CHEMISTRY

BOOKS - VGS PUBLICATION-BRILLIANT

CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

Very Short Answer Questions

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

modern periodic law?

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

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

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

(a) Lawrence Berkeley Laboratory

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

(b) Seaborg's group

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

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

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

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

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

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

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12. State and give one example for Dobereiner's law of triads and Newland's law of octaves.

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

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

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15. Among

$N^{-3}, O^{-2}, F^{-}, Na^{+}, Mg^{+2}$ and Al^{+3}

(a) What is common in them?

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16. Among

$N^{-3}, O^{-2}, F^{-}, Na^{+}, Mg^{+2}$ and Al^{+3}

(b) Arrange them in the increasing ionic radii.

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17. What is the signficance of the term isolated gaseous atom while defining the ionization enthalpy.

Hint: Requirement for comparison.

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

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19. Ionization $\text{enthalpy}_1(IE)_1$ of O is less then that of N-explain.

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

(a) O or F

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

(b) F or Cl

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

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23. Use the periodic table to identify elements.

(a) With 5 electrons in the outer subshell.

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24. Use the periodic table to identify elements.

(b) Would tend to lose two electrons.

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25. Use the periodic table to identify elements.

(c) Would tend to gain two electrons.

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26. Given the outer electronic configuration of s,p,d and f-block elements.

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27. Write the increasing order of the metalic character among the elements B, Al, Mg and K.

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28. Write the correct increasing order of non-metallic character for B,C,N,F and Si.

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

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

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

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32. How are electronegativity and metallic & non-metallic characters related?

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33. What is the valency possible to arsenic with respect to oxygen and hydrogen?

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

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

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

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

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38. Radii of iron atom and its ions follow $Fe > Fe^{2+} > Fe^{3+}$ - explain.

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39. $IE_2 > IE_1$ for a given element - why?

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40. What is lanthanoid contraction ? What are the consequences of lanthanoid contraction?

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

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

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43. Why are zero group elements called noble gases or inert gases?

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44. Select in each pair, the one having lower ionization energy and explain the reason.

(a) I and I^-

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45. Select in each pair, the one having lower ionization energy and explain the reason.

(b) Br and K

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46. Select in each pair, the one having lower ionization energy and explain the reason.

Li and Li^+

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47. Select in each pair, the one having lower ionization energy and explain the reason.

(d) Ba and Sr

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48. Select in each pair, the one having lower ionization energy and explain the reason.

(e) O and S

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49. Select in each pair, the one having lower ionization energy and explain the reason.

(f) Be and B

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50. Select in each pair, the one having lower ionization energy and explain the reason.

N and O

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51. IE_1 of $O < IE_1$ of N but IE_2 of $O > IE_2$ of $N -$ Explain.

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52. Na^+ has higher value of ionization energy than Ne, though both have same electronic configuration - Explain.

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53. Which is each pair of elements has a more electronegative gain enthalpy? Explain.

(a) N or O

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

(b) F or Cl

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55. Electron affinity of chlorine is more than that of fluorine - explain.

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56. Which in each has higher electron affinity?

F or Cl^-

Watch Video Solution

57. Which in each has higher electron affinity?

(b) O or O^-

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58. Which in each has higher electron affinity?

(c) Na^+ or F

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59. Which in each has higher electron affinity?

F or F^-

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60. Arrange the following in order of increasing ionic radius :

(a) $Cl^-, P^{-3}, S^{-2}, F^-$.

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61. Arrange the following in order of increasing ionic radius :

(b) $Al^{+3}, Mg^{+2}, Na^+, O^{-2}, F^-$.

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62. Arrange the following in order of increasing ionic radius :

(c) Na^{+}, Mg^{2+}, K^{+}

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63. Mg^{+2} is smaller than O^{-2} in size, though both have same electronic configuration - explain.

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

(a) Which has the highest first ionization enthalpy ?

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

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

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

(c) Which has the largest atomic radius?

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

(d) Which has the most metallic character?

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

(a) Increasing first ionization enthalpy

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

(b) Increasing negative electron gain enthalpy

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

(d) Increasing non-metallic character.

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71. Arrange in the given order:

(a) Increasing EA : O, S and Se

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72. Arrange in the given order:

(b) Increasing $IE_1 : Na, K \text{ and } Rb$

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73. Arrange in the given order:

(c) Increasing radius: $I^-, I^+ \text{ and } I$

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74. Arrange in the given order:

(d) Increasing electronegativity: F , Cl, Br, I

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75. Arrange in the given order:

(e) Increasing EA : F, Cl, Br, I

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76. Arrange in the given order:

(f) Increasing radius : Fe, Fe^{+2}, Fe^{+3}.

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77. Name the element with highest ionization enthalpy.

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

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79. Which element possesses highest electron affinity?

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80. Name unknown elements at the time of Mendeleef.

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81. Name any two typical elements.

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82. Name any two bridge elements.

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83. Name two pairs showing diagonal relationship.

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84. Name two transition elements.

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85. Name two rare earths.

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86. Name two transuranic elements.

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Short Answer Questions

1. On the basis of quantum numbers, justify that the 6^{th} period of the periodic table should have 32 elements.

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2. How did Mosley's work on atomic number show that atomic number is a fundamental property better than atomic weight?

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3. State modern periodic law. How many groups and periods are present in the long form of the periodic table?

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

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5. Mention the number of elements present in each of the periods in the long form periodic table.

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6. Give the outer orbit general electronic configuration of

(a) Noble gases

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7. Give the outer orbit general electronic configuration of

(b) Representative elements

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8. Give the outer orbit general electronic configuration of

(c) Transition elements

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9. Give the outer orbit general electronic configuration of

(d) Inner transition elements.

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10. Wtite the characteristic properties of transition elements.

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11. What are rare earths and transuranic elements?

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12. What is isoelectronic series? Name a series that will be isoelectronic with each of the

following atom or ions .

(a) F^-

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13. What is isoelectronic series? Name a series that will be isoelectronic with each of the following atom or ions .

(b) Ar

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14. What is isoelectronic series? Name a series that will be isoelectronic with each of the following atom or ions .

(c) He

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15. What is isoelectronic series? Name a series that will be isoelectronic with each of the following atom or ions .

(d) Rb^{+}

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16. Explain why cation is smaller and anion is larger in radii than their parent atoms.

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17. Arrange the second period elements in the increasing order of their first ionization enthalpies. Explain why Be has higher IE_1 then B.

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18. IE_1 of Na is less than that of `Mg-explain.

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19. What are the various factors due to which the IE of the main group elements tends to decrease down a group ?

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20. The first ionization enthalpy values (in $kJmol^{-1}$) of group 13 elements are:

B	Al	Ga	In	Ti
801	577	579	558	589

How do you explain this deviation from the general trend?

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21. Would you expect the second electron gain enthalpy of oxygen as positive, more negative or less negative than the first? Justify.

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22. What is the basic difference between the electron gain enthalpy and electropositivity?

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23. Would you expect IE_1 for two isotopes of the same element to be the same or different? Justify.

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24. Increasing order of reactivity among group - 1 elements is $Li < Na < K < Rb < Cs$, whereas among group - 17 elements it is $F > Cl > Br > I$- explain.

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25. Assign the position of the element having outer electronic configuration.

(a) ns^2np^4f or $n = 3$

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26. Assign the position of the element having outer electronic configuration.

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

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27. Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

(a) Li and O

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28. Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

(b) Mg and N

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29. Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

(c) Al and I

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30. Predict the formulae of the stable binary compounds that would be formed by the

combination of the following pairs of elements.(d) Si and O

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31. Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

(e) P and Cl

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32. Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

(f) Element with atomic number 30 and Cl.

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33. Write a note on the variation of metallic nature in a group and in a period.

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34. How does the covalent raduis increase in group 7?

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35. Which element of 3^{rd} period has the highest $I.E_1$? Explain the variation of $I.E_1$ in this period?

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36. What is valency of an element? How does it vary with respect to hydrogen in the third period.

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37. What is diagonal relationship? Give a pair of elements having diagonal relationship. Why do they show this relation?

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38. What is lanthanoid contraction ? What are the consequences of lanthanoid contraction?

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39. The first of lithium is 5.41 eV and electron affinity of Cl is $-3.61eV$. Calculate ΔH in kJ mol^{-1} for the reaction: $Li_g + Cl_g \rightarrow Li_g^+ + Cl_g^-$.

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40. How many Cl atoms can you ionize in the process $Cl \rightarrow Cl^{+} + e$ by the energy liberated for the process $Cl + e \rightarrow Cl^{-}$ for one Avogadro number of atoms. Given IP = 13.0 eV, and EA = 3.60 eV. Avogadro number = 6×10^{23}.

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41. The electron affinity of chlorine is 3.7 eV. How much energy in kcal is released when 2g of chlorine atoms is completely converted to

Cl^- ions in the gaseous state?

$(1eV = 23.06Kcal)$.

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Long Answer Questions

1. Discuss in detail about the classification of elements by Mendeleeff.

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2. From a study of properties of neighbouring elements, the properties of an unknown element can be predicted - justify with an example.

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3. Define the mordern periodic law . Discuss the construction of the long form of the periodic table .

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4. Discuss the relation between the number of electron filled into the sub energy levels of an orbit and the maximum number of elements present in a period.

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5. Write an essay on s, p, d and f-block elements.

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6. Relate the electronic configuration of elements and their properties in the classification of elements.

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7. What is a periodic property? How the following properties vary in a group and in a period? Expain

(a) Atomic radius.

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8. What is a periodic property? How the following properties vary in a group and in a period? Expain

(b) Electron gain enthalpy.

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9. What is a periodic property? How the following properties vary in a group and in a period? Explain

(a) IP.

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10. What is a periodic property? How the following properties vary in a group and in a period? Explain

(b) EN.

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11. Write a note on

(a) Atomic radius.

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12. Write a note on

(b) Metallic radius.

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13. Write a note on

(c) Covalent radius.

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14. Define IE_1 and IE_2. Why is $IE_2 > IE_1$ for a given atom? Discuss the factors than effect IE of an element.

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15. How do the following properties change in group - 1 and in the third period? Explain with example.

(a) Atomic radius.

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16. How do the following properties change in group - 1 and in the third period? Explain with example.

(b) IE

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17. How do the following properties change in group - 1 and in the third period? Explain with example.

(c) EA

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18. How do the following properties change in group - 1 and in the third period? Explain with example.

(d) Nature of oxides.


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19. Define electron gain enthalpy. How it varies in a group and in a period ? Why is the electron gain enthalpy of O or F is less

negative than that of succeeding element in the group ?

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20. What is electronegativity?

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21. How does it very in a group and in a period ?

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22. Explain the following

(a) Valency

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23. Explain the following

(b) Diagonal relationship

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24. Explain the following

(c) Variation of nature of oxides in the Group - 1:

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