr and Kr

Answer: C

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9. Which of the following has both members from the same period of the periodic table

A. Na,F

B. Mg,Ca

C. Na,Cl

D. Be,Al

Answer: C

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10. Atomic number of nitrogen is 7. The atomic number of the third member in the same family is

A. 23

B. 15

C. 33

D. 51

Answer: C

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11. Element with atomic number 38, belongs to

A. II A group and 5^{th} period

B. II A group and 2^{nd} period

C. V A group and 2^{nd} period

D. III A group and 5^{th} group

Answer: A

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12. Set of elements with the following atomic numbers belong to the same group

A. 9, 16, 35, 3

B. 12, 20, 4, 38

C. 11, 19, 27, 5

D. 24, 47, 42, 55

Answer: B

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

A. Mg-Ba

B. Mg-Na

C. Mg-Cu

D. Mg-Cl

Answer: A

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14. The elements with atomic number 10, 18, 36, 54 and 86 are all

A. Light metals

B. Inert gases

C. Halogens

D. Rare earths

Answer: B

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15. Which of the following pairs has elements containing same number of electrons in the outermost orbit?

A. N,O

B. Na,Cl

C. Ca,Cl

D. Cl,Br

Answer: D

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16. The period that includes all blocks of elements is

A. 1

B. 2

C. 6

D. 7

Answer: C

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17. Among s-block metals and transition metals, which are more metallic?

A. s-block metals

B. Transition metals

C. Both are equally metallic

D. Cannot be predicted

Answer: A

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18. Element with atomic number 52 belongs to

A. s-block

B. p-block

C. d-block

D. f-block

Answer: B

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19. The general electronic configuration of f-block elements is

A. $ns^2np^6(n-1)d^{0-1}(n-2)f^{1-14}$

B. $ns^2(n-1)d^{0.1}(n-2)f^{1-14}$

C. $ns^2nd^{0.1}nf^{1-14}$

D. $ns^2(n-1)d^{0.1}(n-1)f^{1-14}$

Answer: B

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20. The common oxidation state exhibited by inner transition elements usually in their compounds is

A. $+2$

B. $+3$

C. $+5$

D. 0

Answer: B

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21. The pair of atomic numbers which represent the p-block elements

A. 6,12

B. 7,53

C. 19,35

D. 38,51

Answer: B

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22. Which of the following is an element present in the d-block, but not a transition element?

A. Cd

B. Cu

C. Ca

D. Cr

Answer: A

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23. Which of the following is an alloy of non-transition elements?

A. Elektron

B. Brass

C. Bronze

D. German silver

Answer: A

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24. Common oxidation state of elemental transition metal is

A. $+1$

B. 0

C. $+3$

D. $+2$

Answer: B

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25. Configuration that does not denote a transition element

A. $3d^1 4s^2$

B. $3d^{10} 4s^1$

C. $3d^{10} 4s^2 4p^2$

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

Answer: C

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Level I Main Exercise Ii

1. Which of the following is not a periodic property ?

A. Valency

B. Specific heat

C. Ionisation potential

D. Atomic size

Answer: B

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2. Elements of the same vertical group of the periodic table have

A. same atomic size

B. same electronic configuration

C. same number of electrons in outermost shell of their atoms

D. same number of atoms

Answer: C

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3. The approximate size of an atom is

A. 10^{-6} m

B. 10^{-8} m

C. 10^{-10} m

D. 10^{-12} m

Answer: C

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4. Atomic radius is measured by

A. Mulliken oil drop method

B. Rutherford's α-ray scattering experiment

C. X-ray diffraction technique

D. Electric discharge tube experiment

Answer: C

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5. Atomic radius depends upon

(i) Number of bonds formed by the atom

(ii) Nature of the bonding

(iii) Oxidation state of the atom

A. I and ii

B. ii and iii

C. I and iii

D. I,ii,iii

Answer: D

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6. Covalent bond length of chlorine molecule is 1.98Å. Then covalent radius of chlorine is

A. 1.98 Å

B. 1.7 Å

C. 2.05 Å

D. 0.99 Å

Answer: D

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7. Van der Waal's radius is used for

A. Molecular substances in gaseous state only

B. Molecular substances in solid state only

C. Molecular substances in liquid state only

D. Molecular substances in any state

Answer: B

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8. If the atomic radius of non-metal bromine is 1.14 Å, its covalent radius is

A. 1.14 Å

B. 1.12 Å

C. 1.16 Å

D. 0.57 Å

Answer: A

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9. The covalent and van der Waals radii of chlorine respectively are

A. 1.80 Å & 0.99 Å

B. 0.99 Å & 1.80 Å

C. 1.80 Å & 1.80 Å

D. 0.99 Å & 0.99 Å

Answer: B

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10. In the isoelectronic species the ionic radii (A°) of N^{3-}, O^{2-} and F^{-} are respectively given by

A. 1.36, 1.71, 1.40

B. 1.36, 1.40, 1.71

C. 1.71 , 1.36 , 1.40

D. 1.71 , 1.40 , 1.36

Answer: D

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11. Correct statement among the following is

A. Covalent radius is 40% more than Van der waals radius

B. Van der waals radius is less than covalent radius

C. Van der waals radius is 40% more than covalent radius

D. Radii cannot be compared

Answer: C

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12. Very slight decrease in atomic radius occurs in a transition series when compared with that in representative series. This is due to

A. Shielding effect

B. Penetrating effect

C. Compton effect

D. Inert pair effect

Answer: A

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13. Separation of Lanthanides from their mixture is not easy because of

A. Shielding effect

B. Penetrating effect

C. Consequences of lanthanide contraction

D. Inert pair effect

Answer: C

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14. If the radius of Fe^{++} is $0.76A^{\circ}$, the radius of Fe^{+++} may be

A. $0.64A^\circ$

B. $0.76A^\circ$

C. $0.88A^\circ$

D. $1.08A^\circ$

Answer: A

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15. Among elements with the following electronic configurations, the one with the largest radius is

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

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

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

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

Answer: A

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16. Largest ion among the following is

A. Na^+

B. O^{2-}

C. S^{2-}

D. Cl^-

Answer: C

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17. Which of the following has the largest atomic radius ?

A. Al

B. Si

C. Cl

D. Na

Answer: D

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18. Which of the following order is correct for the size of Fe^{3+}, Fe and Fe^{2+} ?

A. $Fe < Fe^{2+} < Fe^{3+}$

B. $Fe^{2+} < Fe^{3+} < Fe$

C. $Fe < Fe^{3+} < Fe^{2+}$

D. $Fe^{3+} < Fe^{2+} < Fe$

Answer: D

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19. Metallic radius of Ca is 200pm. Covalent radius of Ca is

A. 200 pm

B. 230 pm

C. 280 pm

D. 174 pm

Answer: D

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20. Similarity in the radius of Zr and Hf is explained on the basis of

A. Lanthanide contraction

B. Inert pair effect

C. Same outershell configuration

D. Anomalous configuration

Answer: A

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Level I Main Exercise Iii

1. If the Ionisation potential (I.P.) of Na is 5.48 eV. The I.P. of K will be

A. 4.34 eV

B. 5.68 eV

C. 10.88 eV

D. 5.48 eV

Answer: A

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2. A sudden jump between the values of second and third ionisation energies of an element is associated with configuration

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

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

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

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

Answer: D

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3. Amongst the following elements (whose electronic configurations are given below), the one having the highest first ionization energy is

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

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

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

D. $[Ar]3s^{10}4s^24p^2$

Answer: B

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4. The first ionization energy of Lithium will be

A. Greater than Be

B. Less than Be

C. Equal to that of Na

D. Equal to that of F

Answer: B

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5. Which of the following is true regarding inert pair effect ?

A. due to poor shielding of p orbital

B. due to poor shielding of d & f orbital

C. due to poor shielding of s orbital

D. due to poor shielding of s & p orbital

Answer: B

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6. Generally the ionisation potential in a period increases, but there are some exceptions. The one which is not an exception is

A. Be & B

B. N & O

C. Mg & Al

D. Na & Mg

Answer: D

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7. Element that has the highest first ionisation energy among the following is

A. Ca

B. Mg

C. Al

D. Si

Answer: D

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8. The ionization potential of nitrogen is more than that of oxygen because of

A. the greater attraction of the electrons by the nucleus

B. the extra stability of the half filled p-orbitals

C. the smaller size of nitrogen

D. more penetration effect

Answer: B

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9. Which of the following element has the greatest tendency to lose electrons ?

A. F

B. S

C. Fe

D. Be

Answer: C

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10. Second ionisation potential of oxygen is

A. Equal to that of fluorine

B. Less than that of fluorine

C. Greater than that of fluorine

D. Half of that of fluorine

Answer: C

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11. In which of the following process maximum energy is released

A. $O_{(g)} + e^- \rightarrow O^-_{(g)}$

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

C. $S_{(g)} + e^- \rightarrow S^-_{(g)}$

D. $S^-_{(g)} + e^- \rightarrow S^{-2}_{(g)}$

Answer: C

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12. Ionisation energy of F^- is equal in magnitude with the electron affinity of

A. F^-

B. F

C. F^+

D. F^{2+}

Answer: B

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13. When an electron is added, energy is absorbed in which of the following?

A. C

B. N

C. F

D. O

Answer: B

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14. The correct order of electron affinity of the elements of oxygen family in the periodic table is

A. $O > S > Se$

B. $S > O > Se$

C. $S > Se > O$

D. $Se > O > S$

Answer: C

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15. The I.P of X ion is equal to

A. EA of X

B. EN of X

C. IP of X

D. IP of X^+

Answer: A

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16. Energy is released in the process of

A. $Na_{(g)} \rightarrow Na^+_{(g)} + e$

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

C. $N^{-2}_{(g)} + e \rightarrow N^{-3}_{(g)}$

D. $O_{(g)} + e \rightarrow O^{-}_{(g)}$

Answer: D

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17. Which of the following is the correct order of electron affinity

A. $I > Br > F > Cl$

B. $F < Cl < Br < I$

C. $F > Cl > Br > I$

D. $I < Br < F < Cl$

Answer: D

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18. Pair of elements with equal values of electronegativiy

A. Be,Al

B. Mg,Al

C. Mg,Ca

D. F,Ne

Answer: A

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19. The electronegativity of the following elements increase in the order

A. C,N,Si,P

B. N,Si,C,P

C. Si,P,C,N

D. P,Si,N,C

Answer: C

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20. Two elements A and B have the following electronic configurations. The formula of the compound formed between them can be $A = 1s^2 2s^2 2p^6 3s^2 3p^1, B = 1s^2 2s^2 2p^4$

A. AB

B. AB_2

C. A_2B_3

D. A_3B_2

Answer: C

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21. The formula of a metallic carbonate is MCO_3. The formula of that metallic perchlorate is

A. $MClO_4$

B. M_2ClO_4

C. M_3ClO_4

D. $M(ClO_4)_2$

Answer: D

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22. A metal forms a chloride with the formula MCl_2. Formula of Phosphoric acid is H_3PO_4. Formula of the Phosphate of the metal is

A. M_3PO_4

B. MPO_4

C. $M_3(PO_4)_2$

D. M_2PO_4

Answer: C

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Level I Main Exercise Iv

1. An oxide of an element is a gas and dissolves in water to give an acidic solution. The element belongs to

A. II group

B. IV group

C. VIII group

D. Zero group

Answer: B

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2. Acidic nature of the similar oxides of a group from top to bottom

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: B

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3. Which of the following properties increases across a period ?

A. Reducing property

B. Size of atom

C. Acidic nature of oxides

D. Metallic property

Answer: C

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4. Among the following elements most acidic oxide is given by

A. Al

B. P

C. N

D. Sb

Answer: C

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5. The strongest reducing agent is

A. K

B. Al

C. Mg

D. Br

Answer: A

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6. The more basic oxide is

A. CaO

B. MgO

C. K_2O

D. Na_2O

Answer: C

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7. An element with $1s^2 2s^2 2p^6 3s^2$ electronic arrangement will be forming

A. Acidic oxide

B. Basic oxide

C. Neutral oxide

D. Amphoteric oxide

Answer: B

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8. Diagonal relationship is present between the lighter elements of periods

A. Second, third

B. Second, fourth

C. Third, fourth

D. Third , fifth

Answer: A

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9. The diagonal relationship phenomenon is not observed after

A. I A Group

B. II A Group

C. III A Group

D. IV A Group

Answer: D

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10. The polarising power of which of the following pair is similar

A. Li,Mg

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

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

D. Li^+, Mg^+

Answer: B

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11. Which of the following oxide is amphoteric?

A. CrO

B. Cr_2O_3

C. CrO_3

D. CrO_5

Answer: B

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12. Assertion: Be and Al have similar properties.

Reason : Cations of Be and Al have same polarising power

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

C. Assertion is true but Reason is false

D. Assertion is false but Reason is true

Answer: A

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13. Assertion: Li generally forms covalent compounds

Reason : Li^+ ion is small and has high polarizing power

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

C. Assertion is true but Reason is false

D. Assertion is false but Reason is true

Answer: A

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14. Assertion: As_2O_3 and Sb_2O_3 are amphoteric in nature

Reason : As and Sb are metalliods

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

C. Assertion is true but Reason is false

D. Assertion is false but Reason is true

Answer: A

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15. Assertion: Lithium resembles magnesium in its properties

Reason: The ratio of ionic charge to $(\text{Ionic radius})^2$ is almost same for Li^+ and Mg^{2+}

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

C. Assertion is true but Reason is false

D. Assertion is false but Reason is true

Answer: A

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16. Some statements are given. Among them the correct statements are

(a) IP_2 of sodium is greater than that of Magnesium

(b) IP_2 of lithium is greater than IP_1 of Helium

(c) IP_2 of sodium is greater than IP_1 of Neon

(d) IP_1 of oxygen is greater than that of Nitrogen

A. All are correct

B. Only a,b and c are correct

C. Only a , b are correct

D. Only a, d are correct

Answer: B

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17. Elements X, Y and Z have atomic numbers 19, 37 and 55 respectively. Which of the following statements is true about them?

A. Their ionization potential would increase with increasing atomic number

B. 'Y' would have an ionization potential between those of X and Z

C. Z would have the highest ionization potential

D. Y would have the highest ionization potential

Answer: B

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18. The statement that is false for the long form of the periodic table is

A. It reflects the sequence of filling the electrons in the order of sub energy levels s, p, d and f

B. It helps to predict the stable valency states of the element

C. It reflects trends in physical and chemical properties of the elements

D. It helps to predict the relative ionicity of the bond between any two elements

Answer: B

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19. The compound of vanadium has magnetic moment of 1.73 BM. The vanadium chloride has the formula:

A. VCl_2

B. VCl_3

C. VCl_4

D. VCl_5

Answer: C

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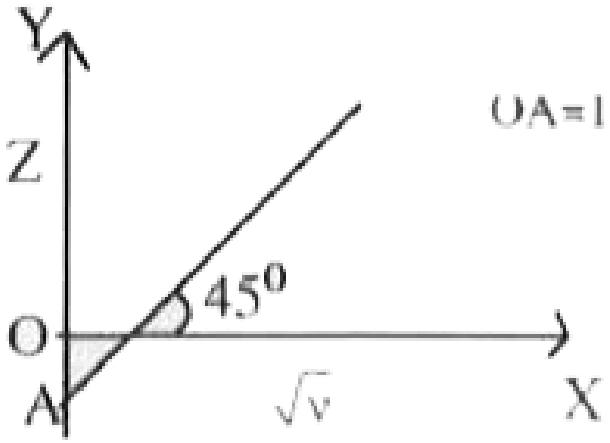
20. The frequency of the characterstic X ray of K_α line of metal target 'M' is 2500 cm^{-1} and the graph between $\sqrt{v}$ Vs 'z' is as follows, then atomic number of M is



A. 49

B. 50

C. 51

D. 25

Answer: C

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21. $(IE)_1$ and $(IE)_2$ of $Mg_{(g)}$ are 740, 1540 kJ mol^{-1} . Calculate percentage of $Mg^{+}_{(g)}$ and $Mg^{2+}_{(g)}$ if 1 g of $Mg_{(s)}$ absorbs 50.0 kJ of energy.

A. $\%\ Mg^{+}$ = 70% $\%Mg^{+2}$ = 30%

B. $\%Mg^{+}$ =68.35% $\%Mg^{+2}$ = 31.65%

C. $\%\ Mg^{+}$ = 72% $\%Mg^{+2}$ = 28%

D. $\%Mg^{+}$ = 60% $\%\ Mg^{+2}$ = 40%

Answer: B

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22. Use (IE) and (EA) listed below to determine whether the following process is endothermic exothermic.

$Mg_{(s)} + 2F_{(g)} \rightarrow Mg^{2+}_{(g)} + 2F^{-}_{(g)}$

$(IE)_1$ of $Mg_{(g)} = 737.7\text{kJ mol}^{-1}$

$(IE)_2$ of $Mg_{(g)} = 1451\text{kJ mol}^{-1}$

(EA) of $F_{(g)} = -328\text{kJ mol}^{-1}$

A. Exothermic

B. Endothermic

C. Both

D. None

Answer: B

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23. If Aufbau rule is not followed, K - 19. will be placed in

A. s-Block

B. p-block

C. d-block

D. f-block

Answer: C

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24. $M_{(g)} \rightarrow M_{(g)}^{+} + e^{-}$, ΔH=100 eV , $M_{(g)} \rightarrow M_{(g)}^{2+} + 2e^{-}$, ΔH=250 eV

Which is incorrect statement ?

A. I_1 of $M_{(g)}$ is 100 eV

B. I_1 of $M_{(g)}^{+}$ is 150 eV

C. I_2 of $M_{(g)}$ is 250 eV

D. I_2 of $M_{(g)}$ is 150 eV

Answer: D

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25. AB is predominantly ionic as A^+B^- if

A. $(IP)_A < (IP)_B$

B. $(EA)_A < (EA)_B$

C. $(EN)_A < (EN)_B$

D. $(IP)_B < (IP)_A$

Answer: C

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Level Ii Type I Lecture Sheet 1 More Than One Correct Answer

1. Which of the following element(s) belongs to halogen group ?

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

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

C. $[Ar]3d^{10}, 4s^2 4p^5$

D. $[Kr]4d^{10}, 5s^2, 5p^5$

Answer: A::C::D

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2. Which of the following statements concerning elements with atomic number 10 is true?

A. forms a covalent network solid

B. element is mono atomic

C. has almost zero value of E.A

D. has very high value of I.P.

Answer: B::C::D

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3. Which of the following outer electronic configurations corresponds to the d-block of the periodic table ?

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

B. $3d^5 4s^1$

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

D. $5d^1 6s^2$

Answer: B::D

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4. Which of the following species have five unpaired electrons ?

A. Cr^{3+}

B. Mn^{2+}

C. Fe^{3+}

D. Cu^{2+}

Answer: B::C

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5. The first element of a group in many ways differ from the other heavier members of the group. This is due to

A. the small size

B. the high electronegativity

C. high ionisation potential

D. the unavailability of d-orbitals

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

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Level Ii Type I Lecture Sheet 1 Linked Comprehension

1. Numerous forms of the periodic table have been devised from time to time. A modern version which is most convenient and widely used is the long or extended from of periodic table. The aufbau principle and the electronic configuration of atoms provide a theoretical foundation for the periodic classification. The horizontal rows are called periods. There are altogether seven periods. The first period consists of 2 elements. The subsequent periods consists of 8, 8,18, 18 and 32 elements respectively. The seventh period is incomplete and like the sixth period would have maximum of 32 elements. Elements having similar outer electronic configurations in their atoms are grouped in vertical columns. These are referred to as groups or families. According to the recommendations of IUPAC, the groups are numbered 1 to 18 replacing the older notation of groups 0, IA, IIA, ...VIIA, VIII, IB.....VIIB. Each successive period in the periodic table is associated with the filling up next higher principal energy level following aufbau sequence. The number of elements in each period is twice the number of atomic orbitals available in the energy level that is being filled. All the elements are classified into four blocks, i.e., s-block, p-

block, d-block, and f-block depending on the type of atomic orbitals that are being filled with electrons.

An element belongs to group 17 with atomic number is 17. What is the atomic number of the element belonging to same group and present in fifth period?

A. 25

B. 33

C. 35

D. 53

Answer: D

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2. Numerous forms of the periodic table have been devised from time to time. A modern version which is most convenient and widely used is the long or extended from of periodic table. The aufbau principle and the electronic configuration of atoms provide a theoretical foundation for

the periodic classification. The horizontal rows are called periods. There are altogether seven periods. The first period consists of 2 elements. The subsequent periods consists of 8, 8,18, 18 and 32 elements respectively. The seventh period is incomplete and like the sixth period would have maximum of 32 elements. Elements having similar outer electronic configurations in their atoms are grouped in vertical columns. These are referred to as groups or families. According to the recommendations of IUPAC, the groups are numbered 1 to 18 replacing the older notation of groups 0, IA, IIA, ...VIIA, VIII, IB.....VIIB. Each successive period in the periodic table is associated with the filling up next higher principal energy level following aufbau sequence. The number of elements in each period is twice the number of atomic orbitals available in the energy level that is being filled. All the elements are classified into four blocks, i.e., s-block, p-block, d-block, and f-block depending on the type of atomic orbitals that are being filled with electrons.

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

A. 3rd period and 3rd group

B. 4 period and 3rd group

C. 3rd period and 2nd group

D. 4th period and 2nd group

Answer: B

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3. Numerous forms of the periodic table have been devised from time to time. A modern version which is most convenient and widely used is the long or extended from of periodic table. The aufbau principle and the electronic configuration of atoms provide a theoretical foundation for the periodic classification. The horizontal rows are called periods. There are altogether seven periods. The first period consists of 2 elements. The subsequent periods consists of 8, 8,18, 18 and 32 elements respectively. The seventh period is incomplete and like the sixth period would have maximum of 32 elements. Elements having similar outer electronic configurations in their atoms are grouped in vertical columns. These are

referred to as groups or families. According to the recommendations of IUPAC, the groups are numbered 1 to 18 replacing the older notation of groups 0, IA, IIA, ...VIIA, VIII, IB.....VIIB. Each successive period in the periodic table is associated with the filling up next higher principal energy level following aufbau sequence. The number of elements in each period is twice the number of atomic orbitals available in the energy level that is being filled. All the elements are classified into four blocks, i.e., s-block, p-block, d-block, and f-block depending on the type of atomic orbitals that are being filled with electrons.

Elements A, B, C, D and E have the following electronic configuration:

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

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

A. A and C

B. A and D

C. A and B

D. A and E

Answer: C

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4. In the modern periodic table, the elements are placed in order to increasing atomic number. These have been numerous designs of the table over the years but the most common is the long form of periodic table. The long form of periodic table shows all the elements in numerical order.

Write the expected ground state electronic configuration of the element with one unpaired 5p electron that forms a covalent compound with fluorine.

A. $[Kr]5s^2, 5p^5$

B. $[Kr]5s^2, 4d^{10}5p^1$

C. $[Kr]5s^2, 4d^{10}, 5p^5$

D. $[Ar]5s^2, 5d^{10}5p^5$

Answer: C

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5. In the modern periodic table, the elements are placed in order to increasing atomic number. These have been numerous designs of the table over the years but the most common is the long form of periodic table. The long form of periodic table shows all the elements in numerical order.

What is the atomic number of the (as yet undiscovered) alkali earth metal after radium?

A. 120

B. 121

C. 124

D. 118

Answer: A

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Level Ii Type I Lecture Sheet 1 Matching

1. Match the atomic number in Column-I , with groups in Column-II

Column-I	Column-II
A) 55	P) VIII
B) 45	Q) IIIB
C) 81	R) IIIA
D) 64	S) IA

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2. Match the following

Column-I	Column-II
A) $1s^2, 2s^2 2p^6, 3s^2 3p^6, 4s^1$.	P) d-block element
B) $1s^2, 2s^2 2p^6, 3s^2 3p^6$	Q) Halogen
C) $1s^2, 2s^2 2p^6, 3s^2 3p^6, 3d^6 .4s^2$	R) Alkali metal
D) $1s^2, 2s^2 2p^5$	S) Noble gas

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Level Ii Type I Practice Sheet 1 More Than One Correct Answer

1. Choose the correct statement(s)

A. The maximum positive oxidation state shown by any element is equal to the total number of electrons (s and p) in valence shell

B. The maximum oxidation state shown by elements in a group is also known as group oxidation number

C. Group oxidation number is the most common or most stable oxidation state for a particular element

D. All the elements in a group form some compounds in which they exhibit their group oxidation number

Answer: A::B

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2. The element Ge belongs to

A. Fourth period

B. p-Block

C. Group 14

D. Inert gases

Answer: A::B::C

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3. Which of the following species will be isoelectronic with Ne?

A. N^{3-}

B. Na^{+}

C. Al^{3+}

D. F^{-}

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

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4. The number of periods present in the long form of the periodic table

A. Atomic weight

B. Atomic number

C. N/P ratio

D. Electronic configuration

Answer: B::D

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5. Chlorine atom does not differ from chloride ion in the number of which of the following?

A. Protons

B. Neutrons

C. Electrons

D. Size

Answer: A::B

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6. It is not possible to measure the atomic radius precisely since the electron cloud surrounding the atom doesnot have sharp boundary. One practical approach to estimate the size of an atom of a non-metallic element is to measure the distance between two atoms when they are bound together by a single bond in a covalent molecule and then dividing by two. For metals we define the term "metallic radius" which is taken as half the internuclear distance separating the metal cores in the metallic crystal. The vander Waal's radius represents the overall size of the atoms which includes its valence shell in a nonbonded situation. It is

the half of the distance between two similar atoms in separate molecules in a solid. The atomic radius decreases across a period and increases down the group. Same trends are observed in case of ionic radius. Ionic radius of the species having same number of electrons depends on the number of protons in their nuclei.

The size of iso electronic species $-F^-$, Na^+ and Mg^{2+} is effected by

A. Nuclear charge

B. Valence principle quantum number (n)

C. Electron - Electron interation in the outer orbitals

D. None of these

Answer: A

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7. It is not possible to measure the atomic radius precisely since the electron cloud surrounding the atom doesnot have sharp boundary. One practical approach to estimate the size of an atom of a non-metallic

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The correct order of radii is

A. $Na < Li < K$

B. $O > S > Se$

C. $Cl < F < Li$

D. $Fe^{3+} < Fe^{2+} < Fe$

Answer: D

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8. It is not possible to measure the atomic radius precisely since the electron cloud surrounding the atom doesnot have sharp boundary. One practical approach to estimate the size of an atom of a non-metallic element is to measure the distance between two atoms when they are bound together by a single bond in a covalent molecule and then dividing by two. For metals we define the term "metallic radius" which is taken as half the internuclear distance separating the metal cores in the metallic crystal. The vander Waal's radius represents the overall size of the atoms which includes its valence shell in a nonbonded situation. It is the half of the distance between two similar atoms in separate molecules in a solid. The atomic radius decreases across a period and increases down the group. Same trends are observed in case of ionic radius. Ionic radius of the species having same number of electrons depends on the number of protons in their nuclei.

Atomic radii of the noble gases are larger than the precedent elements of the same periods because

A. Atomic radius of a noble gas is expressed as vander Waal's radius

B. Valence shell electron are completely filled so there is interelectronic repulsions

C. Both (a) and (b)

D. None

Answer: C

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9. It is not possible to measure the atomic radius precisely since the electron cloud surrounding the atom doesnot have sharp boundary. One practical approach to estimate the size of an atom of a non-metallic element is to measure the distance between two atoms when they are bound together by a single bond in a covalent molecule and then dividing by two. For metals we define the term "metallic radius" which is taken as half the internuclear distance separating the metal cores in the metallic crystal. The vander Waal's radius represents the overall size of

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Which of the following statement is correct?

A. Metallic radius refer to metals only and is greater than covalent radius

B. Metallic radius refer to metals only and is smaller than covalent radius

C. Generally covalent radius refer to non-metals as well as metals in bonded state (covalent bond)

D. Atomic radii of noble gases are expressed as vander Waal's radii which are smaller than metallic radii

Answer: A

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10. It is not possible to measure the atomic radius precisely since the electron cloud surrounding the atom doesnot have sharp boundary. One practical approach to estimate the size of an atom of a non-metallic element is to measure the distance between two atoms when they are bound together by a single bond in a covalent molecule and then dividing by two. For metals we define the term "metallic radius" which is taken as half the internuclear distance separating the metal cores in the metallic crystal. The vander Waal's radius represents the overall size of the atoms which includes its valence shell in a nonbonded situation. It is the half of the distance between two similar atoms in separate molecules in a solid. The atomic radius decreases across a period and increases down the group. Same trends are observed in case of ionic radius. Ionic radius of the species having same number of electrons depends on the number of protons in their nuclei.

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

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

B. $N^{3-}, O^{2-}, Na^{+}, Mg^{2+}, Al^{3+}$

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

D. both (a) and (b)

Answer: D

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11. Match the following

Column-I (Atom)	Column-II (IUPAC group no. in periodic table)
A) With atomic number = 29	P) 1
B) Having electronic configuration $[Kr]5s^2 4d^{10}$	Q) 11
C) Which form ion with $3s^2$, $3p^6$, $3d^{10}$ configuration of outermost shell after the removal of 3 electrons	R) 2
D) In which last entered electron have $n = 4, l = 0, m = 0, s = \pm 1/2$ set of	S) 12
	T) 13

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12. Match the following

Column-I	Column-II
A) 7^{th} period	P) Transition elements
B) IIIB group	Q) Inner transition elements
C) IA	R) Hydrogen
D) VIIA	S) Halogens

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Level Ii Type I Lecture Sheet 2 More Than One Correct

1. Thenumber of factors that influence the ionisation energy

A. the size of the atom

B. the charge on the nucleus

C. how effectively the inner shell electrons screen the nuclear charge

D. type of orbital in which electron is present

Answer: A::C::D

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2. Which of the following is the correct order of electron affinity

A. $S > O^-$

B. $O^- < S^{--}$

C. $O^- > S^{--}$

D. $N^- > P$

Answer: A::B

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3. The correct statement(s) among the following is (are)

A. first ionization potential of Al is less than the first ionization potential of Mg

B. second ionization potential of Mg is greater than the second ionization potential of Na

C. first ionization potential of Na is less than the first ionization potential of Mg

D. third ionization potential of Mg is greater than the third ionization potential of Al

Answer: A::C::D

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4. The process in which liberation of energy associated in the

A. $F \rightarrow F^-$

B. $H \rightarrow H^-$

C. $Cl \rightarrow Cl^-$

D. $O \rightarrow O^{2-}$

Answer: A::B::C

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5. In which of the following arrangements, the order is correct according to the property indicated against it ?

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

B. $B < C < N < O$ - increasing first ionization enthalpy

C. $I < Br < F < Cl$- increasing electron gain enthalpy (with negative sign)

D. $Li < Na < K < Rb$ - increasing metallic radius

Answer: A::C::D

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Level Ii Type I Lecture Sheet 2 Comprehension

1. The minimum amount of energy required to remove the most loosely bound electron from an isolated atom in the gaseous state in known as ionisation energy or ionisation enthalpy (IE_1) of the element. The energy required to remove the second electron from the monovalent cation is called second ionisation enthalpy (IE_2). Similarly, we have third, fourth ..... inonisation enthalpies. The values of ionisation energy depends on a number of factors such as (i) size of the atom (ii) screening effect (iii) nuclear charge (iv) half filled and fully filled orbitals (v) shape of orbital. In a group, the ionisation energy decreases from top to bottom. In a period, the value of ionisation energy increases from left to right.

Compared to the second ionisation energy of an atom, the third ionisation

A. the same

B. greater

C. smaller

D. half

Answer: B

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2. The minimum amount of energy required to remove the most loosely bound electron from an isolated atom in the gaseous state in known as ionisation energy or ionisation enthalpy (IE_1) of the element. The energy required to remove the second electron from the monovalent cation is called second ionisation enthalpy (IE_2). Similarly, we have third, fourth ..... inonisation enthalpies. The values of ionisation energy depends on a number of factors such as (i) size of the atom (ii) screening effect (iii) nuclear charge (iv) half filled and fully filled orbitals (v) shape of orbital. In a group, the ionisation energy decreases from top to bottom. In a period, the value of ionisation energy increases from left to right.

In a period, the ionisation energy is lowest for the :

A. noble gases

B. Halogen

C. alkaline earth metals

D. alkali metals

Answer: D

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The first ionisation energy of Mg, Al, P and S follows the order:

A. $Mg < Al < P < S$

B. $Al < Mg < P < S$

C. $Al < Mg < S < P$

D. $Mg < Al < S < P$

Answer: C

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4. The first $(\Delta_i H_1)$ and the second $(\Delta_i H_2)$ ionisation enthalpies in kJmol^{-1} and the electron gain enthalpy $\left(\Delta_{eg} H\right)$ in kJmol^{-1} of a few elements are given below:

Elements	$\Delta_i H_1$	$\Delta_i H_2$	$\Delta_{eg} H$
(P)	520	7300	-60
(Q)	419	3051	-48
(R)	1681	3374	-328
(S)	1008	1846	-295
(T)	2372	5251	$+48$
(U)	738	1451	-40

Which one of the above elements is least reactive?

A. (R)

B. (S)

C. (T)

D. (U)

Answer: C

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Which one of the above elements is least reactive?

A. (P)

B. (Q)

C. (U)

D. (S)

Answer: B

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Level Ii Type I Lecture Sheet 2 Matching

1. Match the element in Column-I with the periodic property in Column-II

Column-I	Column-II
A) F	P) Maximum ionization energy
B) Cl	Q) Maximum electronegativity
C) Fe	R) Maximum electron affinity
D) He	S) Variable oxidation state

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2. Match the electronic configuration in Column-I with the ionisation energy in Column-II (in KJmole)

Column-I	Column-II
A) ns^2	P) 2100
B) ns^2np^1	Q) 1400
C) ns^2np^3	R) 800
D) ns^2np^6	S) 900

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Level Ii Type I Practice Sheet 2 More Than One Correct Answer

1. Amongst the following statements, which is(are) correct ?

A. Electro negativity of sulphur is greater than that of oxygen.

B. Electron affinity of oxygen is smaller than that of sulphur

C. Electron affinity of fluorine is most negative.

D. Electron affinity of chlorine is most negative

Answer: B::D

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2. Select the correct statement(s)

A. Sulphur has a lower electron affinity than chlorine

B. Iodine has a lower electron affinity than bromine

C. Boron has a lower Ist ionisation energy than phosphorus

D. Sulphur has a lower Ist ionisation energy than phosphorus

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

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3. Which of the following statement is/are not correct?

A. I.P. increases down the group

B. I.P. of s-block element is less than corresponding d-block elements

C. If Δ I.P. $>$ 16 eV, higher oxidation state is more stable

D. I.P. of halogen elements is maximum in their respective period

Answer: A::C::D

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4. (a)

$M^-_{(g)} \to M_{(g)}, (b) M_{(g)} \to M^+_{(g)}, (c) M^+_{(g)} \to M^{2+}_{(g)}, (d) M^{2+}_{(g)} \to M^{3+}_{(g)}$

Minimum and maximum I.P. would be of :

A. a

B. b

C. c

D. d

Answer: A::D

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5. Which of the following orders for electron affinity is/are correct?

(a)$S > O < Se$,(b)$Cl > F$, (c) $S > O$, (d) $O > S$, (e)$N > P$, (f) $C > N$

A. a,b

B. c,f

C. c,e

D. d,e

Answer: A::B

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Level Ii Type I Practice Sheet 2 Comprehension

1. The amount of energy released when an electron is added to an isolated gaseous atom to produce a monovalent anion is called electron affinity or first electron affinity or electron gain enthalpy. The first

electron is given a negative sign as the addition of an electron to a neutral atom is an exoergic process. The addition of electron to A^{-1} requires energy to overcome the force of repulsion. Thus, the second electron affinity is an endoergic process. The magnitude of electron affinity depends on a number of factors such as (i) atomic size (ii) effective nuclear charge (iii) screening effect (iv) half and fully filled orbitals and (v) shape of orbital. In general, electron affinity increases as the atomic radii decrease in a period. However, there are exceptions when the atoms have stable configurations. In a group, electron affinity decreases as the size increases. However, the members of 3rd period have somewhat higher values than the members in the 2nd period of the same subgroups.

Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species ?

A. $F < Cl < O < S$

B. $S < O < Cl < F$

C. $O < S < F < Cl$

D. $Cl < F < S < O$

Answer: C

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2. The amount of energy released when an electron is added to an isolated gaseous atom to produce a monovalent anion is called electron affinity or first electron affinity or electron gain enthalpy. The first electron is given a negative sign as the addition of an electron to a neutral atom is an exoergic process. The addition of electron to A^{-1} requires energy to overcome the force of repulsion. Thus, the second electron affinity is an endoergic process. The magnitude of electron affinity depends on a number of factors such as (i) atomic size (ii) effective nuclear charge (iii) screening effect (iv) half and fully filled orbitals and (v) shape of orbital. In general, electron affinity increases as the atomic radii decrease in a period. However, there are exceptions when the atoms have stable configurations. In a group, electron affinity decreases as the size increases. However, the members of 3rd period have somewhat higher values than the members in the 2nd period of the same

subgroups.

Which of the following species has the highest electron affinity?

A. F^{-1}

B. O^{-}

C. Na

D. O

Answer: D

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Which of the following processes is endoergic in nature ?

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

B. $Cl + \bar{e} + Cl^-$

C. $S + \bar{e} \rightarrow S^-$

D. $F + \bar{e} \rightarrow F^-$

Answer: A

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4. The concept of electronegativity (EN) is mainly to discuss the nature of chemical bonding, EN of an atom is the measure of its capacity to attract the shared electron pair towards itself. Linus Pauling compiled the values of EN that are most widely used, and that are displayed for a few elements in Table - 1. These values are based on bond energy differences between atoms bonded to themselves (e.g. A-A) and to other atoms (e.g. A-B), and an arbitary value of 4 to fluorine (most electronegative element)

H						
2.1						
Li	Be	B	C	N	O	F
1.0	1.5	2.0	2.5	3	3.5	4
Na	Mg	Al	Si	P	S	Ce
0.9	1.2	1.5	1.8	2.1	2.5	3.0
K	Ca	Ga	Ge	As	Se	Br
0.8	1.0	1.6	1.8	2.0	2.4	2.8

Mulliken regarded electronegativity as the average value of ionization energy and electron affinity of an atom EN=$\frac{1}{2}$(IE+EA). Both IE and EA are expressed in electron volts. In the Table-2, values of IE and EA for several elements are listed Table-3 shows the values of dipole moments and bond

energies for simple molecules.

Table-2

Atom	IE (eV)	EA(eV)
H	13.6	-0.76
Li	5.32	-0.622
C	11.25	-1.27
N	14.52	+0.07
O	13.66	-1.46
F	17.42	-3.34
Cl	13.0	-3.62
S	10.4	-2.07
Br	11.8	-3.40

Table - 3

Molecule	Dipole moment (cm) × 10^{30}	Bond energy (kJ mol^{-1})
HF	6.37	565
H_2O	6.17	463
NH_3	4.90	388
HCl	3.60	431
HBr	2.67	366
HI	1.40	299

Based upon the electronegativity difference of bonded atoms, which of the following about the chemical bond?

A. Ionic if $\Delta EN < 1.2$, Polar covalent if $\Delta EN > 1.2$

B. Ionic if $\Delta EN > 1.2$, Polar covalent if $\Delta EN < 1.2$

C. Ionic if $\Delta EN < 2.0$, Polar covalent if $\Delta EN > 2.0$

D. Ionic if $\Delta EN < 2.0$, Polar covalent if $\Delta EN < 2.0$

Answer: D

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5. The concept of electronegativity (EN) is mainly to discuss the nature of chemical bonding, EN of an atom is the measure of its capacity to attract the shared electron pair towards itself. Linus Pauling compiled the values of EN that are most widely used, and that are displayed for a few elements in Table - 1. These values are based on bond energy differences between atoms bonded to themselves (e.g. A-A) and to other atoms (e.g. A-B), and an arbitary value of 4 to fluorine (most electronegative element)

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0.9	1.2	1.5	1.8	2.1	2.5	3.0
K	Ca	Ga	Ge	As	Se	Br
0.8	1.0	1.6	1.8	2.0	2.4	2.8

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NH_3	4.90	388
HCl	3.60	431
HBr	2.67	366
HI	1.40	299

Which of the following best describes the relationship of electronegativity, bond energy moment in a diatomic molecule ?

A. As electronegativity increases, both bond energy and bond moment increases

B. As electronegativity increases, bond energy decreases but bond moment increases

C. As electronegativity increases, bond energy increases but bond moment decreases

D. As electronegativity increases, both bond energy and bond moment decreases

Answer: A

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Level Ii Type I Practice Sheet 2 Matching

1. Match the following

Column-I	Column-II
A) Exothermic change ($\Delta H = -ve$)	P) $O^{+}_{(g)} \longrightarrow O^{++}_{(g)}$
B) Endothermic change ($\Delta H = +ve$)	Q) $O_{(g)} \longrightarrow O^{-}_{(g)}$
C) $I.E._2$ of oxygen	R) $O_{(g)} \longrightarrow O^{++}_{(g)}$
D) E.A. of oxygen	S) $O^{-}_{(g)} \longrightarrow O^{--}_{(g)}$
	T) $O_{(g)} \longrightarrow O^{--}_{(g)}$

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Level Ii Type I Lecture Sheet 3 More Than One Correct

1. Which of the following statements are correct ?

A. F is the most electronegative and Cs is the most electropositive available element

B. The electro negativity of halogens decreases from F to I

C. The electron affinity of Cl is higher than that of F though their electro negativity is the reverse

D. The electron affinity of noble gases is low.

Answer: A::B::C

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2. Which of the following have a diagonal relationship ?

A. Li $\rightarrow$ Mg

B. $B \rightarrow Mg$

C. $Be \rightarrow Al$

D. $Be \rightarrow Na$

Answer: A::C

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3. Which of the following statement(s) is(are) true?

A. ionisation energy $\propto \frac{1}{\text{Screening effect}}$

B. The ionisation energies of Be and Mg are more than ionisation energies of B and Al respectively

C. Atomic and ionic radii of Niobium and Tantalum are almost same

D. Metallic and covalent radii of potassium are $2.3A^{\circ}$ and $2.03A^{\circ}$ respectively

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

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4. Pick out the correct statements(s) of the following

A. All atoms with an odd atomic number are necessarily paramagnetic.

B. All atoms with an even atomic number are necessarily diamagnetic

C. All atoms with an even atomic number may be diamagnetic or paramagnetic

D. Atoms with an odd atomic number may be paramagnetic and in some cases diamagnetic.

Answer: A::C

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5. Which of the following statement(s) is(are) correct?

A. vander Waals radius of iodine is more than its covalent radius

B. All isoelectronic ions belong to the same period of the periodic table

C. IE_1 of N is higher than that of O while IE_2 of O is higher than that of N

D. The electron gain enthalpy of N is positive while that of P is negative.

Answer: A::C::D

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Level Ii Type I Lecture Sheet 3 Comprehension

1. Consider metal (X) and non-metal (Y) react to form ionic compound. Given that metal X room temperature and non-metal exists as diatomic gaseous molecule.

What is the formula of ionic compound if electronic configurations of outermost shell of $X = ns^2$ and $Y = ns^2np^3$?

A. X_2Y_2

B. X3Y2

C. XY_2

D. XY

Answer: A

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2. Consider metal (X) and non-metal (Y) react to form ionic compound. Given that metal X room temperature and non-metal exists as diatomic gaseous molecule.

In which of the following cases lattice energy of resulting product will be highest ?

A. $-q = \Delta H_f^\circ(X_2Y) - SE - IP_1 - \frac{BE}{2} + EGE_1 - EGE_2$

B. $-q = -\Delta H_f^\circ(X_2Y) - 2SE - IP_1 - \frac{BE}{2} - EGE_1 - EGE_2$

C.

$+q = -\Delta H_f^\circ(X_2Y) - 2SE - IP_1 - IP_2 - \frac{BE}{2} + EGE_1 - EGE_2$

D. $-q = -\Delta H_f^\circ(X_2Y) - 2SE - 2IP_1 - \frac{BE}{2} + EGE_1 - EGE_2$

Answer: B

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3. Consider metal (X) and non-metal (Y) react to form ionic compound. Given that metal X room temperature and non-metal exists as diatomic gaseous molecule.

In which of the following cases lattice energy of resulting product will be highest ?

A. X and Y both are monovalent

B. X and Y both are divalent

C. X is monovalent and Y is divalent

D. X is divalent and Y is monovalent

Answer: B

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4. Ionization potential is the minimum amount of energy needed to remove the outermost electron from the gaseous isolated atom. Its unit is eV/atom or kJ/mol. Successive ionization energy is the amount of energy needed to remove electron successively from a gaseous ion, it may be termed as $I.E._2$, $I.E._3$, ... The difference in the values of $I.E._1$, $I.E._2$, . helps to determine electronic configuration of the elements.

Element	$I.E._1$	$I.E._2$	$I.E._3$ (kcal/mol)
P	497	947	1500
Q	98	735	1100
R	176	347	1850
S	296	530	2050

Which of the element can make MX type compound (X is the halogen)?

A. P

B. Q

C. R

D. S

Answer: B

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Element	$I.E._1$	$I.E._2$	$I.E._3$ (kcal/mol)
P	497	947	1500
Q	98	735	1100
R	176	347	1850
S	296	530	2050

The order of ionic mobility in aqueous solution of the following ions will be (If R, S belong to same group):

A. $R^{2+}_{(aq)} > S^{2+}_{(aq)}$

B. $S^{2+}_{(aq)} > R^{2+}_{(aq)}$

C. $S^{2+}_{(aq)} = R^{2+}_{(aq)}$

D. cannot be co-related

Answer: A

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Level Ii Type I Lecture Sheet 3 Matching

1. Match the following

Column-I	Column-II
A) Tendency of metals to show ionic bonding	P) Decreases along the period
B) Electron affinity	Q) Increases along the period
C) Oxidizing power	R) Increases down the group
D) Metallic character	S) Decreases down the group

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Level Ii Type I Practice Sheet 3 More Than One Correct

1. Which of the following statement is(are) correct ?

A. Fluorine has the highest electro negativity

B. Helium has the highest ionization energy

C. Alkali metals are the strongest oxidizing agents

D. Carbon has the highest melting point among non metals

Answer: A::B::D

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2. Anamolous pair among the following are

A. Co-Cu

B. Ar-K

C. Te-I

D. Th-Pr

Answer: B::C::D

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3. Which of the following show amphoteric behaviour

A. $Zn(OH)_2$

B. BeO

C. Al_2O_3

D. SO_2

Answer: A::B::C

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4. The screening effect of inner electrons of an atom causes

A. decrease in ionisation energy

B. increase in atomic size

C. increase in ionisation energy

D. decrease in atomic size

Answer: A::B

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5. 22.44 kJ energy is required to convert 8 gm of gaseous atom of metal M to $M_{(g)}^{+}$ if $I.E._1$ of metal M = 374 kJ/mole. Select correct for above metal M

A. 0.6 mole gaseous ion (M^+) are formed

B. Same energy can convert all $M^+_{(g)}$ to $M^{2+}_{(g)}$

C. Atomic mass of metal = 133.33

D. 3.613×10^{22} atoms of M are converted to $M^+_{(g)}$

Answer: C::D

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Level Ii Type I Practice Sheet 3 Comprehension

1. Consider the following ionization energies for a metal M

$M_{(g)} \rightarrow M^+_{(g)} + e^-$, ΔH=+580 kJ/mole

$M^+_{(g)} \rightarrow M^{2+}_{(g)} + e^-$, ΔH =+1815 kJ/mole

$M^{2+}_{(g)} \rightarrow M^{3+}_{(g)} + e^-$, ΔH=+2740 kJ/mole

$M^{3+}_{(g)} + M^{4+}_{(g)} + e^-$, ΔH= + 11600 kJ/mole

Total no. of electron(s) in outermost shell of metal M are:

A. 2

B. 3

C. 4

D. 1

Answer: B

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2. Consider the following ionization energies for a metal M

$M_{(g)} \rightarrow M^{+}_{(g)} + e^{-}$, ΔH=+580 kJ/mole

$M^{+}_{(g)} \rightarrow M^{2+}_{(g)} + e^{-}$, ΔH =+1815 kJ/mole

$M^{2+}_{(g)} \rightarrow M^{3+}_{(g)} + e^{-}$, ΔH=+2740 kJ/mole

$M^{3+}_{(g)} + M^{4+}_{(g)} + e^{-}$, ΔH= + 11600 kJ/mole

Which one of the four ions has largest electron affinity?

A. $M^{+}_{(g)}$

B. $M^{2+}_{(g)}$

C. $M_{(g)}^{3+}$

D. $M_{(g)}^{4+}$

Answer: D

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3. Consider the following ionization energies for a metal M

$M_{(g)} \rightarrow M_{(g)}^{+} + e^{-}$, ΔH=+580 kJ/mole

$M_{(g)}^{+} \rightarrow M_{(g)}^{2+} + e^{-}$, ΔH =+1815 kJ/mole

$M_{(g)}^{2+} \rightarrow M_{(g)}^{3+} + e^{-}$, ΔH=+2740 kJ/mole

$M_{(g)}^{3+} + M_{(g)}^{4+} + e^{-}$, ΔH= + 11600 kJ/mole

Select correct order.

A. $M_{(g)}^{2+} < M_{(g)}^{4+}$ (size)

B. $M_{(g)}^{4+} < M_{(g)}^{3+}$ (ionization energy)

C. $M_{(g)} < M_{(g)}^{+}$ (electron affinity)

D. $M_{(g)}^{3+} < M_{(g)}^{2+}$ (Z/e ratio)

Answer: C

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4. Screening effect is the effect produced by intervening electron between nucleus and valence electrons. They shield the nucleus from valence electron and effective nuclear charge decreases if there is less shielding effect, the effective nuclear charge decreases. Balance electrons are attracted by nucleus and repelled by other electrons.

Net attractive force on electron under consideration $=Z-\sigma$ = (Nuclear charge screening effect) which is Slater's formula for screening constant.

If one electron is present in outermost orbit, there will be no screening in that orbital. Each electron contributes 0.35 (total electrons minus 1) present in outermost shell. In penultimate energy level, electrons contribute 0.85. A contribution of 1.0 is from remaining electrons (present in last but one energy level).

The effective nuclear charge for 4s electrons of Zn will be

A. 26.85

B. 4.35

C. 15.30

D. 10

Answer: A

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5. Screening effect is the effect produced by intervening electron between nucleus and valence electrons. They shield the nucleus from valence electron and effective nuclear charge decreases if there is less shielding effect, the effective nuclear charge decreases. Balance electrons are attracted by nucleus and repelled by other electrons.

Net attractive force on electron under consideration $=Z-\sigma$ = (Nuclear charge screening effect) which is Slater's formula for screening constant.

If one electron is present in outermost orbit, there will be no screening in that orbital. Each electron contributes 0.35 (total electrons minus 1) present in outermost shell. In penultimate energy level, electrons

contribute 0.85. A contribution of 1.0 is from remaining electrons (present in last but one energy level).

The number of lobes in most of the f-orbitals are

A. 6

B. 8

C. 10

D. 4

Answer: A

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6. Match the following

Column-I	Column-II
A) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2 < Ba(OH)_2$	P) Solubility
B) $Al_2O_3 < MgO < Na_2O < K_2O$	Q) Acidic character
C) $NH_3 < PH_3 < AsH_3 < SbH_3$	R) Bond moment
D) $PH_3 < AsH_3 < SbH_3 < NH_3$	S) Basic character

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7. Match the following

Column-I	Column-II
A) IE_1 2372, IE_2 5251	P) A reactive metal
B) IE_1 520, IE_2 7300	Q) A reactive non-metal
C) IE_1 900, IE_2 1760	R) A noble gas
D) IE_1 1680, IE_2 3380	S) A metal that forms an halide of formula AX_2

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Level Ii Type Ii Lecture Sheet 1 Subjective Analytical Type Questions

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

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2. In terms of period and group, where would you locate the element with Z = 114.

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

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4. Which element do you thick would have been named by (a) Lawrence Berkeley Laboratory (b) Seaborg's group

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

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6. What are representative elements? Give their valence shell configuration

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7. Justify the position of f-block elements in the periodic table.

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8. An element X' has atomic number 34. Give its position in the periodic table.

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Level Ii Type Ii Practice Sheet 1 Subjective Analytical Type Questions

1. What factors impart characteristic properties to the transition elements?

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2. Give the outer shells configuration of d-block and f-block elements.

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3. State and give one example for Dobereiner's law of triad and Newland's law of octaves.

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4. Name the anomalous pairs of elements in the Mendeleev's periodic table.

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

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6. Among N^{-3}, O^{-2}, Mg^{+2} and Al^{+3}

(a) What is common in them. (b) Arrange them in the increasing ionic radii

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7. On the basis of quantum numbers, justify that the 6th period of the periodic table should have 32 elements.

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8. Why f-block elements are placed below the main table.

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Level Ii Type Ii Lecture Sheet 2 Subjective Analytical Type Questions

1. What is the significance of the term isolated gaseous atom while defining the ionization enthalpy.

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

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3. Ionization enthalpy $[IE_1]$ of O is less than that of N - explain.

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4. Which in each pair of elements has a more negative electron gain enthalpy?

(a) F or Cl^- ,(b) O or O^- ,(c) Na^+ or S , (d) F or F^-

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5. What is electronegativity? How is this useful in understanding the nature of elements?

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6. Name the most electronegative element. Is it also having the highest electron gain enthalpy? or Why not?

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7. $IE_2 > IE_1$ for a given element - Why.

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8. IE_1 of $O < IE_1$ of N but IE_2 of $O > E_2$ of N - explain.

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Level Ii Type Ii Practice Sheet 2 Subjective Analytical Type Questions

1. Na^+ has higher value of ionization energy than Ne. So ionisation energy of Na^+ is more than Ne.

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2. Which in each pair of elements has a more negative electron gain enthalpy? Explain.

A. a) N or O

B. b) F or Cl

C.

D.

Answer: N or O: Nitrogen. Because of stable half filled orbitals

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3. Electron affinity of chlorine is more than that of fluorine explain.

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4. Which has bigger electron affinity in each pair?

(a)F or Cl^- ,(b)O or O^- , (c)Na^+ or F ,(d)F or F^-

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

(a)Which has the highest first ionization enthalpy?

(b)Which has the most negative electron gain enthalpy?

(c) Which has the largest atomic radius?

(d) Which has the most metallic character?

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6. Consider the elements N, P, O and S and arrange them in order of Increasing first ionization enthalpy

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7. Consider the elements N, P, O and S and arrange them in order of :

(b) Increasing negative electron gain enthalpy

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8. Consider the elements N, P, O and S and arrange them in order of Increasing non-metallic character

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9. Arrange in the given order:

Increasing EA : O,S and Se

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10. Arrange in the given order:

Increasing IE_1:Na , K and Rb

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11. Arrange in the given order:

Increasing radius : I,I^+ and I^-

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12. Arrange in the given order:

Increasing electronegativity :F , Cl , Br, I

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13. Arrange in the given order:

Increasing electronegativity :F , Cl , Br, I

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14. Which of the following order is correct for the size of Fe^{3+}, Fe and Fe^{2+} ?

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15. Name the element with highest ionization enthalpy.

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16. Name the family with highest value of ionization enthalpy.

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17. Which element processes highest electron affinity?

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18. Name unknown group of elements at the time of Mendeleef

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19. Name any two typical elements.

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Level Ii Type Ii Lecture Sheet 3 Subjective Analytical Type Questions

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

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2. Use the periodic table to identify elements

(a) With 5 electrons in the outer subshell

(b) Would tend to lose two electrons

(c) Would tend to gain two electrons

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3. Give the outer shells configuration of d-block and f-block elements.

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

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5. Considering the elements B,C,N,F and Si, the correct order of their non-metalllic character is

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6. Write the correct increasing order in chemical reactivity in terms of oxidizing property for N, O, F and Cl.

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7. What is screening effect? How is it related to IE?

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8. How are electronegative and metallic & non-metallic characters related?

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Level Ii Type Ii Practice Sheet 3 Subjective Analytical Type Questions

1. What is the valency possible to Arsenic with respect to oxygen and hydrogen?

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2. What is an amphoteric oxide? Give the formula of an amphoteric oxide formed by an element of group-13.

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3. What is diagonal relation? Give one pair of elements, that have this relation.

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4. How does the nature of oxides vary in the third period?

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5. What is the correct order of radii of Fe^{2+}, Fe^{3+} and neutral Fe atom. Why?

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6. What is lanthanide contraction? Give one of its consequences.

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7. What is the atomic number of the element, having maximum number of unpaired 2p electrons? To which group does it belong?

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8. Sodium is strongly metallic, while chlorine is strongly non-metallic - explain.

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