CHEMISTRY

BOOKS - OMEGA PUBLICATION

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Question

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

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2. Who was the first to consider the idea of trends among properties of elements ?

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3. State Dobereiner's law of triads, with an example.

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4. Who gave the law of octaves?

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5. Write newland's law of octaves for classification of elements.

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6. Which element do you think would have been named by

(i) Lawrence Berkeley laboratory (ii) Seaborg's group

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7. Define mendeleev's periodic law

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

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9. Who gave modern periodic law ?

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10. State modern periodic law.

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

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12. What is periodicity? What is the cause of periodicity?

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

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14. Give the groups and periods in the moders periodic table?

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15. What are magic numbers ?

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16. What would be the IUPAC name of atomic number 106 ?

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17. Give the verious notations for IUPAC nomencalature of elements.

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

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19. What would be the IUPAC name and symbol of the elements having atomic number 111 and 102 ?

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20. what would be the IUPAC name and symbol for the element with atomic number 120 ?

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

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22. Using the periodic table, predict the formulae of compounds which might be

formed by the following pair of elements,

i) silicon and bromine ii) aluminum and sulpur.

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23. What are s-block elements ?

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24. Give the general electronic configuration of the s-block elements.

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

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26. Give the general characteristies of s-block elements

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27. Which group elements are known as alkaline earth metals ?

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28. Which group elements are known as alkali metals?

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29. What are p-block elements ?

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30. Write the general electronic configuration of p-block elements.

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31. What are representative elements ?

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32. Give the general characteristics of d-block elements.

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33. What are d-Block elements ? Write their general electronic configuration.

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34. Give the general electronic configuration of

d-block elements.

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35. What are transition elements ? Which of the d block elements are not regarded as transition elements and why ?

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36. How many elements are present in the each transition series?

37. How many groups are there in d-block element?

38. Give the general characteristics of d-block elements.

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39. What are f-block elements ? Write their general electronic configuration.

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40. Write the general electronic configuration of f-block elements.

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41. Give the general characteristies of f-block elements.

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42. How elements are classified on the basis of their properties ?

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43. Give the general characteristics of metals.

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44. Give general chemical properties of non-metals.

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45. What are metalloids ?

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

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

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48. Zn, Cd and Hg are sometimes not considered as transition elements. Give reasons with electronic configuration.

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49. Assign the position of the elements having outer eletronic configuration

i) ns^2np^4 for n=3 ii) $(n-1)d^2ns^2$ for n=4

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

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50. How would you justify the presence of 18 elements in the fifth period of the periodic table ?

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51. Which period of the periodic table contains maximum number of elements?

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52. Give the periods and blocks to which each of the following elements belong?

$_{13}Al$ ii) $_{24}Cr$ ii) $_{29}Cu$ iv) $_{11}Na$

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

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

a) Identify elements with five electrons in the outer shell.

b) Identify elements that would tend to loose

two electrons.

c) Identify elements that would tend to gain two electrons.

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

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55. Why are elements having ns^2np^6 configuration called noble gases?

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56. Zr and Hf have same atomic and ionic radii because

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57. Define covalent radius.

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58. How do the atomic radii vary in group and in period ? Give reasons for variation.

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59. Explain the variation of radii in a period.

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60. Why is the size of cation smaller then its parent atom?

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61. Why is the size of anion always larger than the parent atom?

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62. Compare the radius of cation, anion and neutral atom.

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63. Out of Na and Na^+, which one has larger size and why?

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

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

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65. What are isoelectronic species ?

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66. Mg^{2+} ion is smaller than O^{-2} ion although both have same electronic configuration. Why ?

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67. What do you understand by isoelectronic species ? Name the , species isoelectronic with each of the following.

i) F^{-1} ii) Ar iii) Mg^{2+} iv) Rb^{+}

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

a) What is common in them ?

b) Arrange them in order of increasing ionic radii.

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

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70. Define ionization enthalpy with an example.

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71. How does ionisation energy vary along a period and down a group ?

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72. Which element has the highest and which has the lowest ionization enthalpy in the periodic table ?

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73. What is screening effect ?

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74. Why ionization enthalpy of berylium is more than that of boron ?

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75. Ionization enthalpy of nitrogen is more than that of oxygen. Explain why?

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76. Explain, why ionization enthalpy of oxygen is smaller than nitrogen ?

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77. Ionization enthalpy of nitrogen is more than that of oxygen. Explain why?

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

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79. Among Be, B and C, which element has the highest first ionisation enthalpy and why ?

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80. Ionization enthalpy of nitrogen is more than that of oxygen. Explain why?

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

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

83. The first ionisation enthalpy value (in kJ//mol) of group 13 elements are :

How would you explain this deviation from the general trend ?

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84. Would you expect the first ionization enthalples for the two isotopes of the same element to be the same of different ?

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85. Define electron gain enthalpy or electron affinity. How does it vary along the period and down the group ?

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86. What are the units of electron gain enthalpy or electron affinity value ?

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87. Halogens have maximum negative electron gain enthalpy in the respective periods of the periodic table. Why ?

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88. Why electron affinity of fluorine is less than that of chlorine ?

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89. Why noble gases have zero electron affinity values ?

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90. Name. the element, which has the highest electron gain enthalpy or electron affinity value in the periodic table.

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91. Which of the following pairs of elements would have a more negative electron gain enthalpy? i) O or N ii) F or Cl

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

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93. Which of the following will have the most negative electron gain enthalpy and which the east negative? (P, S, CI, F). Explain your answer.

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94. Define the term electronegativity.

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95. Name the element of group 16 which has highest electronegativity.

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96. 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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97. What is the basic difference between electron gain enthalpy and electronegativity ?

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Multiple Choice Questions Mcqs

1. Mendeleev's periodic law is based on

A. atomic number

B. atomic weight

C. number of neutrons

D. none of these

Answer: B

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2. In the modern periodic table elements are arranged in order of

A. increasing mass

B. increasing volume

C. increasing atomic number

D. alphabetically

Answer: C

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3. The modern periodic table known as the long form of periodic table was made by

A. Lother Meyer

B. Neils Bohr

C. Mendeleev

D. Mosely

Answer: B

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4. The long form of periodic table has

A. seven horizontal rows and eithteen vertical columns

B. ten horizontal rows and eighteen vertical columns

C. eighteen horizontal rows and seven vertical columns

D. eighteen horizontal rows and ten vertical columns.

Answer: A

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5. Fill in the blanks: The elements of group 17 are called.....

A. transition element

B. normal elements

C. typical element

D. none of these

Answer: C

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6. Alkaline earth metals belong to

A. s-block

B. p-block

C. d-block

D. f-block

Answer: A

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7. Which of the following represents the electronic configuration of d-block elements?

A. $(n-1)s^{1-2}nd^{n-10}$

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

C. $(n-1)d^{n-10}ns^2np^4$

D. $(n-1)p^4ns^2$

Answer: B

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8. Explain why transition elements have high melting and boiling points ?

A. hydrogen

B. helium

C. nitrogen

D. none of these

Answer: B

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9. Which among the following will have largest size ?

A. Br

B. I^-

C. I

D. F

Answer: B

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10. Which of the following is/are correct?

A. $Cs > Rb > K > Na > Li$

B. $Li > Na > K > Rb > Cs$

C. $Li > Cs > Rb > K > Na$

D. none of these

Answer: C

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11. The energy required to remove an electron from a gaseous atom from its ground state is called

A. potential energy

B. ionisation energy

C. electrode potential

D. activation energy

Answer: B

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12. In a period from Li to F ionisation enthalpy

A. increases

B. decreases

C. remains same

D. none of these

Answer: A

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13. Given the correct order of electronegativity of central atom in following compounds

$$\underset{(a)}{C}H_3 - CH_3, \underset{(b)}{C}H_2 = CH_2, \underset{(c)}{C}H = CH$$

The correct order is

A. $a > b > c$

B. $c > a > b$

C. $c > b > a$

D. $b > c > a$

Answer: C

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14. The electronegativities of F and H are 4.0 and 2.1 respectively. The percent ionic character in H and F bond is

A. 43

B. 34

C. 94

D. 39

Answer: A

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15. Which of the following element has maximum electron gain enthapy(negative)? $F, Cl, Br, I.$

A. F

B. Cl

C. Br

D. I

Answer: B

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16. The main source of energy is ..... .

A. $F \rightarrow F^-$

B. $C < oCl^-$

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

D. $H \rightarrow H^-$

Answer: C

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17. The 3rd period of the periodic table contains

A. 8 elements

B. 32 elements

C. 3 elements

D. 18 elements

Answer: A

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18. Which of the elements show least values of ionisation energies within their periods?

A. Alkaline earth

B. Alkali metals

C. Noble gases

D. Chalcogens

Answer: B

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19. $r_{\text{van der Waal}}$ is

A. half the bond length

B. twice the bond length

C. half the distance between centres of nuclei of two non bonded atoms of adjacent molecules in solid state

D. none of these

Answer: C

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20. Which of the following does not have any unit?

A. Electronegativity

B. Electron affinity

C. Ionisation potential

D. Atomic radii.

Answer: A

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21. The size of following species increases in the order

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

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

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

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

Answer: A

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22. How does ionisation energy vary along a period and down a group ?

A. increase in nuclear charge

B. increase in atomic size and nuclear change

C. increase in nuclear charge and decrease in shielding effect

D. increase in atomic size and also shielding effect

Answer: D

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23. Amongst the following electronic configurations which one will have highest electron affinity ?

A. $1s^1$

B. $1s^2 2s^1$

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

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

Answer: D

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24. Which period of the periodic table contains maximum number of elements?

A. 7th

B. 6 th

C. 4th

D. 5th

Answer: B

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25. The outermost electronic configuration of the element with highest value of electron affinity is

A. ns^2np^3

B. ns^2np^5

C. ns^2np^4

D. ns^2np^6

Answer: B

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26. Which is the most electronegative element among the following :

A. F

B. Cl

C. I

D. Br

Answer: A

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27. In a given shell, the order of screening effect is

A. $s > p > d > f$

B. $p > d > f > s$

C. $f > d > p > s$

D. $s < p < d < f$

Answer: D

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28. The size of isoelectronic species F^-Ne and Na^+ is affected by

A. Nuclear charge (Z)

B.

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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29. The elements of group 16 are called

A. Noble gases

B. Chalcogens

C. Halogenes

D. Alkali metals.

Answer: B

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