CHEMISTRY

BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)

CLASSIFICATION OF ELEMENTS & PERIODICITY IN PROPERTIES

Warm Up Exercise

1. Write Dobereinder's law of traids and cite an example.

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2. Three elements X, Y and Z follow Doberiner's law of traids. If atomic masses of X and Z are 7 and 39 respectively, then determine the atomic mass of Y.

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3. Write Nelands's law of octaves.

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4. For which elements, Newlands' law of octaves is not applicable?

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5. What property did mendeleev use to classify the elements?

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6. What do you mean by periodicity of properties of elements?


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7. Which properties of the elements are dependent on its electronic configuration and which are not?


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8. How many periods annd groups are there in the modern version of mendeleev's periodic table?

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9. Elements of the 4th, 5th and 6th period of mendeleev's periodic table were divided into even and odd series-why?

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10. Name the elements with which even and odd series of 4th, 5th and 6th periods begin.

11. What is the importance of zero group in periodic table?

12. Identify the elements eka-aluminium and eka-silicon. What wa the reason for such naming?

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13. Mention two defects of Mendeleev's periodic table.

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

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15. What is the cause of periodicity in properties of the elements?

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16. How many periods and groups are there in the present form (i.e., long form) of the periodic table?

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17. Which group of the long form of the periodic table contains solid, liquid and gaseous elements?

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18. State the reason for repetition of properties of the elements after certain regular intervals of their atomic numbers.

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19. What are rare-earth elements? Why are they so called?

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20. Write down the names of the coinage metals and indicate their position in the long form of the periodic table.

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21. Give one example of each of the following and indicate their positions in periodic table (long form) (i) liquid non-metal (ii) liquid metal (iii) radiactive halogen (iv) radiactive inert gas (v) radiactive alkali-metal.

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22. On the basis of energy sequence of subshells, show that there are 32, elements in the 6th period.

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23. Indicate the period which contains the first series of transition elements.

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24. Mention the names of the first member of each of first, second and third series of transition elements.

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25. Mention the names of the first and last member of actinide series.

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26. What are pnictogens and chalcogens?

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27. Elements of same group exhibit similar chemical properties- why?

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28. Mention the limitations of the long form of the periodic table.

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29. What are d-block elements? Give their general electronic configuration.

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30. Why are sodium (Na) and potassium (K) placed in the same group of the pariodic table? Give any two reaons?

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31. Give general electronic configuration of (i) transition elements and (ii) inner-transition elements.

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32. What is the reason for paramagnetic behaviour of most of the d-block elements?

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33. Why do some of the alkali metal salts impart colour to the flame?

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34. What is the reason for strong reducing character of s-block elements?

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35. d-block elements form coloured complexes. Explain.

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36. Which block in the periodic table contains metals, non-metals and metalloids? Give three examples of metalloids.

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37. What are the difference between typical and transitional elements?

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38. Can Cu (At. No. 29) and Zn (At. No. 30) be called transition elements? Explain.

39. Cu in +1 oxidation state and Hg in +2 oxidation state resemble each other in their properties. Explain.

40. What is lanthanoid contraction? Accound for such contraction.

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41. Mention the names of two noble metals and indicate their positions in the periodic table.

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42. Which one of the following exhibits paramagnetism? Sc^{3+}, Cr^{3+}, Cu^{+}, Zn^{2+}

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43. Locate the position of an element with atomic number 33 in the long form of the periodic table.

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44. Find the atomic number of an element which belongs to third period and group-17 in the periodic table.

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45. An element belongs to third period of p-block. It has five valance electrons. Predict its group.

A. 13

B. 16

C. 15

D. 10

Answer: C

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46. Write the IUPAC name and symbol of the element with atomic number 135.

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47. How many elements beyond actinides have been given official names in the last period of the periodic table? Write the IUPAC name and symbol of the last element.

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48. Arrange the following elements in decreasing order of their atomic radius: Na, H, Si, S, P, Cl

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49. Atomic radius of elements in a period decrease with increase in atomic number but for inert gases it increases. Why?

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50. What are isoelectronic species? Name one isoelectronic species for (i) F^-, (ii) Ar (iii) Mg^{2+}, (iv) Rb^+.

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51. Indicate the largest and smallest species among the following : Mg, Al, Mg^{2+}, Al^{3+}.

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52. Consider the set of ions $(Na^{+}, N^{3-}, Mg^{2+}, O^{2-}, F^{-}$ and $Al^{3+})$ and answer the following questions:

(i) what is the common factor associated with the species.

(ii) Arrange the ions in order of increasing radii.

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53. Number of electrons in Sr^{2+} and Br^{-} are same, justify whether atomic radii of these two ions will be same or not.

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54. Write the names of the smallest cation and anion.

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55. Calculate the atomic volume of sodium (atomic mass=23) if density be 0.972 g-cm^{-3}.

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56. On the basis of atomic number and position in the periodic table arrange the following elements in decreasing order of their metallic character Si, Na, Mg, P, Be.

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57. Arrange in increasing order of oxidisinig power F,Br,Cl, I.

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58. The atom of an element has the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^5$. Identify it as a metal or a non-metal.

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59. Which of the following oxide is the most acidic in nature?

$Al_2O_3, SO_2, SO_3, P_4O_{10}$ and CO.

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60. Arrange the elements according to the instruction given:

(i) Na, Cu, Zn (increasing order of electropositivity).

(ii) Na, Cs, K, Rb Li (increasing order of atomic volume).

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61. First ionisation enthalpy off Na is less than that of Mg, but second ionisation enthalpy of Na is higher than that of Mg. explain.

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62. Ionisation enthalpy values of Se, Br, Te and I are 869, 941, 1191 and 1142kJ $\cdot mol^{-1}$. The values are not arranged in the correct order. Predict for which elements the ionisation enthalpy value is 869 kJ $\cdot mol^{-1}$ and 1142 $kJ \cdot mol^{-1}$ respectively.

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63. Ionisationn enthalpy of Be is greater than that of B-why?

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64. Why is the ionisation enthalpy of oxygen is less than those of nitrogen ad fluorine?

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65. Outermost electronic configuration of two elements are $2s^2$ and $2s^2 2p^1$ respectively. Which has greater ionisation enthalpy?

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66. Which has highest ionisation enthalpy, N, O, Ar, P?

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67. Ionisation potential fo hydrogen is 1312 $kJ \cdot mol^{-1}$ Express the value in $eV \cdot \text{atom}^{-1}$. $(1eV = 1.6 \times 10^{-19})$

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68. Electron gain enthalpy of N is less than that of O. explain.

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69. F is more electronegative than Cl, but electron-gain enthalpy of Cl is greater than that of F. explain.

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70. Why does nitrogen posses positive electron-gain enthalpy?

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71. Identify the elements having maximum and minimum negative value of electron affinity P,S, Cl and F. explain.

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72. What is the basic difference between electron-gain enthalpy and elecrronegativity of an element?

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73. Which one has the least electron-gain enthalpy: B,C, N,O?

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74. Electron-gain enthalpy value of Cu is negative while that of Zn is positive explain?

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75. Indicate the similarity in the electron affinity of Mg and N.

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76. Explain the order of electronegativity: $I < Br < Cl < F$.

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77. Out of the following elements, which one has the least value of electronegativity? Na, C,S,Br,Mg, Li

78. Arrange in increasing order of electronegativity N,Na,Si,Cl.

79. Which element in each of the following pairs has higher electronegativity (i) K & Cu, (ii) P & S, (iii) C & Si.

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80. Justify the following statement- Electronegativity of N atom in all nitrogen-containing compounds is same.

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81. Write the fformula of the compound formed by the most electronegative and least electronegative elements.

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82. Which is most acidic SO_3, P_2O_5, ZnO, Na_2O?

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83. Which is most basic: $SiO_2, MgO, Al_2O_3, Na_2O$?

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84. Arrange according to the instruction given (i) $Al_2O_3, P_2O_5, Cl_2O_7, SO_3$ (increasing order of acidic) (ii) $MgO, ZnO, CaO, Na_2O, CuO$ (increasing order of basicity).

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85. How does the basicity of the oxides of representative elements vary on moving down a group in the periodic table? On moving across a period from left to right, how does the acidicty of the oxides of representative elements vary?

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86. identify the following as acidic, basic or amphoteric oxides: BeO, Al_2O_3, CaO, SiO_2.

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87. Between NaOH and CsOH, which one is more basic and why?

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88. B_2O_3 is acidic while BeO is an amphoteric oxide. Why?

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89. Formulas of oxide and chloride of an element M is $M_2O_3 \& MCl_3$ respectively. State the group to which the element belongs to. Determine whether it is a metal or non-metal.

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90. Arrange the following compounds in increasing order o their reducing property: NH_3, PH_3 and AsH_3 .

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91. The aqueous solution of NH_3 is slightly basic whereas aqueous solution of H_2S. Is slightly acidic. Why?

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92. Which products are liberated at the cathode and anode when molten ionic hydrides are electrolysed?

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93. Why diagonal relationship is not observed in case of elements of the fourth and fifth periods?

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94. Li and Mg are found in different groups of the periodic table, yet they show similar chemical properties. Explain.

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95. Write the reasons in favour of placing hydrogen in grou pIA of the periodic table.

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96. Briefly discuss the position of noble gases in Mendeleev's periodic table along with reaon.

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97. Write the reasons in favour of placing hydrogen in group VIIA of the periodic table.

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Question Answer Zone For Board Examination

1. Mentnion two laws (for the (classification of elements), which were proposed before mendeleev.

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2. Write IUPAC name and the symbol of the element with atomic number 100.

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3. What are the names given to eka-aluminium and eka-silicon predicted by mendeleev?

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4. mention the number of periods and groups in the long form of the periodic table.

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5. Mention the name of the s-block element which is placed along with the p-block elements.

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6. To whicih groups of the long form of periodic table to the chalcogens belong?

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7. Write the general electronic configuration of innertransition elements.

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8. Write the stomic number of the element placed just below cobalt (Z=27) in the modern periodic table.

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9. Indicate the position of the element having electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$ in the periodic table.

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10. What is the total number of elements incorporated till not in the periodic table? Write down the name and symbol of the last element.

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11. Which group of the long form of the periodic table contains solid, liquid and gaseous elements?

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12. Which element is the most electronegative?

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13. Name one property which is not periodic.

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14. Arrange according to the instructions given the in the bracker: (1) O, Te, Se, S

(Increasing order of electronegativity),

(2) Na, Cu, Zn (Increasing order of electropositive character),

(3) I, F, Br, Cl (Increasing order of metallic character).

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15. Name the elements having highest and lowest ionisation enthalpy.

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16. What do mean by the statement-covalent radius of H-atom is 0l.37 Å?

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17. indicate the similarity observed in the electron-gain enthalpy values of Mg and N.

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18. Why is the size F^- smaller tha that of O^{2-} ion?

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19. Compare the radii of K^+ and Cl^- ions (each contain the same number of electron).

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

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21. Electronic configuration of the atom of an element is $1s^2 2s^2 2p^6 3s^2 3p^1$. Locate its position in the periodic table. It is a metal or non-metal? What is its valency?

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22. Atomic numbers of elements A,B and C are 10,13, & 17 respectively. (1) Write their electronic configuration rations.

(2) Which one of them will form cation and which one an atnion?.

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23. A, B and C are three elements with atomic numbers 17,18 and 20 respectively.

(1) Write theirelectronoic configuration.

(2) which one of them is metal and which one a non-metal?

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24. Outer electronic configuration of 4 elements are as given below follows:

(1) $3d^0 4s^1$

92) $3s^2 3p^5$

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25. Write electronic configuration of the element with atomic number 35. what will be the stable oxidation states of the element?

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26. Justify the mentioning two reasons, the inclusion of Ca and Mg in the same group of the periodic table.

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27. Cu, Ag & Au are regarded as transition elements. Why?

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28. Write down electronic configuration of the element having atomic number 21. name two other elements of the series to which this element belongs, why do they belong to the same series?

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29. Can Cu (At. No. 29) and Zn (At. No. 30) be called transition elements? Explain.

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30. Atomic number of three elements A,B and C are 8, 13 and 17 respectively

(1) Write their electronic configuration.

(2) Ascertain their positions in the periodic table.

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31. Why is atomic size of Ca^{2+} smaller than that of K^{+} ?

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32. Atomic radius of chlorine atom is 0.99 Å but ionic radius of chloride $\left(Cl^{-}\right)$ is 1.81 Å- explain.

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33. First ionisation energy of elements increases with atomic numbers of the elements in a period-why cite an exception.

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34. Ionisation potential of O is less than that of N-explain.

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35. Explain why the Ionisation potential of inert gases are very high white that of alkali metals are very low.

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36. Which member in each of the following pairs has lower value of ionisation potential

(1) F, Cl

(2) S, Cl

(3) Ar, K.

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37. Why is the value of electron-gain enthalpy negative?

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38. Calculate the energy (in kJ unit) required to convert all sodium atoms into sodium ion, present in 3.45 mg of its vapour ? (I.P of sodium 490kJ mol^{-1})

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39. A,B,C and D are four elements of the same period, of which A and B belong to s-block. B and D react together to form B^+D^-. C and D unit together to produce a covalent compound, CD_2.

(1) What is the formula of the compound formed by A and D?

(2) What is the nature of that compound?

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40. What changes in the following properties are observed while moving from left to right along a period & from top to bottom in a group? (1) Atomic volume,

(2) Valency,

(3) Electronegativity.

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1. (i) Write the name of the element which is diagonally related to the element beryllium.

(ii) Three element A, B and C have atomic numbers 11, 14 and 17 respectively. State the blocks in periodic table in which elements A and C belong to. Write the formulas of the compound formed between B and C and A and C. state the nature of the bonds.

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2. (i) Classify as basic amphoteric or acidic. BeO, Al_2O_3, CaO, SiO_2.

(ii) State the modern periodic law.

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3. (i) Write the symbols of one transition and inner-tranisatio element.

(ii) Indicate as directred: (a) which has the highest ionic radius? Al^{3+}, Mg^{2+}, O^{2-}, F^{-}.

(b) which has the lowest electronegativity? H,

Na, Si, Cl.

(c) which has highest ionisation energy N, O, Ar, P.

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4. (i) State the group number in modern periodic table where solid, liquid and gaseous elements are present at room temperature. Identify solid, liquid element.

(ii) Indicate the given elements as alkali metal,

alkaline-earth metal, coinage metal, chalcogen:

Li, Ca, S,Cu.

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5. Among which of the following pairs of elements, the first one has lesser ionisation energy than the second-

A. Na, K

B. N, O

C. B, Be

D. Br, I

Answer:

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6. Name a pair of elements exhibit diagonal relationship.

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7. Name a chalcogen and an alkaline earth metal.

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8. Explain why the size of a cation is smaller than that of corresponding neutral atom and it is reverse for an anion.

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9. State how oxidising and reducing properties change along the group of periodic table.

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10. (i) Mention the names of most electropositive and most electronegative stable elements in the periodic table.

(ii) What is metalloid? Give one example.

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

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12. Arrange as directed: (i) $SiO_2, NO_2, Al_2O_3, CiO_2$ (Increasing acidic property)

(ii) Na^+, Al^{3+}, F^-, Cl^-

(increasing ionic radius).

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13. Arrange the following ions in the increasing order of their ionic radius $F^-, Mg^{2+}, Al^{3+}, O^{2-}$.

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14. Arrange the following elements according to their decreasing oxidising ability I,Br, F,Cl.

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15. Arrange as per introduction: (i) $Na_2O, B_2O_3, Al_2O_3, MgO$ (increasing order of basicity) (ii) Be, O, Cl, I (increasing order of electronegativity).

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16. The first ionisation energy of the Be is greater than that of B but the second ionisation energy of Be is less than that of B. explain.

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17. (i) Two atoms X and Y have electronic configuration $[He]2s^2 2p^3$ and $[Ne]3s^2 3p^2$ respectively. Which period and group of periodic table do they belong to?

(ii) Second electron affinity of an element is always endotheric. Explain.

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18. (i) Electron affinity of Cl is greater than that of E explain.

(ii) Indicate the basic/acidic behaviour of the hydrides of following elements: F,C,O,N.

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19. metallic property of element-___down the group in periodic table.

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20. Arrange the following in increasing order of ionic radius: $Na^+, F^-, O^{2-}, Al^{3+}, N^{3-}$.

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21. (i) Why does nitrogen have a higher ionisation enthalpy than that of oxygen?

(ii) Arrange the following in increasing order of acidity: $NO_2, Al_2O_3, SiO_2 : ClO_2$.

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22. What will be the order of Na, Mg, Al and Si in terms of first ionisation enthalpy?

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23. Arrange the following ions in order of increasing ionic radii: Na^+, F^-, O^{2-}, Mg^{2+}.

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24. (i) Why is theh electron-gain enthalpy of oxygen is less than that of sulphur?

(ii) Arrange the following metal oxides in terms of ascending order of basicity: ZnO, MgO, CaO, CuO.

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25. (i) Why is the first ionisation enthalpy of helium maximum among all the elements?

(ii) Arrange thegiven compounds in terms of

ascending order of oxidising property: HCl, HBr, HI, HF.

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26. Determine the position of an element in long form of periodic table if its electronic configuration is $[_{18}Ar]3d^{10}4s^2$.

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27. Mention the name and the position of two elements, one of which is most electronegative annd other is most electropositive in periodic table.

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28. (i) Which of the following two elements have diagonal relationship? Li, Be, Al and Si.

(ii) Between $_{29}Cu$ and $_{19}K$ which one has higher ionisation enthalpy and why?

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29. Arrange the following ions in ascending order of radius: $Na^+, F^-, O^{2-}, Mg^{2+}$

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30. Is the electronegativity of Sn^{2+} and Sn^{4+} equal or different?

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31. (i) What is the oxidation state of TI in the compound TlI_3?

(ii) Which is stronger oxidising agent between CO_2 and PbO_2 and why?

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32. (i) Which one is more stable between BCl_3 and $TiCl_3$ and why?

(ii) What is oxidation state of Zn in Zn-Hg?

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33. Arrange the following elements in the increasing order of their first ionisation enthalpy. Li, Be, Na, Mg.

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34. Arrange the following elements in the decreasing order of their electro-negativity Si, N, F, Cl.

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35. (i) The outermost electronic configuration of the atom of an element is $3s^2 3p^3$. Mention its position of the element in the long periodic table.

(ii) Why is electron gain enthalpy of oxygen less than that of sulphur.

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Solved Ncert Exercise

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

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2. Which property did Medeleev use to classify the elements in his periodic table? Did he stick to that?

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

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

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

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

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7. Which element do you think would have been names by-Lawrence Berkely Laboratory & Sseaborg's group?

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

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9. What does atomic & ionic radius really mean to you?

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10. What do atomic radius vary in a peiod and ini a group? How do you explain the variation?

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

(1) F^-

(2) Ar.

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12. Consider the given species: $N^{3-}, O^{2-}, F^-, Na^+, Mg^{2+}$ and Al^{3+}

(1) What is common in them?

(2) Arrange them in the order of increasing ionic radii.

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

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14. What is the significance of the terms- 'Isolated gaseous atom' and 'ground tate'

while defining the ionisation enthalpy ad electron-gain enthalpy?

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15. Enegy of an electron in the ground state of the H. atom is $-2.18 \times 10^{-18} J$. Calculate the ionisation enthalpy off atomic hydrogen in terms of $J \cdot mol^{-1}$.

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

(1) Be has higher $\Delta_i H$ than B

(2) O has lower $\Delta_i H$ than N and F?

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17. How would you explain the fact that the first ionisation enthalpy of sodium is lower

than that of magnesium but its second ionisation enthalpy is higher than that of magnesium?

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

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19. First ionisation enthalpy values (in kJ mol^{-1}) of group-13 elements are B=801, Al=577, Ga=578, In=558 and TI=589, how would you explain this deviation from the general trend?

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20. Which of the given pairs would have a more negative electron-gain enthalpy: (1) O or

F

(2) F or Cl?

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21. Electron gain enthalpy of Cl is more negative than F though electronegativity of F is greater than 'Cl'- Explain.

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

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

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

(1) gains an electron

(2) Loses an electron.

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

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

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27. Use the periodic table in answer the given questions.

(1) Identify an element with 5 electrons in outer subshell.

(2) Identify an element that would tend to lose

2 electrons.

(3) Identify a element that would tend to gain 2 lectrons.

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

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

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30. Assign the position of the element having outer electronic configuration (1) $ns^{2_np^4}$ for n=3,

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

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31. The first $(\Delta_i H_1)$ and second $(\Delta_i H_2)$ ionisation enthalpy $\left(kJ \cdot mol^{-1}\right)$ and the $\left(\Delta_{eg} H\right)$ electron-gain enthalpy (in $kJ \cdot mol^{-1}$) o a few elements are given below:

which of the above elements is likely to be:

(1) the least reactive element.

(2) the most reactive metal.

(3) The most reactive non-metal.

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32. Predict the formulas of the stable binary compounds that would be formed by given paris of elements: (1) Li and O, (2) Mg and N, (3) Al and I, (4) Si and O, (5) P and F, (6) Element with atomic number 7I and F.

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33. In modern periodic table, period indicates the value of (A) atomic number

(B) atomic mass

(C) principal quantum number ltbr. (D) azimuthal quantum number.

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

A. P-blcok has 6 columns, because a maximum of 6 electron can occupy all the orbitals in a. p-shell.

B. d-block has 8 columns, as a maximum of 8 electrones can occupy all the orbitals in a d-subhsell.

C. Each block contains a number of coloums. Equal to the number of electrons that an occupy that subshell.

D. Block indicates value of azimuthal quantum number (l) for last subshell that received electrons in building up electronic configuration.

Answer: B

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

(A) Valence principal quantum number (n).

(B) Number charge (Z).

(C) Nuclear mass

(D) Number of core electrons.

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36. Size of isoelectronic species F^-, Ne, Na^+ is affected by:

A. nuclear charge (Z)

B. Valence pricipal quantum number (n)

C. electron-electron interaction in the outer orbitals

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

Answer: A

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37. Which one of the following statement is incorrect in relation to ionisation enthalpy?

A. Ionisation enthalpy increases for each successive electron.

B. The greatest increase in ionisation enthalpy core experienced on removal of

electron from core noble gas configuration.

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

D. Removal of electron from orbital with higher value.

Answer: D

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

A. $B > Al > Mg > K$

B. $Al > Mg > B > K$

C. $Mg > Al > K > B$

D. $K > Mg > Al > B$

Answer: D

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39. Considering the element B, C, N, F and Si, the correct order of their non-metallic character to

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

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

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

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

Answer: C

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

A. $F > Cl > O > N$

B. $F > O > Cl > N$

C. $Cl > F > O > N$

D. $O > F > N > Cl.$

Answer: B

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Higher Order Thinking Skills Hots Questions

1. What will be the name (IUPAC) and symbol if the element with atomic number 119 is discovered? Write its electronic configuration. Also write the formulas of the stable chloride and oxide of this element.

Watch Video Solution

2. Formulas of oxide and chloride of an element A are A_2O_5 and ACl_3 respectively.

Which group of the mendeleev's periodic table will the element belong to? State whetehr it is a metal or a non-metal.

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3. A and B are two elements with atomic numbers 9 and 17 respectively. Explain why the element A is a more powerful oxidisng agent than the element B.

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4. Elements A, B and C have atomic numbers (Z-2), Z and (Z+1) respectively. Of these, B is an inert gas.

(1) Which one of these has the highest electronegativity?

(2) Which one of the these has thhe highest ionisation potential?

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5. Atomic radius of $_{10}Ne$ is more than that of $_{9}F^{-}$ why?

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6. First electron affinity of oxygen is negative but second electron affinity is positive-explain.

Watch Video Solution

7. Electron affinity of sodium is negativ but magnesium has positive value-why?

Watch Video Solution

8. if electron affinity of chlorine is 350 $kJ \cdot mol^{-1}$, then what is the amount of energy liberated to convert 1.779g of chlorine (existing at atomic state) to chlroide ions completely (in gaseous state)?

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9. Second ionisation enthalpy of Mg is sufficiently high and second electron-gain enthalpy of O has a positive value. How do you

explain the existence of $Mg^{2+}O^{2-}$ rather than $Mg^{+}O^{-}$?

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10. Atomic numbers of some elements are given below. Classify them into three groups so that the two elements in each group exhibit identical chemical behaviour: 9,12,16,34,53,56.

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11. Which one is more basic and why-mGo & Al_2O_3?

Watch Video Solution

12. "Through the nuclear charge of sulphur is more than that of phosphorus, yet the ionisation potential of phosphorus is relatively high"-why?

Watch Video Solution

13. Mg has relatively higher ionisation enthalpy than Al although the atomic number of the latter is more than the former-explain why?

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14. Compare the atomic radii of fluorine and neon.

Watch Video Solution

15. Why are electron-gain enthalpy of Be and N positive?

Watch Video Solution

16. "Electron affinity of lithium is negative but the electron affinity of beryllium is positive"- why?

Watch Video Solution

17. $LiCO_3$, inspite of being an alkali metal carbonate, is sparingly soluble in water like $MgCO_3$- explain.

Watch Video Solution

Entrance Question Bank

1. An element belong to group-15 and third period of the periodic table. Its electronic configuration will be-

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

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

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

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

Answer: C

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2. Which one of the following has lowest ionisation energy-

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

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

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

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

Answer: B

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3. It the 1st ionisation energy of H atom is 13.6 eV, then the 2nd ionisation energy of the atom is-

A. 27.2 eV

B. 40.8 eV

C. 54.4 eV

D. 108.8 eV

Answer: C

Watch Video Solution

4. The stable bivalency of Pb and trivalency of Bi is-

A. due to d contraction in Pb and Bi

B. due to relativistic contraction of the 6s-orbitals of Pb and Bi, leading to inert pair effect.

C. Due to screening effect

D. due to attainment of noble gas configuration

Answer: B

Watch Video Solution

5. Which of the following is correct?

A. radius of $Ca^{2+} < Cl^{-} < S^{2-}$

B. radius of $Cl^{-} < S^{2-} < Ca^{2+}$

C. radius of $S^{2-} = Cl^{-} = Ca^{2+}$

D. radius of $S^{2-} < Cl^{-} < Ca^{2+}$

Answer: A

Watch Video Solution

6. For BCl_3, $AlCl_3$ and $GaCl_3$, the following order of ionic character is-

A. $BCl_3 < AlCl_3 < GaCl_3$

B. $GaCl_3 < AlCl_3 < BCl_3$

C. $BCl_3 < GaCl_3 < AlCl_3$

D. $AlCl_3 < BCl_3 < GaCl_3$.

Answer: C

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7. The hydrides of the first elements in group 15-17, namely NH_3, H_2O and HF respectively show abnormally high values for melting and boililng points. This is due to-

A. small size of N, O and F

B. the ability to form extensive intermolecular H-bonding

C. the ability to form extensive intramolecular H-bonding

D. effective van der waals interactions.

Answer: B

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8. Decreasing basic character of K_2O, BaO, CaO, MgO is

A. $K_2O > BaO > CaO > MgO$

B. $K_2O > CaO > BaO > MgO$

C. $MgO > BaO > CaO > K_2O$

D. $MgO > CaO > BaO > K_2O$

Answer: A

Watch Video Solution

9. Amongst Be, B, Mg and Al the second ionisation potential is maximum for-

A. B

B. Be

C. Mg

D. Al

Answer: A

Watch Video Solution

10. An element X belongs to fourth period and fifteenth group of the periodic table. Which of the following statements is true-

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

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

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

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

Answer: D

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11. Which of the following atoms should have the highest 1st electron affinity-

A. F

B. O

C. N

D. C

Answer: A

Watch Video Solution

12. Which of the follwing order is wrong?

A. SO_2, P_2O_5, CO

B. BeO, Al_2O_3, SO_2

C. CaO, SiO_2, Al_2O_3

D. CO_2, Al_2O_3, CO

Answer: B

Watch Video Solution

13. Which of the following orders presents correct sequence of the increasing basic nature of the given oxides-

A. $Al_2O_3 < MgO < Na_2O < K_2O$

B. $MgO < F_2O < Al_2O_3 < Na_2O$

C. $Na_2O < K_2O < MgO < Al_2O_3$

D. $K_2O < Na_{20O < Al_2O_3 < MgO}$

Answer: A

Watch Video Solution

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

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

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

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

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

Answer: B

Watch Video Solution

15. The first ionisation potential of Na is 5.1 eV. The value of electron gain enthalpy of Na^{+} will be-

A. $+2.55eV$

B. $-2.55eV$

C. $-5.1eV$

D. $-10.2eV$

Answer: C

Watch Video Solution

16. Which of the given represents correct order of incrasing first ionisation enthalpy for Ca, Ba, S, Se and Ar-

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

B. $CA < S < Ba < Se < Ar$

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

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

Answer: D

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17. Which one has the highest boiling point-

A. Kr

B. Xe

C. He

D. Ne

Answer: B

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18. Ionic radii (Å) of N^{3-}, O^{2-} and F^{-} are -

A. 1.71, 1.40 and 1.36

B. 1.71, 1.36 and 1.40

C. 1.36, 1.40 and 1.71

D. 1.36, 1.71 and 1.40

Answer: A

Watch Video Solution

19. Which of the following atoms ha the highest first ionisation energy-

A. Rb

B. Na

C. K

D. Sc

Answer: D

Watch Video Solution

20. The group having isoelectronic species is-

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

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

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

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

Answer: A

Watch Video Solution

21. Both lithium and magnesium displace several similar propertiess due to the diagonal relationship, however, the one which is incorrect, is-

A. both form nitrides

B. nitrates of both Li and Mg yiled NO_2 and O_2 on heating

C. both form soluble carbonates

D. both form soluble bicarbonates

Answer: C

Watch Video Solution

22. What is the value of electron-gain enthalpy of Na^+ if IE_1 of Na=5.1 eV-

A. $-5.1eV$

B. $-10.2eV$

C. $+2.55eV$

D. $+10.2eV$

Answer: A

Watch Video Solution

23. In which of the following arrangements, given sequence is not according to the property indicates against it-

A. $H_2O < H_2S < H_2Se < H_2Te$:

increasing pK_a values

B. $NH_3 < PH_3 < AsH_3 < SbH_3$:

increasing acidity

C. $CO_2 < SiO_2 < SnO_2 < PbO_2$:

increasing oxidising power

D. $HF < HCl < HBr < HI$: increasing

acidic strength

Answer: A

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24. Identify the wrong statement among the following-

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

B. atomic radius of the elements decreases as one moves across from left to right in the 2nd 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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25. Reason of lanthanoid contraction is-

A. negligible screening effect of f-orbitals

B. increasing nuclear charge

C. decreasing nuclear charge

D. decreasing screening effect

Answer: A

 Watch Video Solution

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

A. H^+

B. Li^+

C. Na^+

D. Mg^{2+}

Answer: B

Watch Video Solution

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

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

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

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

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

Answer:

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

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

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

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

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

Answer: A

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29. Because of lanthanide contraction, which of the following pairs of elements have nearly same atomic radii (Number in the parenthesis are atomic numbers)-

A. $Zr(40)$ and $Hf(72)$

B. $Zr(40)$ and $Ta(73)$

C. $Ti(22)$ and $Zr(40)$

D. $Zr(40)$ and $Nb(41)$

Answer: A

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

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

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

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

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

Answer: A

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31. The element Z=114 has been discovered recently. It will belong to which of the fallowing family/group and electronic configuration-

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

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

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

D. $ha\log enfamily,$

[Rn]5f^(14)6d^(10)7s^(2)7p^(5)`

Answer: A

Watch Video Solution

32. Among CaH_2, BeH_2, BaH_2, the order of ionic character is-

A. $BeH_2 < CaH_2 < BaH_2$

B. $CaH_2 < BeH_2 < BaH_2$

C. $BeH_2 < HaH_2 < CaH_2$

D. $BaH_2 < BeH_2 < CaH_2$.

Answer: A

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33. Which of the following is most acidic?

A. MgO

B. BeO

C. BaO

D. CaO

Answer: B

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34. The first ionisation enthalpy of Na, Mg and Si are 496, 737, 776 $kJ \cdot mol^{-1}$ respectively. What will be the first ionisatin enthalpy potential of Al Al in $kJ \cdot mol^{-1}$

A. $> 766 kJ \cdot mol^{-1}$

B. > 496 and $< 737 kJ \cdot mol^{-1}$

C. > 737 and $< 766 kJ \cdot mol^{-1}$

D. $> 496 kJ \cdot mol^{-1}$

Answer: B

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35. Which is correct regarding size of atom-

A. $N < O$

B. $B < Ne$

C. $V > Ti$

D. $Na > K$

Answer: B

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36. An element (X) belongs to fourthh period and fifteenth group of the periodic table. Which one of the following is true regarding the outer electronic configuration of (X)? It has-

A. partially filled d-orbitals and completely filled s-orbital.

B. completely filled x-orbital and completely filled p-orbitals.

C. completely filled s-orbital and half filled p-orbitals

D. half-filled d-orbitals and completely filled s-orbital.

Answer: C

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Mcq Hotspot

1. Which of the following transormation produces 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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2. The amount of energy released when 10^6 atoms of iodine in vapour state are converted into I^- ions is $4.8 \times 10^{-13} J$. What is the electron affinity of iodine in $kJmol^{-1}$

A. 489

B. 289

C. 259

D. 389

Answer: B

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3. The elements which occupy the peaks of ionisation energy potential curve, are-

A. Na, K, Rb, Cs

B. Na, Mg, Cl, I

C. Cl, F, Br, I

D. He, Ne, Ar, Kr

Answer: D

Watch Video Solution

4. The electronic conifiguration of the atom having maximum difference in second and third ionisation 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: A

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5. Identify the least stable ion amongst the following-

A. Li^-

B. Be^-

C. B^-

D. C^-

Answer: B

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6. If each orbital can accommodate maximum of four electrons„ the number of elements in the third period of the periodic table will be-

A. 10

B. 12

C. 14

D. 16

Answer: D

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7. Three elements, X and Y and Z are present in the third short period and their oxides are ionic, amphoteic and giant molecule respectively. The correct order of atomic number of X, Y and Z is-

A. $Z < Y < X$

B. $Y < Z < X$

C. $X < Z < Y$

D. $X < Y < Z$

Answer: D

Watch Video Solution

8. A gaseous mixture of He, Ne, Ar and Kr is irradiated with photons of frequency appropriate to ionise Ar. The ion(s) present in the mixuture will be-

A. Only Ar^+

B. Ar^+ and He^+

C. Ar^+ and Ne^+

D. Ar^+ and Kr^+

Answer: D

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9. Boiling point of Kr & Rn are $-152^\circ C \& -62^\circ C$ respectively. Then the boiling point of Xe is expected to be-

A. $-92^\circ C$

B. $-87^\circ C$

C. $-107^\circ C$

D. $-77^\circ C$

Answer: C

Watch Video Solution

10. Which of the following is smallest in size-

A. $Li^+(aq)$

B. $Na^+(aq)$

C. $K^+(aq)$

D. $Rb^+(aq)$

Answer: D

Watch Video Solution

11. Atomic radius of Li is 1.23 Å and ionic radius of Li^+ is 0.76 Å. Percentage of volume occupied by single valence electron in Li is-

A. 35

B. 52.5

C. 76.4

D. 83.72

Answer: C

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12. Number of valency electrons in element A is 3 and that in the element B is 6. most probable compound from A and B is-

A. A_2B

B. AB_2

C. A_6B_3

D. A_2B_3

Answer: D

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13. The ionic radius of 'Cr' is minimum in which of the following compounds-

A. K_2CrO_4

B. CrF_3

C. CrO_2

D. $CrCl_3$

Answer: A

Watch Video Solution

14. The correct order of radii is-

A. $N < Be < B$

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

C. $Na < Li < K$

D. $Fe^{3+} < Fe^{2+} < Fe^{4+}$

Answer: B

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15. The atomic number of the inert gas in which the total number of d-electrons is equal to the difference in the numbers of total p-and s-electrons is-

A. 18

B. 36

C. 54

D. 86

Answer: B

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16. The element with atomic number 118 (Uuo) has been discovered recently. Which of the following is not expected for this element-

A. It is radioactive and unstable element

B. It is a solid at room temperature

C. Its ionisation enthalpy is minimum in the group

D. It hs $7s^2 7p^6$ outer shell configuration

Answer: B

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17. Which occupy peak of the atomic volume curve-

A. transition element

B. halogens

C. alkali metals

D. alkaline earth metals

Answer: C

Watch Video Solution

18. The ionisation energy will be maximum for the process-

A. $Be \rightarrow Ba^{2+}$

B. $Be \rightarrow Be^{2+}$

C. $Cs \rightarrow Cs^{+}$

D. $Li \rightarrow Li^{+}$

Answer: B

Watch Video Solution

19. The correct order of second ionisation potential of carbon, nitrogen, oxygen and fluorine is-

A. $C > N > O > F$

B. $O > N > F > C$

C. $O > F > N > C$

D. $F > O > N > C$

Answer: C

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20. The most reactive metal is-

A. Na

B. Fe

C. Hg

D. Cs

Answer: D

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21. 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, then ionisation enthaly 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

Watch Video Solution

22. The second electron affinity of oxygen is +744 kJ $\cdot mol^{-1}$ then the second electron affinity of sulphur is-

A. $-200kJ \cdot mol^{-1}$

B. $+450kJ \cdot mol^{-1}$

C. $+800kJ \cdot mol^{-1}$

D. $1200kJ \cdot mol^{-1}$

Answer: B

View Text Solution

23. What would be the atomic number of the next halogen if discovered in future-

A. 116

B. 117

C. 118

D. 119

Answer: B

Watch Video Solution

24. An element belongs to group 17 ad the fourth period of the periodic table. Which of the following properties will be shown by the element-

A. gaseous, non-metallic

B. liquid, non-metallic

C. solid, non-metallic

D. solid, metallic

Answer: B

Watch Video Solution

25. Five successive ionisation enthalpies of an element are 800, 2427, 3638, 25024 & $32824kJ \cdot mol^{-1}$ respectively. The number of valence electrons of the element is-

A. 3

B. 5

C. 4

D. 2

Answer: A

Watch Video Solution

26. Choose the correct set of ionic radii among the following-

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

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

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

D. $K^+ > Cl^-$

Answer: C

Watch Video Solution

27. Electron affinity $\left(kJ \cdot mol^{-1}\right)$ of three halogens X, Y, Z are -349, -333 and -325. X, Y, Z are respectively-

A. F_2, Cl_2 and Br_2

B. Cl_2, F_2 and Br_2

C. Br_2, Cl_2 and F_2

D. Br_2, F_2 and Cl_2

Answer: B

Watch Video Solution

28. The correct order of ionic radii is-

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

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

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

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

Answer: A

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29. The ionisation enthalpy of lithium is 520 $kJ \cdot mol^{-1}$. The amount of energy required to convert 210 mg of Li-atoms is gaseous state into Li^{+} ions is-

A. $-520kJ$

B. $-173.\ kJ$

C. $2.47kJ$

D. $15.60kJ$

Answer: D

Watch Video Solution

30. Electronic conifguration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ indicates-

A. Metal cation

B. non-metal atom

C. non-metal anion

D. metal atom

Answer: A

Watch Video Solution

31. In the periodic table metals used as catalyst belongs to-

A. f-block

B. d-block has 8 columns, as a maximum of 8 electrones can occupy all the orbitals in a d-subhsell.

C. p-block

D. s-block

Answer: B

Watch Video Solution

32. Oxide of an element having configuration $[Ne]3s^1$ is-

A. amphoteric

B. basic

C. acidic

D. neutral

Answer: B

Watch Video Solution

33. Which one of the following orders is not in accordance with the property stated against it-

A. $F > Cl > Br > I$, Oxidising power

B. $F > Cl > Br > I$: electronegativity

C. $F - F > Cl - Cl > Br - Br > I - I$

: bond dissociation energy

D. $HI > HBr > HCl > HF$: acidic property in water

Answer: C

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34. In which of the following process energy is absorbed-

A. $F \rightarrow F^-$

B. $H \rightarrow H^-$

C. $Cl \rightarrow Cl^-$

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

Answer: D

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35. In which of the following pairs do both the metals have identical values of metallic radii-

A. Ag and Au

B. Cu and Ag

C. Cu and Zn

D. Zn and Hg

Answer: A

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36. In which of the following pairs the difference between the covalent radii of the two metals is maximum-

A. K, Ca

B. Mn, Fe

C. Co, Ni

D. Cr, Mn

Answer: A

Watch Video Solution

37. The increasing order of the first ionisation enthalpies of the element B, P, S and F is-

A. $F < S < P < B$

B. $P < S < B < F$

C. $B < P < S < F$

D. $B < S < P < F$

Answer: D

View Text Solution

38. Which group of atoms have nearly same atomic radius-

A. Na,K,Rb,Cs

B. Li,Be,B,C

C. Fe,Co,Ni,Cu

D. F,Cl,Br,I

Answer: C

View Text Solution

39. The lattice energy is highest for-

A. CsF

B. RbF

C. NaF

D. KF

Answer: C

Watch Video Solution

40. The correct order of lattice energy for lithium halides is-

A. $LiI > LiBr < LiCl > LiF$

B. $LiCl > LiF > LiBr < LiI$

C. $LiBr < LiCl > LiI > LiF$

D. $LiF > LiCl > LiBr > LiI$

Answer: D

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41. An element with atomic number 20 is most likely to combine with the element whose atomic number is-

A. 11

B. 16

C. 18

D. 10

Answer: B

Watch Video Solution

42. $K^+, Cl^-, Ca^{2+}, S^{2-}$ ions are isoelectronic. The decreasing order of their size is-

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

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

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

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

Answer: A

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43. Which of the following oxides of Cr is amphoteric-

A. CrO

B. CrO_3

C. Cr_2O_3

D. none of these

Answer: C

Watch Video Solution

44. The element with atomic number 118 has been discovered recently. In the periodic table the element will occupy its position in the family of-

A. halogens

B. inert gases

C. chalcogens

D. alkaline earth metals

Answer: B

Watch Video Solution

45. In the relation, Electronegativity $= \frac{0.359 Z_{eff}}{r^2} + 0.744$, r is-

A. ionic radius

B. metallic radius

C. van der waals radius

D. covalent radius

Answer: D

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Mcq Hotspot More Than One Correct Type

1. Select the processes which are endothermic in nature-

A. $H \rightarrow H^-$

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

C. $Ar \rightarrow Ar^+$

D. $Cl \rightarrow Cl^+$

Answer: B

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2. Which of the following sequences contain atomic number of only representative elements-

A. 3,33,53,87

B. 2,10,22,86

C. 7,17,25,37,48

D. 9,35,55,88

Answer: C::D

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3. Which of the given elements will gain one electron more readily in comparison to other elements of their group-

A. S

B. Na

C. O

D. Cl

Answer: A::D

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4. $MgSO_4$ is soluble in water but $BaSO_4$ is not because-

A. the hydration enthalpy of $MgSO_4$ is more than its lattice enthalpy

B. the lattice enthalpy of $MgSO_4$ is greater than its hydration enthalpy

C. the lattice enthalpy of $BaSO_4$ is greater than its hydration enthalpy

D. the hydration enthalpy of $BaSO_4$ is greater than its lattice enthalpy

Answer: A::C

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5. Consider the following ionisation steps-

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

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

Select the correct statement-

A. $\Delta_i H_1$ of $M(g) = 100eV$

B. $\Delta_i H_1$ of $M^+(g) = 150eV$

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

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

Answer: A::B::D

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6. In which of the following sets of atomic numbers, all elements are in the same group-

A. 8,16,24

B. 3,11,37

C. 12,38,56

D. 10,18,54

Answer: B::C::D

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7. Which of the following elements are artifically made and do not exist in nature-

A. Bi

B. Ge

C. Tc

D. At

Answer: C::D

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8. Choose the pairs of in which IE_1 of first element is greater than IE_1 of second element but in case of IE_2 order is reversed-

A. P, S

B. F, O

C. Mg, Al

D. N, O

Answer: A::D

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9. Which of the following ions can form complexes-

A. Al^{3+}

B. Cu^{2+}

C. Cr^{3+}

D. Fe^{2+}

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

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10. Which of the following are correct-

A. $IE_{21}(Mg) < IE_2(Na)$

B. $IE_1(Na) > IE_1(Mg)$

C. $IE_4(Na) > IE_4(Mg)$

D. $IE_3(Mg) > IE_3(Na)$

Answer: A::D

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11. In which of the following sets of ions Z/e decrease-

A. I, I^+, I^-

B. Fe^{3+}, Fe^{2+}, Fe

C. Mg^{2+}, Ne, F^{-}

D. $F, Ne, Mg^{2+}.$

Answer: A::B::C

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12. Which of the following pairs contain metalloid-

A. In, Ti

B. Ge, Ga

C. As, Te

D. I, Bi

Answer: B::C

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13. Which of the following elements exist in liquid state at room temperature-

A. selenium

B. cesium

C. germanium

D. gallium

Answer: B::D

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14. Which of the following elements can form two or more chlorides-

A. Cu

B. Hg

C. Na

D. Cs

Answer: A::B

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15. Which of the following hydrides rarely show basic properties-

A. PH_3

B. AsH_3

C. SbH_3

D. BiH_3

Answer: B::C::D

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16. The size of ionic species is correctly given in the orders-

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

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

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

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

Answer: A::C

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17. The correct sequences of increasing electropositive character are-

A. $Fe < Cu < Mg$

B. $Cu < Fe < Mg$

C. $Cs < Ca < Sr$

D. $Ca < Sr < Cs$

Answer: B::D

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18. Select the correct sequence of electron-gain enthalpy-

A. $S > Se > O$

B. $F > Cl > I$

C. $Cl > F > I$

D. $S > O > Se$

Answer: C::D

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19. Choose the correct option regarding the size of the given species-

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

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

C. $Cl^{-} > O^{2-} > F^{-} > Al^{3+}$

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

Answer: A::C

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20. The correct orders of electronegativity are-

A. $C < Si < P < N$

B. $Si < P < C < N$

C. $P < Se < S < N$

D. $S < P < Se < N$

Answer: B::C

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Very Short Type Questions

1. Who proposed the law of octaves?

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2. For which of the element, law of octave is not applicable?

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3. identify the element predicted by Mendeleev as eka-aluminium.

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4. Mention the name of the group in the periodic table, which contains solid, liquid and gases elements.

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5. Mention the position of the alkali metals in the periodic table.

Watch Video Solution

6. Give an example of an element whose atomic mass has been corrected by Mendeleev's periodic table.

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7. Who proved that atomic number but not the atomic mass is the more proper determining factor of the periodicity of elements?

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8. Give an example of d-block element which is not regarded as transition element.

Watch Video Solution

9. How many rare earth elements are present in the periodic table? Give an example.

Watch Video Solution

10. Give the common electronic configuration of d-block element.

Watch Video Solution

11. Name the transition element having lowest atomic mass.

Watch Video Solution

12. Which element gives brick red colouration to the flame? In which block, the element is found in the periodic table?

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13. Mention the respective block of the elements having atomic number 7,11 and 22.

Watch Video Solution

14. What do you mean by repreesntative elements?

Watch Video Solution

15. Give two terminal elements of rare earth elements series.

Watch Video Solution

16. How will you detect the starting and ending of a period in the periodic table?

Watch Video Solution

17. Which block contains inner transition elements?

Watch Video Solution

18. Give an example of a transition element, which has filled d-subshell in its ground state.

Watch Video Solution

19. Why the ions or atoms of the transition elements are paramagnetic in nature?

Watch Video Solution

20. Give an example of a diamagnetic ion.

Watch Video Solution

21. Why Fe and Co are called ferromagnetic?

Watch Video Solution

22. Which element gives golden-yellow colouration to the flame?

Watch Video Solution

23. Why Mg cannot be identified by flame test?

Watch Video Solution

24. Which are called 'ntals'?

Watch Video Solution

25. Give the electronic configuration of the outermost shell of lanthanides.

Watch Video Solution

26. Which of the groups in the periodic table contain all the metallic elements?

Watch Video Solution

27. Give the names of the noble gas elements present in the second and fifth period.

Watch Video Solution

28. Mention the name and atomic number of the element present in group 13 of third period.

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29. Give the electronic configuration of the fifth element of the first transition series.

Watch Video Solution

30. Identify the transition element(s): K,Mn,Ca,Cs,Fe,Cu,Pb`.

Watch Video Solution

31. Name two elements which d not give flame test.

Watch Video Solution

32. Which lanthanide elements have only 1 electron in 5d-subhsell?

Watch Video Solution

33. Write the outermost electronic configuration of chalcogens.

Watch Video Solution

34. What will be the position in periodic table of the element having electronic configuration $1s^2 2s^2 2p^4$.

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35. Mention the position of the pnictogens in the lonf form of the periodic table.

Watch Video Solution

36. Write in decreasing order: covalent radius, van der waals radius, metallic radius.

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37. Which element has highest oxidising property?

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38. Give one example of each of metal, non metal, metalloid present in the p-block of the periodic table.

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39. Give the names of two non-metals present in s-block of the periodic table.

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40. What is the unit of electron affinity ?

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41. Is the value of electron affinity of an element be zero?

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42. Between Fe^{2+} and Fe^{3+}, which is smaller in size and why?

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43. Which element of each pair has higher electron affinity?

(i) Br, Cl

(ii) F, Cl

(iii) O,S.

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44. The first ionisation potential of carbon is 11.2 eV. State whetehr the value of first ionisation potential of silicon is same or greater or less than that of carbon.

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45. Arrange s,p,d & f-subshells according to their screening power.

Watch Video Solution

46. Which element has lowest ionisation potential?

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47. Which element has highest ionisation potential?

Watch Video Solution

48. What is the unit of ionisation potential?

Watch Video Solution

49. What is the change observed in the covalent character of the oxides of the elements starting from Na to Cl in the third period?

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50. Arrange Mg, Al, Si and Na in the increasing order of their ionisation potentials.

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Fill In The Blanks

1. Mendeleev's periodic law was similar to the law proposed by the scientist____.

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2. In Mendeleev's periodic table, the ____period is an incomplete period.

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3. the starting element of even series are K, Rb and ____.

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4. The starging elements of odd series are____, Ag and Au.

 Watch Video Solution

5. Mendeleev's triad elements are_____.

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6. _____is the fundamental property of an element.

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7. The elements from $_{58}Ce$ to $_{71}Lu$ are called_____

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8. Be,Mg,Ca are called____metals.

Watch Video Solution

9. CU, Ag, Au are called____metals.

Watch Video Solution

10. O,S,Se,Te are called____elements.

Watch Video Solution

11. Ionisation potential of s-block elements is_____

Watch Video Solution

12. Except Be and ____, the s-block elemetns response to the flame test.

Watch Video Solution

13. The s-block elements of fourth, fifth and sixth periods can form complex compound by ____as they have vacant d-orbital.

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14. Noble metals are chemically_____.

Watch Video Solution

15. f-block elements are____in nature due to the presence of odd electrons.

Watch Video Solution

16. ____block elements generally form coloured complex compounds.

Watch Video Solution

17. Zn, Cd and ____are not transition elements though they are d-block elements.

Watch Video Solution

18. The element with electronic configuration $1s^2 2s^2 2p^4$ is present in group_____.

Watch Video Solution

19. The general electronic configuration of transition elements is_____

Watch Video Solution

20. Effective nuclear charge=total nuclear charge-_____.

Watch Video Solution

21. The IUPAC name of the element having atomic number 150 is____.

Watch Video Solution

22. for homonuclear diatomic molecule, covalent radius=_____ $\times$ internuclear distance.

Watch Video Solution

23. Inter nuclear distance of HCl molecule is $1.36Å$ and covlaent radius of chlorine atom is 0.99 Å. Thus, covalent radius of hydrogen atom will be_____.

Watch Video Solution

24. Covalent radius of an element is____than its van der waals radius.

Watch Video Solution

25. Anionic radius is____than the original atomic radius.

Watch Video Solution

26. On moving from left to right across a period, the acidic property of oxide of an element_____.

Watch Video Solution

27. Hydrides of most of the non-metals are___in nature.

Watch Video Solution

28. The first ionisation potential of carbon is _____but the second ionisation potential is _____ than boron.

Watch Video Solution

29. Among the halogens._____ is most reducing in nature.

Watch Video Solution

30. Electron affinity of Be and _____are almost same.

Watch Video Solution

31. In a particular energy level, (orbit), the _____follows the order $s > p > d > f$.

Watch Video Solution

32. In case of elements belonging to the same group, ionic radii____with increase in atomic number.

Watch Video Solution

33. F^-, Ne, Mg^{2+}, Na^+ are___ ions.

Watch Video Solution

34. Ionisation enthalpy of Cu and K can be explained on the basis of _____.

Watch Video Solution

35. _____of the atom of any element and the first ionisation enthaly of its anion (unit -ve

charge) are same.

Watch Video Solution

36. Atomic mass=Atomic volume $\times$ _____.

Watch Video Solution

37. Low solubility of Li_2CO_3 and $MgCO_3$ in water can be exaplained by____

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Short Type Questions

1. Why Dobereiner's law of traids is not helpful in the classification of elements?

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2. On which, Newlands' law of octaves is based? For which elements it is not applicable?

Watch Video Solution

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

Watch Video Solution

4. Which one is not regarded as a transition element between Cu and Zn? Why?

Watch Video Solution

5. Which period is called an incomplete period of Mendeleev's periodic table and why?

Watch Video Solution

6. "All d-block elements are non transition elements"- Explain.

Watch Video Solution

7. Which elements were discovered by Mendeleev's periodic table?

Watch Video Solution

8. Give examples where the atomic mass of the elements have been corrected by Mendeleev's periodic law.

Watch Video Solution

9. What types of elements give colouration in flame test and why?

Watch Video Solution

10. What are representative elements? Give the reason for their chemical reactivity?

Watch Video Solution

11. Describe the method of nomenclature of transfermium elements. Give the symbol and name of the element having atomic numer 135.

Watch Video Solution

12. Mention the importance of subgroup in the mendeleev's periodic table.

Watch Video Solution

13. Write two important characteristics of s-block elements.

Watch Video Solution

14. Write the names and symbols of two terminal elements of first transition series.

Watch Video Solution

15. Zn, Cd and Hg are d-block elements but they are not regarded as transition element- why?

Watch Video Solution

16. Identify the alkali metal, alkaline earth metal and chalcogen from the following elements: Li, Ca, S, Cu.

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17. Electronic configuration of the outermost orbit of an element is $3s^2 3p^3$. What is the position of the element in long for of periodic table? Discuss the cause of lanthanoide contraction.

Watch Video Solution

18. Write the group number of s,p and d-block elements in periodic table.

Watch Video Solution

19. Arrange the element with atomic number 12,17,19,23 and 25 into s,p and d-block.

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20. "The properties of an element depend on the electronic configuration of the outermost orbit of its atom"-justify the statement with reasons.

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21. Justify the position of zero group in Mendeleev's periodic table.

 Watch Video Solution

22. (a) "Atomic number of two elements ar 9 and 17 respectively. Both elements belong to the same group"- explain.

(b) Name a transition element ad an alkali earth metal.

 Watch Video Solution

23. How can the groups, valencies and the positions of transition elements be known from their electronic configurations.

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24. Indicate the position of the element with electronic configuration $(n-1)d^6ns^2, n=4$ in the periodic table.

Watch Video Solution

25. Discuss characteristics of d-block elements.

Watch Video Solution

26. O^{2-} and F^{-} are isoelectronic. Justify whether the atomic radii of these two ions will be same or not.

Watch Video Solution

27. Write the electronic configuration of the following- (a) inert gas (b) transition element (c) innner transition element.

Watch Video Solution

28. Write the name and atomic number of each of the following (a) third alkali metal, (b) second transition element, (c) fourth inert gas, (d) fourth element of second period.

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29. The decrease in atomic size of the transition elements is comparatively less than the increase in the atomic number. Why?

Watch Video Solution

30. What is screening effect? What is the order of screening effect of the subshells?

Watch Video Solution

31. How is atomic or ionic radius of an element related to the quantity $\frac{z}{e}$? State whether the value of ionic radius of O^{2-} ion and atomic radius of $O-$ atom are same or not.

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32. How do the metallic and non-metallic characters vary along the group and period in the periodic table? Indicate the position of the metalloids in the periodic table.

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33. Mention the factors on which the ionisation potential depends.

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34. Which out of magnesium and aluminium has greater ionisation potential and why?

Watch Video Solution

35. Give the definition of electron affinity and electronegativity. Write their differences.

Watch Video Solution

36. Electron affinity of inert elements are positive-why?

Watch Video Solution

37. B_2O_3 is acidic in nature but BeO is amphoteric-why?

Watch Video Solution

38. What do you mean by electronegativity of an element? Discuss its variation along a period and down a group in the periodic table. Discuss with example.

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39. What do you mean by diagonal relationship?

Watch Video Solution

40. The first ionisation potential of carbon is more than that of boron while this trend is reverse in the case of second ionisation potential-explain.

Watch Video Solution

41. Transition elements exhibit variable valency-explain.

Watch Video Solution

42. Which out of Na^+ and Ne has higher ionisation potential?Explain with reson.

Watch Video Solution

43. What are the factors on which electron affinity of an element depends?

Watch Video Solution

44. What is the difference between ionisation potential and electron affinity?

Watch Video Solution

45. The electronegativity of nitrogen in Pauling's scale is 3. is the value fixed? Explain.

Watch Video Solution

46. Mention the importance of the terms 'ground state' and 'isolated gaseous atom' used in the definition of ionisation potential or electronegativity.

Watch Video Solution

47. The atomic sizes of the noble gases are greater than that of the halogen. Why?

Watch Video Solution

48. Explain why nitrogen has higher first ionisation enthalpy than oxygen.

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Practice Set

1. What do you mean by the statement- covalent radius of H-atom is 0.37 Å?

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2. Name one property which is not periodic.

Watch Video Solution

3. State the modern periodic law.

Watch Video Solution

4. State the group in modern periodic table where solid, liquid and gaseous elements are present at room temperature.

Watch Video Solution

5. Arrange the following in increasing order of acidity: NO_2, Al_2O_3, SiO_2, ClO_2.

Watch Video Solution

6. Name the elements in the periodic table which has the highest and lowest first ionisation enthalpy.

Watch Video Solution

7. Arrange the following elements in the increasing order of non-metallic character: B, C, Si, N, F.

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

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9. Predict the formula of the stable binary compounds formed by the combination of the following pairs of elements.

(a). Lithium and oxygen (b) magnesium and nitrogen (c) phosphorus and fluorine.

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10. State how oxidising annd reducing property change along the group of a periodic table? Would you expect the first ionisation

enthalpy of two isotopes of an element to same or different?

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11. Elements A, B ,C and atomic number (Z-2), Z and (Z+1) respectively. Of these, B is an inert gas. (a) which one of these has the highest electronegativity? (b) which one of these has the highest value of ionisation potential (c) what is the compound formed by the combination of A and C?

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12. Mg has relatively higher ionisatin enthalpy than Al although the atomic number of the latter is more than the former-explain why? What are the names given to eka-aluminium and eka-silicon predicted by mendeleev?

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