CHEMISTRY

AAKASH INSTITUTE ENGLISH

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Example

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

:

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

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

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

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

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

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

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

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

Be, N, O, Ne

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

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

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

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

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12. Using the perodic table, perdict the formulas of compounds which might be

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

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

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

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

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Try Yourself

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

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

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

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4. IUPAC symbol of atomic number 119.

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

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

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

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

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

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10. What are transuranic elements ?

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

Na, Mg and Al.

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12. Pick the metalloid among the following given elements.

P, S, Si, Al.

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13. Describe the trend of atomic size along a period

and a group in the periodic table.

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

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

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

Ne.

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

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

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

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

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

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

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

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27. What is the nature of Al_2O_3 ? (Acidic/Basic)

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28. Show that the nature of SO_3 is acidic.

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

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Assignment Section A

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

A. Decreases

B. Increases

C. Remains constat

D. First increases and then decreases

Answer: A

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

A. 2

B. 4

C. 3

D. 1

Answer: B

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3. The electronic structure $(n-1)d^{1-10}ns^{0-2}$ is characteristic of

A. Lanthanides

B. Actinides

C. Rare gases

D. Transition elements

Answer: D

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4. IUPAC name of element of atomic number 114 is

A. 1. Ununtetradium

B. 2. Ununquadium

C. 3. Unnilquadium

D. 4. Unniltetradium

Answer: B

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

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

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

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

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

Answer: B

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

A. Mg-K

B. Mg-Na

C. Na-Ba

D. Mg-Ca

Answer: D

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7. An element with atomic number 29 belongs to

A. 1. s-block

B. 2. p-block

C. 3. d-block

D. 4. f-block

Answer: C

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

A. Increases

B. Decreases

C. Remains constant

D. First increases and then decreases

Answer: B

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

A. Option 1. 2,8,7

B. Option 2. 2,8,8

C. Option 3. 2,8,4

D. Option 4. 2,8,1

Answer: D

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10. The sceening effect of d-electrons is

A. Equal to that of p-electrons

B. More than that of p-electrons

C. Same as f-electrons

D. Less than p-electrons

Answer: D

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11. Correct order of radii

A. $Na > Mg > Al$

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

C. $I^{+} < l < l^{-}$

D. All of these

Answer: D

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

A. He, N, O

B. Ne, N, Cl

C. O, Cl, F

D. N, He, Ne

Answer: D

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

A. 1. Atomic number

B. 2. Electronic configuration

C. 3. Atomic weight

D. 4. Number of electrons in the valence shell

Answer: D

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14. Which pair of elements has same chemical properties ?

A. Z=13, Z=22

B. Z=3, Z=11

C. Z=4, Z=24

D. Z=2, Z=4

Answer: B

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

A. 15

B. 16

C. 9

D. 17

Answer: D

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16. Chalcogens are elements of the group

A. 17^{th}

B. 15^{th}

C. 16^{th}

D. 14^{th}

Answer: C

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17. Which of the following shows diagonal relationship ?

A. Boron and silicon

B. Boron and aluminium

C. Boron and gallium

D. Boron and carbon

Answer: A

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18. What are representative elements?

A. s-block

B. s-block and p-block

C. d-block or transition elements

D. d-block and f-block

Answer: B

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

A. Al^{3+}, Si^{4-}, S^{2-}

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

C. N^{3-}, F^{-}, O^{-}

D. Ca^{2+}, Cl^{-}, Sc^{3+}

Answer: D

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

A. $[He]2s^1$

B. $[Ne]3s^1$

C. $[Ar]4s^1$

D. $[Kr]5s^1$

Answer: D

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

A. f-block elements

B. d-block elements

C. p-block elements

D. s-block elements

Answer: A

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

A. ns^2, np^4

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

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

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

Answer: C

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23. Find the incorrect statement.

A. Valence electron and valency is same for group 1

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

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

D. Smallest atom of periodic table is He

Answer: D

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

A. 1. Increases

B. 2. Decreases

C. 3. First increases and then decreases

D. 4. First decreases and then increases

Answer: A

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

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

A. F^-

B. O^-

C. Na^+

D. Mg^{2+}

Answer: B

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

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

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

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

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

Answer: C

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

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

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

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

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

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

Answer: A

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

A. S,Cl,O,F

B. Cl,S,O,F

C. S,Cl,F,O

D. Cl,S,F,O

Answer: A

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

A. A_2B_3

B. AB_2

C. AB_2

D. A_2B

Answer: C

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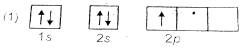
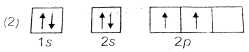
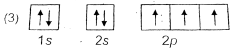
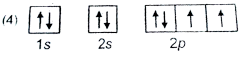
31. Which orbital diagram gives an insight ionization energy ?

A. 

B. 

C. 

D. 

Answer: C

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32. The largest atomic radius will be of

A. Be

B. Na

C. F

D. Mg

Answer: B

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33. The order of increasing atomic radii is

A. $Ne < F < O < N$

B. $F > N > O > Ne$

C. $N < O < F < Ne$

D. $F < O < N < Ne$

Answer: D

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

A. 1.s-subshell

B. 2. p-subshell

C. 3. d-subshell

D. 4. f-subshell

Answer: A

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

A. $C < N < O < F$

B. $C < O < N < F$

C. $N < C < O < F$

D. $C < O < F < N$

Answer: B

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

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

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

C. Larger is the atomic radii lower is ionization energy

D. Ionization enthalpy $\propto$ effective nuclear charge

Answer: B

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

A. Option 1. $Na < Cl < F$

B. Option 2. $Na < F < Cl$

C. Option 3. $F < Cl < Na$

D. Option 4. $Cl < F < Na$

Answer: C

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

A. O

B. Be

C. $Be \approx B$

D. N= O

Answer: A

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

A. Z=37

B. Z=31

C. Z=54

D. Z=24

Answer: D

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40. Correct order of 1st ionisationpotential (IP) among following elements Be, B, C, N, O is

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

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

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

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

Answer: A

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Assignment Section B

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

A. F

B. Na

C. Mg

D. Ne

Answer: B

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

A. Option 1. Atomic number

B. Option 2. Atomic weight

C. Option 3. Atomic volume

D. Option 4. Number of neutrons

Answer: B

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

A. Option 1. s

B. Option 2. p

C. Option 3. d

D. Option 4. f

Answer: C

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4. Out of following which has the highest electronegativity ?

A. H

B. Li

C. Na

D. Be

Answer: A

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5. Which of the following has largest size ?

A. H^-

B. He

C. Li^+

D. Be^{+2}

Answer: A

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

A. 4s

B. 4p

C. 4d

D. 4f

Answer: A

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7. The element which belongs with chalcogen family is

A. N

B. P

C. S

D. Cl

Answer: C

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

A. Na

B. Mg

C. Ca

D. Ar

Answer: A

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9. An atom with high electronegativity generally has :-

A. Low electron affinity

B. Small atomic number

C. Large atomic radius

D. High ionisation potential

Answer: D

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10. Ionic radii are

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

B. Greater than the respective atomic radii of electropositive elements

C. Greater than the respective atomic radii of electronegative elements

D. Less than the respective atomic radii of electronegative elements

Answer: C

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11. The first ionization enthalpies of Na,Mg,Al and Si are in the order

A. $Na < Mg > Al < Si$

B. $Na < Mg < Al > Si$

C. $Na > Mg > Al > Si$

D. $Na > Mg > Al < Si$

Answer: A

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

A. Mg^{2+}

B. B^{3+}

C. V^{3+}

D. Fe^{2+}

Answer: D

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

A. Cu- Coinage metal

B. Ba- Alkaline earth metal

C. Zn- Alkaline earth metal

D. Xe- Noble gas

Answer: C

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

A. 1st group

B. 3rd group

C. 15th group

D. 17th group

Answer: C

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

A. Mg

B. Al

C. Na

D. Ar

Answer: A

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

A. A decrease in the ionisation energy

B. An increase in the jonisation energy

C. No effect on the ionisation potential

D. An increase in the attraction of the nucleus on the outermost electrons

Answer: A

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

The polarising power is defined as

A. $\frac{\text{ionic charge}}{\text{ionic radius}}$

B. $\frac{(\text{ionic charge})^2}{\text{ionic radius}}$

C. $\frac{\text{ionic charge}}{(\text{ionic radius})^2}$

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

Answer: C

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

A. Metallic to non-metallic character

B. Oxidising to reducing properties

C. Metallic solids through network solids to molecular solids

D. Base forming to acid forming character

Answer: B

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

A. $O > S > Se$

B. $S > Se > O$

C. $Se > O > S$

D. $Se > S > O$

Answer: B

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

A. Li

B. Be

C. K

D. B

Answer: A

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21. The element which has highest electron affinity ?

A. Oxygen

B. Sulphur

C. Nitrogen

D. Phosphorus

Answer: B

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

A. Option1. 2.8

B. Option 2. 1

C. Option 3. 2.0

D. Option 4. 1.5

Answer: A

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

A. Mg

B. Al

C. K

D. Ga

Answer: D

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24. Which one of the following order is correct ?

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

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

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

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

Answer: B

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

A. CO_2

B. Cl_2O_7

C. SiO_2

D. SO_2

Answer: B

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26. Electron gain enthalpy will be positive in

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

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

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

D. Na^{-} is formed from Na

Answer: A

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27. Enthalpy change in the following process is

$A + e^- \rightarrow A^- \Delta H = -XkJ/\text{mole}$

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

A. Option 1. $A^{-2} \rightarrow A^- + 1e^-$

B. Option 2. $A + e^- \rightarrow A^-$

C. Option 3. $A^- \rightarrow A + e^-$

D. Option 4. $A^+ + e^- \rightarrow A$

Answer: C

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

A. Option 1. 102

B. Option 2. 108

C. Option 3. 110

D. Option 4. 112

Answer: D

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

A. Option 1. s

B. Option 2. p

C. Option 3. d

D. Option 4. f

Answer: D

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30. A sudden large jump between the value of second and third ionization energies of an el,ement would be associated with which of the following electronic configuration?

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

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

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

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

Answer: D

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

A. 8^{th} group, 4^{th} period

B. 14^{th} group, 3^{rd} period

C. 12^{th} group, 3^{rd} period

D. 12^{th} group, 4^{th} period

Answer: A

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

A. Option 1. $M_{(g)} \xrightarrow{+e^-} M^{(-)}_{(g)}$

B. Option 2. $M_{(s)} \xrightarrow{-e} M^{+}_{(s)}$

C. Option 3. $M^{+}_{(g)} \xrightarrow{+e^-} M_{(g)}$

D. Option 4. $M_{(g)} \xrightarrow{-e^-} M^{(-)}_{(g)}$

Answer: C

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

A. They belong to same group

B. They belong to same period

C. Both have nearly the same ionic size

D. The ratio of their charge to size is nearly the same

Answer: D

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34. The ionisation energy of Li is 500 KJ/mole. The amount of energy required to convert 70 mg of Li atoms in gaseous state into Li^+ ion (in KJ) is

A. 5.0 kJ

B. 52 kJ

C. 520 kJ

D. 52 J

Answer: A

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Assignment Section C

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

A. $B > Be$

B. $Tl > Ga$

C. $N > O$

D. $Li > Na$

Answer: B::C::D

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

A. Fe

B. Ga

C. Na

D. I

Answer: B::D

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

A. Actinoids are placed in main body of periodic table

B. Chemical properties are periodic function of atomic number

C. In periodic table, 18 group are present

D. 7th period is incomplete

Answer: B::C::D

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

A. $Zn > Cu$

B. $N > O$

C. $Al > Ca$

D. $B > C$

Answer: A::D

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5. Choose the correct option(s)

A. Oxygen has highest electron gain enthalpy among chalcogens

B.

C.

D.

Answer: B::D

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6. Choose the process which is/are endothermic ?

A. $O^{-1} + e^{-} \rightarrow O^{-2}$

B. $Ar \rightarrow A_r^{+} + e^{-}$

C. $Ar + e^{-} \rightarrow Ar^{-}$

D. $H + e^{-} \rightarrow H^{-}$

Answer: A::B::C

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

A. $Be^{+2} < B^{+3} < Li^{+}$

B. $B^{+3} < Be^{+2} < Li^{+}$

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

D. $B^{+3} < Ga^{+3} < Al^{+3}$

Answer: B::C::D

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8. Which of the following pairs contain metalloids ?

A. Ga, Ge

B. As, Te

C. I, Sb

D. In, Tl

Answer: A::B

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9. Choose the correct statement(s).

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

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

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

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

Answer: A::D

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

A. $Fe < Mg < Cu$

B. $Na > Mg > Al$

C. $Mg < Ca < Sr$

D. $Fe > Cu > Zn$

Answer: B::C::D

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

A. N, O

B. P,S

C. Be,B

D. F,O

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

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

A. 55,12,48,53

B. 13,33,54,83

C. 3,33,53,87

D. 22,33,55,66

Answer: B::C

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Assignment Section D Linked Compreshension Type Questions

1. Ionisation energy is the amount of energy required to remove the outermost e^- from a gaseous atom. It's unit is kJ/mole or kcal/mole. Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as IE_2, IE_3, IE_4 etc. the difference in

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

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

Which element is a noble gas ?

A. A

B. B

C. C

D. D

Answer: B

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2. Ionisation energy is the amount of energy required to remove the outermost e^- from a gaseous atom. It's unit is kJ/mole or kcal/mole. Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as IE_2, IE_3, IE_4 etc. the difference in the values of IE_1, IE_2 and IE_3 helps to

determine electronic configuration of the element.

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

Which of the following is a non-metal ?

A. A

B. B

C. C

D. D

Answer: C::D

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3. Ionisation energy is the amount of energy required to remove the outermost e^- from a gaseous atom. It's unit is kJ/mole or kcal/mole. Successive ionisation energy - It is the amount of energy required to remove electron successively from a gaseous ion. These are termed as IE_2, IE_3, IE_4 etc. the difference in the values of IE_1, IE_2 and IE_3 helps to determine electronic configuration of the element.

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C	418	1091	1652	
D	550	1025	1500	

Which element is a noble gas ?

A. A

B. B

C. C

D. D

Answer: D

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

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

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

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

When there is pure covalent bond between A-B

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

$$\Rightarrow X_A = X_B$$

According to Mulliken, electronegativity depends on

A. Ionisation potential

B. Electron gain enthalpy

C. Electron affinity

D. Both (1) & (3)

Answer: D

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

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

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

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

When there is pure covalent bond between A-B

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

$$\Rightarrow X_A = X_B$$

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

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

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

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

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

Answer: A

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

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

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$$\Rightarrow X_A = X_B$$

Pauling's Electronegativity scale is based on

A. Thermochemical data

B. I.E. data

C. E.A. data

D. Both (2) & (3)

Answer: A

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Assignment Section E Assertion Reason Type Questions

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

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

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

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

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

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

Answer: B

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

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

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

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

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

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

Answer: C

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

Statement-2 : Noble gases belong to 18^{th} group.

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

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

for Statement-1

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

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

Answer: B

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

Statement-2 : Both are chemically inert.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-4

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-4

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

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

Answer: C

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

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

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

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

for Statement-1

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

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

Answer: A

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6. Statement-1: Long form of periodic table exactly explain the position of hydrogen.

Statement-2 : Hydrogen is most abundent element of the universe.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-6

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-6

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

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

Answer: D

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

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

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

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

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

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

Answer: D

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

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

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

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

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

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

Answer: C

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

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

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

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

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

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

Answer: D

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

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

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

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

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

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

Answer: A

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

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

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

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

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

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

Answer: C

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

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

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

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

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

Answer: B

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

Statement-2 : s electrons are closer to the nucleus than p-electrons, hence, more tightly attached.

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

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

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

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

Answer: A

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

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

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

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

for Statement-1

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

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

Answer: C

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Assignment Section F Matrix Match Type Questions

1. Match the following

Column-I (Element)	Column-II (Electronegativity on Pauling scale)
(A) Carbon	(p) 0.8
(B) Nitrogen	(q) 1.6
(C) Aluminium	(r) 2.5
(D) Cesium	(s) 3.0

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2. Match the following

Column-I (Periodic properties)	Column-II (Function of)
(A) Electronegativity	(p) Effective nuclear charge
(B) Atomic radii	(q) Screening effect
(C) Ionization energy	(r) Electronic configuration
(D) Electron affinity	(s) Be > B (Half filled and fully filled configuration)

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3. Match the following

Column-I (Transformations)	Column-II (Observation)
(A) $Na(g) \xrightarrow{+e^-} Na^{(-)}(g)$	(p) Release of energy
(B) $O(g) \xrightarrow{+2e^-} O^{2-}(g)$	(q) Absorb energy
(C) $K(g) \xrightarrow{-e^-} K^{(+)}(g)$	(r) Attains noble gas configuration
(D) $Al(g) \xrightarrow{-e^-} Al^{(-)}(g)$	(s) Accompany contraction in size

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4. Match the following

Column-I	Column-II
(A) Na < Mg < Al	(p) True for electropositive character
(B) Mg < Ca < Sr	(q) False for size
(C) Fe > Cu > Zn	(r) True in reverse order for electropositive character
(D) Fe (I) < Fe (II) < Fe (III)	(s) True for electronegativity
	(t) False for electronegativity

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Assignment Section G Integer Answer Type Questions

1. What is the group no of element Une ?

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

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

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

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5. The largest group in Modern periodic table is

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Assignment Section H Multiple True False Type Questions

1. Statement-1 : Electronegativity of an element depends on ionisation energy of that element.
Statement-2 : Electroegativity regularly decreases along the group.

Statement-3 : Fluorine is the most electronegative element.

A. T F T

B. T T T

C. F T T

D. F F T

Answer: A

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

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

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

A. T T F

B. F F T

C. T F T

D. T F F

Answer: A

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

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

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

A. F T F

B. T T T

C. T F T

D. F T T

Answer: D

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Assignment Section I Subjective Type Questions

1. Covalent radius of an element having 82 electrons in extranuclear part and 82 protons in the nucleus is 146 Å. Calculate the electronegativity on Allred Rochow scale of that element.

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2. Calculate the energy required to convert all the atoms of M (atomic number : 12) to M^{2+} ions present in 12 mg of metal vapours. First

and second ionization enthalpies of M are 737.77 and 1450.73 $kJ \ \ \mathrm{mol}^{-1}$ respectively.

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3. Calculate the electronegativity value of chlorine on Mulliken's scale, given that $IP = 13.0eV$ and $EA = 4.0eV$.

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

IE_1	IE_2
$I2372$	5251
$II900$	1760
$III520$	7300

Now identify

(a) Which element is most reactive ?

(b) Which element is noble gas ?

(c) Which can form a stable dihalide ?

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

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

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

(b) Compare the polarising power of their cation.

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

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8. Arrange the following in increasing order as directed

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

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

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9. Why Al_2O_3 is amphoteric while B_2O_3 is acidic ?

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Assignment Section J Aakash Challengers Questions

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

A. Zn

B. Sc

C. Cd

D. Hg

Answer: D

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2. s orbital is more penetrating because

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

B. s orbital is non-directional

C. s orbital is spherical in shape

D. All of these

Answer: A

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3. The correct pair regarding property given in bracket is

A. $F_2 > Cl_2$ (Oxidising character)

B. $F > Cl$ (Electron affinity)

C. $F < Cl$ (Electronegativity)

D. $O > N$ (Ionisation energy)

Answer: A

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4. Choose the correct statement

A. Isotopes have nearly same chemical properties

B. Isoelectronic species must be neutral

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

D. All of these

Answer: D

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

A. Option 1. n^2

B. Option 2. 2(l+1)

C. Option 3. $2n^2$

D. Option 4. $(l+1)^2$

Answer: C

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6. Choose the correct regarding E.N.

A. $B > Al > Ga > In$

B. $B > Al = Ga = In$

C. $B > In > Ga > Al$

D. $B > Al < Ga < In$

Answer: D

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Exercise

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

A. Atomic number

B. Electronic conifiguration

C. Atomic weight

D. Number of electrons in the valence shell

Answer: D

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2. Which pair of elements has the same characteristic chemical properties ?

A. Z=13 , Z=22

B. Z=3 , Z=11

C. Z=4 , Z=24

D. Z=2 , Z=4

Answer: B

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

A. 15

B. 16

C. 9

D. 17

Answer: D

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4. Chalcogens are elements of the group

A. 17^{th}

B. 15^{th}

C. 16^{th}

D. 14^{th}

Answer: C

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5. Representative elements are elements of

A. s - block

B. s-block and p-block

C. d-block or transition elements

D. d-block and f-block

Answer: B

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

A. ns^2, np^4

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

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

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

Answer: C

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

A. Z=37

B. Z = 31

C. Z=54

D. Z=24

Answer: D

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

(a). hydrogen

(b). nitrogen

(c). helium

(d). boron

A. H

B. Mg

C. He

D. Ag

Answer: A

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9. Number of groups in d-block

A. 5

B. 10

C. 15

D. 20

Answer: B

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10. Which of the following is transition element ?

A. P

B. Zn

C. Cu

D. Na

Answer: C

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11. Correct order of radii

A. $Na > Mg > AI$

B. $Na^{+} > Mg^{2+} > AI^{3+}$

C. $I + < I < I^{-}$

D. N , He, Ne

Answer: D

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

A. He , N , O

B. Ne , N, CI

C. O, CI,F

D. N, He, Ne,

Answer: D

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

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

A. F

B. O^-

C. Na^-

D. Mg^{2+}

Answer: B

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

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

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

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

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

Answer: C

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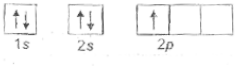
16. Which orbital diagram gives an insight ionization energy ?

A. 

B. 

C. 

D. 

Answer: C

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17. The largest atomic radius will be of

A. Be

B. Na

C. F

D. Mg

Answer: B

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

A. s - subshell

B. p-subshell

C. d-subshell

D. f-subshell

Answer: A

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

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

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

C. Larger is the atomic radii lower is ionization energy

D. Ionization enthalpy $\propto$ effective nuclear charge

Answer: B

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

A. $B < Be < C$

B. B = Be =C

C. $Be < C < B$

D. $Be < B < C$

Answer: A

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21. Which of the following shows diagonal relationship ?

A. Boron and sillicon

B. Boron and aluminium

C. Boron and gallium

D. Boron and carbon

Answer: A

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

A. $[He]2s^1$

B. $[Ne]3s^1$

C. $[Ar]4s^1$

D. $[Kr]5s^1$

Answer: D

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

A. f-block elements

B. d - block elements

C. p-block elements

D. s-block elements

Answer: A

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24. Find the incorrect statement.

A. Valence electron and valency is same for group 1

B. p- block element are metals nonmetals and metalloids

C. Noble gases have 8 valence electrons except He

D. Smallest atom of periodic table is He

Answer: D

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

A. Increases

B. Decreases

C. First increases and then decreases

D. first decreases and then increases

Answer: A

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

A. A_2B_3

B. AB_3

C. AB_2

D. A_2B

Answer: C

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27. The most acidic oxide is:

A. SO_2

B. SO_3

C. NO_2

D. Cl_2O_7

Answer: D

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28. The most basic oxide among the following is

A. Na_2O

B. CaO

C. MgO

D. FeO

Answer: A

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29. Neutral oxide out of following is

A. CO

B. NO

C. N_2O

D. All of these

Answer: D

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30. Which of the following is amphoteric oxide ?

A. MgO

B. BeO

C. CO

D. CO_2

Answer: B

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Assignment Section A Objective Type Questions

1. Define or explain :

Modern periodic law.

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

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

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

D. None of these

Answer: A

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

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

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

the orbitals in the d - subshell

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

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

Answer: B

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

A. Metalloids

B. Transition elements

C. Non - metals

D. Gasses

Answer: A

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

A. Unniloctium

B. Ununoctium

C. Nilniloctinium

D. Ununoctinium

Answer: B

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5. Which of the following is a representative element ?

A. Zn

B. Sr

C. Cu

D. Fe

Answer: D

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

A. Atomic weight increases

B. Atomic weight decreases

C. Size increases

D. Size decreases

Answer: D

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7. Of the following which one is a correct statement

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

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

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

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

Answer: A

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

A. N^{3-}

B. O^{2-}

C. F^{-}

D. All of these

Answer: C

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

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

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

isoelectronic ions of same period

C. Isoelectronic ions have same electric charge

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

Answer: C

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

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

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

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

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

Answer: C

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11. Which of the following is correct ?

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

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

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

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

Answer: A

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12. Which ion has the largest radius ?

A. Se^{2-}

B. F^{-}

C. O^{2-}

D. Rb^{+}

Answer: C

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

above element in the periodic table ?

49

31

34

33

A. 36

B. 49

C. 33

D. 34

Answer: D

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14. Which of the elements has the greatest electron affinity among the halogens.

A. I

B. Br

C. F

D. Cl

Answer: C

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15. General electronic configuration of transition metals is

A. ns^1

B. ns^2np^5

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

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

Answer: B

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16. Which of the following is the correct order of size of the given species

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

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

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

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

Answer: D

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17. The first ionisation potential (in eV) of Be and B, respactively are

A. 8.29, 8.29

B. $9.32, 9.32$

C. $8.29, 9.32$

D. $9.32, 8.29$

Answer: A

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

A. $Ca^{2+} < K^{+} < Ar < CI^{-} < S^{2}$

B. $Ar < Ca^{2+} < K^{+} < CI^{-} < S^{2-}$

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

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

Answer: B

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

A. $Cl(g) + e \rightarrow Cl^{-}(g)$

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

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

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

Answer: A

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20. The elements Eka Aluminium and Eka silicon named by Mendeleev known today as

A. Gallium and Germanium

B. Aluminium and Sillicon

C. Iron and Sulphur

D. Boron and Technitium

Answer: D

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

A. Na_2O

B. CaO

C. NO

D. CI_2O_7

Answer: B

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22. The element with highest electron affinity will belong to

A. Period 2 , group 17

B. Period 3, group 17

C. Period 2, group 18

D. Period 2, group 1

Answer: C

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

A. xkJ

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

C. $\frac{\text{x*}10^3}{0.02N_A}$ J

D. xN_AkJ

Answer: D

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

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

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

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

D. Both (1) & (3)

Answer: C

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25. Match the following regarding nature of the oxides

Column-I	ColumnII
$a.\ N_2O$	(i)Basic
$b.\ BaO$	(ii)Amphoteric
$c.\ As_2O_3$	(iii)Acidic
$d.\ Cl_2O_7$	(iv)Neutral

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

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

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

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

Answer: C

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Assignment Section B Objective Type Questions

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

A. X=2 , 8,4

B. Y = =2 ,8 ,8

C. Z=2,8,8,1

D. J=2,8,8,7

Answer: C

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2. The electronegativity follows the order

A. $F > O > CI > Br$

B. $F > CI > Br > O$

C. $O > F > CI > Br$

D. $CI > F > O > Br$

Answer: A

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3. Ca^{2+} is isoelectronic with

A. Mg^{2+}

B. Kr

C. Ar

D. Na^{+}

Answer: C

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

A. The valency of element is 7

B. The element exists as a triatomic molecule

C. The element is metalloid

D. The element forms basic oxide

Answer: D

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5. The symbol of element with atomic number

Z = 109

A. UnP

B. Uns

C. Uno

D. Une

Answer: D

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

A. 4^{th} period ,group 11

B. 5^{th} period ,group 10

C. 6^{th} period ,group 9

D. 3^{rd} period ,group 16

Answer: B

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7. All elements in the third period have

A. Three complete shells

B. Three complete subshells

C. Three valence electrons

D. Three electrons less than octet .

Answer: B

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

A. $[Rn]6d^{10}7s^27p^2$

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

C. $[Xe]4f^{14}5d^16s^2$

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

Answer: D

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

A. $s > p > d > f$

B. $s < p < d > f$

C. $s < p < d < f$

D. $s > p < d < f$

Answer: A

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10. Which of the following sequence contains atomic number of only representative elements ?

A. 55 ,12 ,48 ,53

B. 13,23,54,83

C. 3,33,53,87

D. 22,33,55,66

Answer: C

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

A. 11 and 20

B. 12 and 30

C. 13 and 31

D. 14 and 33

Answer: C

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12. Which of the following statements is incorrect ?

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

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

C. The ionization potential of Mg is greater than aluminium

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

Answer: B

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13. Total number of elements present in 5 th period of modern periodic table is

A. 2

B. 8

C. 18

D. 32

Answer: C

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

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

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

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

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

Answer: D

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

A. increases in number of orbit

B. increases in number of protons and neutrons

C. increase in number of protons

D. increase in number of protons neutrons and electrons

Answer: A

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

A. K, Ca

B. H, He

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

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

Answer: B

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

IE_1 : 250 kJ mo^{-1}

IE_2 : 820 kJ mo^{-1}

IE_3 : 1100 kJ mo^{-1}

IE_4 : 1400 kJ mo^{-1}

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

A. 3

B. 4

C. 2

D. 1

Answer: D

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

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

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

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

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

Answer: A

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

A. MX

B. MX_2

C. MX_3

D. M_2X

Answer: C

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

A. $Hg_{(s)} \rightarrow Hg^{+}_{(g)} + e^{-}$

B. $Hg_{(l)} \rightarrow Hg^{+}_{(g)} + e^{-}$

C. $Hg_{(g)} \rightarrow Hg^{+}_{(g)} + e^{-}$

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

Answer: C

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

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

A. 18 kJ

B. 36 kJ

C. 360 kJ

D. 24 kJ

Answer: A

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22. The process requiring absorption of energy is

A. $F \rightarrow F^-$

B. $H \rightarrow H^+$

C. $Cl \rightarrow Cl^-$

D. $O \rightarrow O^-$

Answer: B

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23. The least electronegative element has the following electronic configuration

A. ns^2np^5

B. ns^2np^4

C. ns^2np^3

D. ns^2np^6

Answer: D

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

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

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

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

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

Answer: B

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

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

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

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

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

Answer: B

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Assignment Section C Previous Year Question Paper

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

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

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

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

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

Answer: C::D

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

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

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

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

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

Answer: D

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

A. $H^- > H^+ > , H$

B. $Na^+ > F > O^2$

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

D. $AI^{3+} > Mg^{2+} > N^{3-}$

Answer: C

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4. Identify the wrong statement in the following.

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

B. Atomic radius of the elements decreases as one moves across from left to right in the 2^{nd} period of the periodic table

C. Amongst isoelectronic species smaller the positive charge on the cation smaller

is the ionic radius

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

Answer: C

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

A. $+2.55eV$

B. $+10.2eV$

C. $-5.1eV$

D. -10.2 eV

Answer: C

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

enthalpy with negative sign for the elements O, S, F and Cl?

A. $CI < F < O < S$

B. $O < S < F < CI$

C. $F < S < O < CI$

D. $S < O < CI < F$

Answer: B

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

A. $Ca^{2+} > K^{+} > S^{2-} > CI^{-}(2)$

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

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

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

Answer: C

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

A. $Mg < Ca < Cl < P$

B. $Cl < P < Mg < Ca$

C. $P < Cl < Ca < Mg$

D. $Ca < Mg < P < Cl$

Answer: B

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9. Amongst the element with following electronic configurations, which one of them may have the highest ionization energy ?

A. $Ne\left[3s^2 3p^2\right]$

B. $Ar\left[3d^{10} 4s^2 4p^3\right]$

C. $Ne\left[3s^2 3p^1\right]$

D. $Ne\left[3s^2 3p^3\right]$

Answer: D

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10. The correct order of the size is

A. $Ca^{2+} < Ar < K^{+} < CI^{-} < S^{2-}$

B. $Ca^{2+} < K^{+} < Ar < S^{2-} < CI^{-}$

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

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

Answer: C

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

(a)$Cl < F < S < O$

(b) $O < S < F < Cl$

(c) $S < O < Cl < F$

(d) $F < Cl < O < S$

A. $CI < F < S < O$

B. $O < S < F < CI$

C. $S < O < CI < F$

D. $F < CI < O < S$

Answer: B

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

A. $Ca < Al < C < O < F$

B. $Al < Ca < O < C < F$

C. $Al < O < C < Ca < F$

D. $C < F < O < Al < Ca$

Answer: A

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

below the above element in the periodic table

?

A. 36

B. 49

C. 50

D. 54

Answer: C

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

A. K^+

B. Ca^{2+}

C. CI^-

D. S^{-2}

Answer: D

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15. The electronic configuration of inner transition elements is

A. ns^1

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

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

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

Answer: D

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16. Which of the following has the smallest size ?

A. AI^{3+}

B. F^{-}

C. Na^{+}

D. Mg^{2+}

Answer: A

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

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

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

C. $Al^{2+} = Al^{+} = Al$

D. All of these

Answer: A

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

A. $8.29, 8.29$

B. $11.32, 11.32$

C. $8.29, 11.32$

D. $11.32, 8.21$

Answer: D

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19. The correct order of first ionization potential among following elements, Be, B, C,N & O is

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

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

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

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

Answer: A

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20. An atom has electronic configuration $1s^2, 2s^2, 2p^6, 3s^2, 3d^3, 4s^2$ you will place it in

A. Fifth

B. Fifteenth

C. Second

D. Third

Answer: A

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21. Ionic radii are

A. Inversely proportional to effective nuclear charge

B. Inversely proportional to square of effective nuclear charge

C. Directly proportional to effective nuclear charge

D. Directly proportional to square effective nuclear charge

Answer: A

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22. Four successive members of the first row transition elements are listed below with their atomic number. Which one of them is expected to have the highest third ionisation enthalpy ?

A. Vanadium (Z= 23)

B. Chromium (Z= 24)

C. Manganesc (Z=25)

D. Iron (Z=26)

Answer: C

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23. The element with highest electronegativity will belong to

A. Period 2, group 17

B. Period 3, group 17

C. Period 2, group 18

D. Period 2, group 1

Answer: A

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

A. 5149kJ

B. 51.49 kJ

C. 2745 kJ

D. 514.9 kJ

Answer: B

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

A. $Na^{+} > Mg^{+2} > CI^{+7} > Sj^{4+}$

B. $Na^{+} > Mg^{+2} > Si^{4+} > CI^{+7}$

C. $CI^{+7} > Si^{+4} > Mg^{+2} > Na^{+}$

D. $CI^{+7} > Na^{+} > Mg^{+7} > Si^{+4}$

Answer: B

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26. Match the following regarding nature of the oxides

Column-I	Column- II
$a.\ H_2O$	(i)Basic
$b.\ Na_2O$	(ii)Amphoteric
$C.\ ZnO$	(iii) Acidic
$d.\ SO_3$	(iv) Neutral

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

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

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

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

Answer: C

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

A. H^+

B. Li^+

C. Na^+

D. Mg^{2+}

Answer: B

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Assignment Section D Assertion Reason Type Question

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

A: Be and Al show diagonal relationship .

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

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

the assertion then mark (1) .

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

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

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

Answer: B

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

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

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

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

of the assertion then mark (2)

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

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

Answer: B

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3. Assertion(A) : He and Be have similar electronic configuration of the type ns^2.

Reason (r): Both are chemically inert.

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

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

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

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

Answer: C

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

A : Electron affinity of oxygen is higher than suiphur.

R : Number of valence orbitals containing electrons are different.

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

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

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

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

Answer: D

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

A: Ionization enthalpy decreases on moving down the group .

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

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

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

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

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

Answer: A

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

A : Atomic radii decreases in a period upto halogen .

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

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

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

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

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

Answer: B

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

A : Lanthanum (Z: 57) is lanthanoid .

R : Valence electrons are present in 4 f orbital.

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

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

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

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

Answer: D

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

A : Na_2O is more basic than AI_2O_3 .

R : Sodium is less electropositive than aluminium.

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

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

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

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

Answer: C

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

A : F is most electronegative element of

periodic table.

R : Cl is having highest electron affinity.

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

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

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

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

Answer: B

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

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

R: Coinage metals are d-block metals .

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

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

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

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

Answer: B

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