CHEMISTRY

BOOKS - FULL MARKS CHEMISTRY (TAMIL ENGLISH)

PERIODIC CLASSIFICATION OF ELEMENTS

Textual Evaluation Solved M C Q

1. What would be the IUPAC name for an element with atomic number 222 ?

A. bibibiium

B. bididium

C. didibium

D. bibibium

Answer: d

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2. The electronic configuration of the elements A and B are $1s^2, 2s^2, 2p^6, 3s^2$ and $1s^2, 2s^2, 2p^5$ respectively . The formula of the ionic compound that can be formed between these elements is

A. AB

B. AB_2

C. A_2B

D. none of these

Answer: b

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3. The group of elements in which the differentiating electron enters the anti-penultimate shell of atoms are called

A. p-block elements

B. d-block elements

C. s-block elements

D. f-block elements

Answer: d

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4. In which of the follwing options the orders 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. $B < C < O < N$ (increasing first ionization enthalpy)

Answer: a

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5. Which of the following elements will have the highest electronegativity ?

A. Chlorine

B. Nitrogen

C. Cesium

D. Fluorine

Answer: d

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6. Various successive ionization enthalpies (in $kJmol^{-1}$) of an element are given below:

IE_1	IE_2	IE_3	IE_4	IE_5
577.5	1,810	2,750	11,580	14,820

The element is

A. phosphorus

B. sodium

C. aluminium

D. silicon

Answer: c

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7. In the third period the first ionization potential is of the order.

A. $Na > Al > Mg > Si > P$

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

C. $Mg > Na > Si > P > Al$

D. $Na < Al < Mg < P < Si$

Answer: b

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8. Identify the wrong statement.

A. Amongst the isoelectronic species, smaller the positive charge on cation, smaller is the ionic radius

B. Amongst isoelectric species greater the negative charge on the anion, larger is the ionic radius

C. Atomic radius of the elements increases as one moves down the first group of the periodic table

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

Answer: a

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9. Which one of the following arrangements represent the correct order of least negative to most negative electron gain enthalpy

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

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

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

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

Answer: d

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10. The correct order of electron gain enthalphy with negative sigh of F, Cl , Br and I

having atomic number 9,17 ,35 and 53 respectively is

A. $I > Br > CIF$

B. $F > CI > Br > I$

C. $CI > F > Br > l$

D. $Br > I > CI > F$

Answer: c

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11. Which one of the following is the least electronegative element ?

A. Bromine

B. Chlorine

C. Iodine

D. Hydrogen

Answer: d

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12. The element with positive electron gain enthalpy is

A. hydrogen

B. sodium

C. argon

D. Fluorine

Answer: c

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13. The correct order of decreasing electronegativity values among the elements X,Y,Z and A with atomic numbers 4,8,7 and 12 respectively

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Textual Evaluation Solved Choose The Correct Answer

1. Assertion : Helium has the highest value of ionisation energy among all the elements

known

Reason : Helium has the highest value of electron affinity among all the elements known

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2. The electronic configuration of the atom having maximum difference in first and second ionisation energies is

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

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

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

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

Answer: A

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3. Which of the following is second most electronegative element ?

A. Chlorine

B. Fluorine

C. Oxygen

D. Sulphur

Answer: A

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4. IE_1 and IE_2 of Mg are 179 and 348 kcal mol^{-1} respectively . The energy required for the reaction $\text{Mg} \rightarrow \text{Mg}^{2+} + 2e^-$ is

A. $+169 kcal mol^{-1}$

B. $-169 kcal mol^{-1}$

C. $+527 kcal mol^{-1}$

D. $-527 kcal mol^{-1}$

Answer: C

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5. In a given shell the order of screening effect is

A. $s > p > d > f$

B. $s > p > f > d$

C. $f > d > p > s$

D. $f > p > s > d$

Answer: A

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6. Which of the following orders of ionic radii is correct ?

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

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

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

D. None of these

Answer: D

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7. The First ionisation potential of Na ,Mg and Si are 496 , 737 and 786 kj mol^{-1} respectively . The ionisation potential of Al will be closer to

A. $760 kJ mol^{-1}$

B. $575 kJ mol^{-1}$

C. $801 kJ mol^{-1}$

D. $419 kJ mol^{-1}$

Answer: B

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8. Which one of the following is true about metallic character when we move from left to

right in a period and top to bottom in a group?

A. Decreases in a period and increases along the group

B. Increases in a period and decreases in a group

C. Increases both in the period and the group

D. Decreases both in the period and in the group

Answer: A

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9. How does electron affinity change when we move from left to right in a period in the periodic table ?

A. Generally increases

B. Generally decreases

C. Remains unchanged

D. First increases and then decreases

Answer: A

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10. Which of the following pairs of elements exhibit diagonal relationship ?

A. Be and Mg

B. Li and Be

C. Be and B

D. Be and Al

Answer: D

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Textual Evaluation Solved Ii Brief Question

1. Define modern periodic law.

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2. What are isoelectronic ions ? Give examples.

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3. What is effective nuclear charge ?

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4. Is the definition given below for ionisation enthalpy correct ?

Ionisation enthalpy is defined as the energy required to remove the most loosely bound electron from the valence shell of an atom

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5. Magnesium loses electrons successively to form Mg^{+}, Mg^{2+} and Mg^{3+} ions . Which step will have the highest ionisation energy and why ?

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6. Define electronegativity .

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7. How would you explain the fact that the second ionisation potential is always higher than first ionisation potential ?

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

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9. The electronic configuration of atom is one of the important factor which affects the value of ionisation potential and electron gain enthalpy.

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10. In what period and group will an element with Z-118 will be present?

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11. Justify that the fifth period of the periodic table should have 18 elements on the basis of quantum numbers.

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12. Elements a,b,c and d have the following electronic configurations:

$a: 1s^2, 2s^2, 2p^6$

$b: 1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

$c: 1s^2, 2s^2, 2p^6, 3s^2, 3p^6$

$d: 1s^2, 2s^2, 2s^1$

Which elements among these will belong to the same group of periodic table.

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13. Give the general electronic configuration of lanthanides and actides?

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14. Why halogens act as oxidising agents?

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15. Mention any two anomalous properties of second period elements.

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16. Explain the pauling method for the determination os ionic radius.

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17. Explain the periodic trend of ionisation potential.

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18. Explain the diagonal relationship

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19. Why the first ionisation enthalphy of sodium is lower than that of magnesium while

its second ionisation enthlpy is higher than that of magnesium ?

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20. Calculate the ionic radii of K^+ and Cl^- ions in KCl crystal. The internuclear distance between K^+ an Cl^- ions are found to be 3.14Å.

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21. Explain the following, give appropriate reasons.

(i) Ionization potential of N is greater than that of O

(ii) First ionization potential of C-atom is greater than that of B-atom, where as the reverse is true for second ionization potential.

(iii) The electron affinity values of Be and Mg are almost zero and those of N (0.02 eV) and P (0.80 eV) are very low

(iv) The formation of F^-. (g) from F(g) is

exothermie while that of O^{2-}(g) from O (g) is endothermic.

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22. What is screening effect ?

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23. Briefly give the basis for pauling's scale of electronegativity.

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24. State the trends in the variation of electronegativity in group and periods.

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In Text Question Evaluate Yourself

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

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2. The element with atomic number 120 has not been discovered so far. What would be the IUPAC name and the symbol for this element ? Predict the possible electronic configuration of this element.

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3. Predict the position of the element in periodic table satisfying the electron

configuration $(n-1)d^2, ns^2$ where n=5

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4. Using Slater's rule calculate the effective nuclear charge on a 3p electron in aluminium and chlorine .Explain how these results relate to the atomic radii of the two atoms.

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5. A student reported the ionic radii of isocelectronic species X^{3+}, Y^{2+} and Z^{-} as 136 pm 64 pm and 49 pm respectively. Is that order correct ? Comment.

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6. The first ionisation energy (IE_1) and second ionisation energy (IE_2) of elements X, Y and Z are given below.

Element	IE_1 (kJ mol^{-1})	IE_2 (kJ mol^{-1})
X	2370	5250
Y	522	7298
Z	1680	3381

Which one of the above elements is the most reactive metal, the least reactive metal and a noble gas?

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7. The electron gain enthalpy of chlorine is 348 kJ mol^{-1}. How much energy in kJ is released when 17.5 g of chlorine is completely converted into Cl^- ions in the gaseous state?

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Additional Questions M C Q

1. The law of triads is not obeyed by

A. Ca, Sr, Ba

B. Cl, Br, I

C. Li, Na, K

D. Fe,Co, Ni

Answer: D

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2. The law of triads is obeyed by

A. Fe, CO, Ni

B. C, N,O

C. He, Ne, Ar

D. Al, Si, P

Answer: A

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3. Which of the following elements were unknown at that time of Mendeleev?

A. Na, Mg

B. Fe, CO

C. K, Cu

D. Ga, Ge

Answer: D

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4. Which one of the following is the first in first transition series?

A. Sc

B. Zn

C. Ti

D. Cu

Answer: A

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5. Which period mostly include man made radioactive elements?

A. 4 period

B. 7 period

C. 6 period

D. 3 period

Answer: B

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6. Which one of the following is called halogen family?

A. Group 17

B. Group 16

C. Group 1

D. Group 2

Answer: A

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7. What will be the change in valency down the group in the periodic table?

A. increases

B. decreases

C. remains same

D. zero

Answer: C

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8. Which one of the following is a metalloid?

A. N

B. P

C. Bi

D. Sb

Answer: D

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9. Which one of the following is a metal?

A. N

B. Br

C. Bi

D. As

Answer: C

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10. The general electronic configuration of d-block element is _____

A. ns^2nd^{1-10}

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

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

D. ns^2nd^5

Answer: B

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11. Which of the following is the correct electronic configuration of noble gases?

A. ns^2np^1

B. ns^2np^5

C. ns^2np^6

D. ns^2np^3

Answer: C

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12. Which one of the following is in solid state at room temperature?

A. Bromine

B. Mercury

C. Bismuth

D. Gallium

Answer: C

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13. Which of the following is not a metalloid (or) semi-metal?

A. Silicon

B. Arsenic

C. Germanium

D. Sodium

Answer: D

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14. Which of the following metal is not in liquid state?

A. Gallium

B. Aluminium

C. Mercury

D. Caesium

Answer: B

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

A. Atomic radius

B. Ionization enthalpy

C. Electron afinity

D. Oxidation number

Answer: D

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16. Which of the following property increases as we go down the group in the periodic property?

A. Ionization energy

B. Electronegativity

C. Atomic radius

D. Electron affinity

Answer: C

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17. Which one of the following is not an isoelectronic ion?

A. Na^+

B. Mg^{2+}

C. Cl^-

D. O^{2-}

Answer: C

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18. Which one of the following is not an isoelectronic ion?

A. Al^{3+}

B. N^{3-}

C. Mg^{2+}

D. K^{+}

Answer: D

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19. Which of the following possess almost same properties due to lanthanide contraction?

A. Zr, HF

B. Na, K

C. Zn, Cd

D. Ag, Au

Answer: A

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20. Statement-1: Ionization enthalpy of Be is greater than that of B.

Statement-II: The nuclear charge of B is greater than that of Be.

A. Statement-I and II are correct and statement. Il is the correct explanation of statement

B. Statement-I and II are correct but statement-II is not the correct explanation of statement-I.

C. Statement-I is correct but statement-II is wrong.

D. Statement-I is wrong but statement-II is correct.

Answer: B

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21. Statement-I: Ionization enthalpy of nitrogen is greater than that of oxygen.

Statement-II: Nitrogen has exactly half filled

electronic configuration which is more stable than electronic configuration of oxygen.

A. Statement-I is wrong but statement-Il is correct,

B. Statement-I is correct but statement-II is wrong.

C. Statement-I and I are correct and statement-Il is the correct explanation of statement-I.

D. Statement-I and II are correct but statement-II is not the correct explanation of statement I

Answer: C

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22. Which of the following does not have zero electron gain enthalpy?

A. Be

B. Cl

C. Mg

D. N

Answer: B

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23. Which of the following have zero electron gain enthalpy?

A. Halogens

B. Noble gases

C. Chalcogens

D. Gold

Answer: B

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24. Which of the following have the highest value of electronegativity?

A. Halogens

B. Alkali metals

C. Alkaline earth metals

D. Transition metals

Answer: A

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25. Among all the elements which one has the highest value of electronegativity?

A. Chlorine

B. Bromine

C. Fluorine

D. Iodine

Answer: C

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26. Among the alkali metals which one form compounds with more covalent character?

A. Sodium

B. Potassium

C. Rubidium

D. Lithium

Answer: D

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27. Which of the following pair is not diagonally related?

A. Li, Mg

B. Li, Na

C. Be, Al

D. B, Si

Answer: B

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

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

B. The d-block has 8 columns, because a maximum of 8 electrons can occupy all the orbitals in a d-subshell

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

D. The block indicates value of azimuthal quantum number (6for the last subshell that received electrons in building up the electronic configuration)

Answer: B

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29. Which of the following statements is incorrect in relation to ionization enthalpy?

A. Ionization enthalpy increases for each successive electron

B. The greatest increase in ionization enthalpy is experienced on removal of electrons from core noble gas configuration.

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

D. Removal of electron from orbitals bearing lowern value is easier than from

orbital having high value.

Answer: D

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30. 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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31. Considering the elements B, C, N, F and Si, the correct order of their non-metallic character is

A. B >C>Si>F>Si

B. Si >C >B >N>F

C. F>N>C>B>Si

D. F>N>C>Si>B

Answer: c

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32. Considering the elements F, CI, O and N, the correct order of their chemical reactivity in terms of oxidizing property is .....

A. F>Cl> O>N

B. F>O >N >Cl

C. F>O >Cl >N

D. O>F>N >CI

Answer: b

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33. Which of the following is arranged in order of increasing radius?

A. $K^+_{(aq)} < Na^+_{(aq)} < Li^+_{(aq)}$

B. $K^+_{(aq)} > Na^+_{(aq)} > Zn^{2+}_{(aq)}$

C. $K^+_{(aq)} > Li^+_{(aq)} > Na^+_{(aq)}$

D. $Li^+_{(aq)} < Na^+_{(aq)} < K^+_{(aq)}$

Answer: D

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34. Among the following elements, which has the least electron affinity?

A. Phosphorous

B. Oxygen

C. Sulphur

D. Nitrogen

Answer: D

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35. Which one of the following is isoelectronic with Ne?

A. N^{3-}

B. Mg^{2+}

C. Al^{3+}

D. All the above

Answer: D

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36. Which element has smallest size?

A. B

B. N

C. Al

D. P

Answer: B

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37. In halogens, which of the following decreases from flourine to Iodine?

A. Bond length

B. Electronegativity

C. Ionization energy

D. Oxidizing power

Answer: A

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38. What is the electronic configuration of the elements of group 14

A. ns^2np^4

B. ns^2np^6

C. ns^2np^2

D. ns^2

Answer: C

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Additional Questions Match The Follwing

1. Match the following columns

	List-I		List-II
A.	Jewels	1.	Sodium chloride
B.	Bolts and cot	2.	Copper
C.	Table salt	3.	Gold
D.	Utensils	4.	Iron

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2. Match the following columns

	List-I		List-II
A.	Law of triads	1.	Chancourtois
B.	Law of octaves	2.	Henry Moseley
C.	First periodic law	3.	Newland
D.	Modern periodic law	4.	Johann Dobereiner

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3. Match the following columns

List-I		List-II
A.	$Z = 100$	1. Mendelevium
B.	$Z = 101$	2. Lawrencium
C.	$Z = 102$	3. Fermium
D.	$Z = 103$	4. Nobelium

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4. Match the following columns

List-I		List-II
A.	Li	1. 2, 8, 8,1
B.	Na	2. 2, 1
C.	K	3. 2, 8, 18, 18, 8,1
D.	Cs	4. 2, 8, 1

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5. Match the following columns

	List-I		List-II
A.	Alkali metal	1.	$ns^2\ np^{1-6}$
B.	Alkaline earth metals	2.	ns^1
C.	d-block elements	3.	ns^2
D.	p-block elements	4.	$(n-1)d^{1-10}\ ns^{0-2}$

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Additional Questions Fill In The Blanks

1. The chemical symbol of carbon and cobalt are .....

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2. According to Mendeleev's periodic table , the physical and chemical properties of elements are periodic function of their _____

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3. Period .... contain 32 elements

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4. The horizontal rows in the periodic table are called as_____

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5. The shortest period contains..... elements.

A. H,He

B. Li, Be

C. B,C

D. None of these

Answer:

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6. The longest form of periodic table was constructed by.....

A. Dmitri Mendeleev

B. Henry Moseley

C. Lothar Meyer

D. New Lands

Answer:

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7. Group 16 constitutes ..... family.

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8. All the s-block and p-block elements excluding 18th group are called .....

elements

A. transition

B. representative

C. inner transition

D. trans uranium

Answer:

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9. Group numbers 3 to 12 in the periodic table are called .....

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10. The metallic radius of copper is .....

A. 0.99 Å

B. 1.28 Å

C. 1.98 Å

D. 2.56 Å

Answer:

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11. In the modern periodic table, the period indicates the value of .....

A. Atomic mass

B. Atomic number

C. Principal quantum number

D. Azimuthal quantum number

Answer:

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

A. nuclear charge (Z)

B. valence principal quantum number

C. electron- electron interaction in outer orbitals

D. none of the factors because size is same

Answer:

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13. The highest ionization energy is exhibited by.....

A. Halogens

B. Noble gases

C. Alkaline earth metals

D. Transition metals

Answer:

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Additional Questions Iv Choose The Odd One Out

1. Choose the odd one out

A. Lithium

B. Sodium

C. Chlorine

D. Potassium

Answer: c

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2. Choose the odd one out

A. Helium

B. Neon

C. Argon

D. Hydrogen

Answer: d

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3. Choose the odd one out

A. Atomic radius

B. Ionisation energy

C. Electron affinity

D. Electronegativity

Answer: a

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4. Choose the odd one out

A. Chlorine

B. Bromine

C. Fluorine

D. Oxygen

Answer: d

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5. Choose the odd one out

A. Carbon

B. Silicon

C. Germanium

D. Bismuth

Answer: d

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Additional Questions V Choose The Correct Pair

1. Choose the correct pair

A. Uranium : s-block element

B. Phosphorous : d-block element

C. Gold : d-block element

D. Silver :p-block element

Answer: c

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2. Choose the correct pair

A. Halogens : Group 13

B. Alkali metals : Group 2

C. Chalcogens : Group 16

D. Inert gases : Group 1

Answer: c

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3. Choose the correct pair

A. Group 1 : Alkaline earth metals

B. Group 2 : Alkali metals

C. Group 17 : Inert gases

D. Group 18 : Rare gases

Answer: d

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4. Choose the correct pair

A. ns^1 : Alkali metals

B. ns^2np^6 : Alkaline earth metals

C. ns^2np^{1-6} : d-block element

D. $ns^2(n-1)d^{1-10}$:f- block element

Answer: a

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Additional Questions Vi Choose The Incorrect Pair

1. Choose the Incorrect pair

A. Halogens : ns^2np^5

B. Alkali metals : ns^1

C. d-block elements : ns^2np^6

D. Inert gases :ns^2np^6

Answer: c

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2. Choose the Incorrect pair

A. Group 14 : Carbon family

B. Group 15 : Nitrogen family

C. Group 16 : Oxygen family

D. Group 17 : Noble gases

Answer: d

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3. Choose the Incorrect pair

A. Acid making elements : S,P

B. Gas like elements Oxygen, Hydrogen

C. Metallic elements : Gold, Lead

D. Earthy elements : Cl_2, Br_2

Answer: d

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Additional Questions Vii Assertion Reason

1. Assertion (A): Covalent radius is always shorter than the actual atomic radius.

Reason (R): The formation of covalent bond involves the overlapping of atomic orbitals and it reduces the expected internuclear distance.

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

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

C. (A) is correct but (R) is wrong.

D. (A) is wrong but (R) is correct.

Answer: a

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2. Assertion (A): Atomic radius tends to decrease across a period.

Reason (R): As we move from left to right along a period, the valence electrons are

added to the same shell, nuclear charge increases and atomic radius decreases.

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

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

C. (A) is correct but (R) is wrong.

D. (A) is wrong but (R) is correct.

Answer: a

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3. Statement-I: Ionization enthalpy of nitrogen is greater than that of oxygen.

Statement-II: Nitrogen has exactly half filled electronic configuration which is more stable than electronic configuration of oxygen.

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

B. Both (A) and (R) are correct but (R) is not the and(R) are correct but (R) is not the

correct explanation of (A).

C. (A) is correct but (R) is wrong

D. (A) is wrong but (R) is correct

Answer: a

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Additional Questions Viii Choose The Incorrect Statement

1. Choose the incorrect statement

A. The chemical symbol of nickel is Ni.

B. An element is a material made of different kind of atoms.

C. The physical state of bromine is liquid.

D. The physical and chemical properties of the elements are periodic functions of their atomic numbers

Answer: b

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2. Choose the incorrect statement

A. In Chancourtois classification elements offered from each other in atomic weight by 16 or multiples of 16 fell very nearly on the same vertical line

B. Mendeleev's periodic law is based on atomic weight

C. Mendeleev listed the 117 elements known at that time and are arranged in

the order of atomic numbers

D. Mendeleev constructed the first periodic table based on the periodic law.

Answer: c

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3. Choose the incorrect statement

A. Position of hydrogen could not be made clear

B. Isotopes find correct place in Mendeleev's periodic table.

C. Mendeleev's periodic table could not explain the variable valencies of elements.

D. The aufbau principle and the electronic configuration of atoms provide a theoretical foundation for the modern periodic table.

Answer: b

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4. Choose the incorrect statement

A. The valency of the elements increases from left to right in a period.

B. Valency decreases from 7 to 1 with respect to oxygen.

C. The metallic character of the elements decreases across a period.

D. The elements located in the top right portion have very high ionisation energy and are metallic in nature.

Answer: A::B

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5. Choose the incorrect statement

A. Oxidation character increases from left to right in a period

B. Reducing character increases from left to right in a period.

C. The elements on right side of the periodic table have high electron i c accept electrons.

D. Alkali metals form salts with all the oxo-acids

Answer: b

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6. Choose the incorrect statement

A. d-block elements show variable oxidate states

B. Electronegativity is not a measurable quantity

C. Mostly d-block elements are diamagnetic due to paired electrons

D. The elements of group 1 and group 2 are called s-block elements.

Answer: c

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7. Choose the incorrect statement

A. Atomic radius of elements increases with increase in atomic number as we go down the group.

B. Atomic radius of elements increases with increase in atomic number as we go

across the period.

C. Atomic radius of elements decreases as we go from left to right in a period.

D. Electronegativity is not a measurable quantity.

Answer: b

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Additional Questions Ix Choose The Correct Statement

1. Choose the correct statement

A. Ionization is always an exothermic process.

B. Ionization energies always increase in the order $I.E_1 > I.E_2 > I.E_3$z.

C. Ionization energy measurements are carried out with atoms in the solid state.

D. In an endothermic reaction heat is absorbed by the system from the

surroundings.

Answer: d

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Additional Questions 2 Mark Questions

1. State Johann Dobereiner's law of triads.

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2. Write a note about chancourtois classification .

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3. State the Newland's law of octaves.

Watch Video Solution

4. State Mendeleev's period law.

Watch Video Solution

5. Explain about the relationship between the atomic number of an element and frequency of the X-ray emitted from the elements.

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6. State modern periodic law.

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7. What are the anomalies of the long form of periodic table?

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8. Mention the names of the elements with atomic number 101 ,102,109 and 110.

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9. Write a note about the electronic configuration of elements in groups.

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10. Give the name and electronic configuration of elements of 1^{st} group and 2^{nd} group.

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11. Write any two characteristic properties of alkali metals.

12. Write any two characteristic properties of alkaline earth metals.

13. Groups from 13 to 18 in the periodic table are called p-block elements. Give reason.

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14. Why noble gases do not show much of chemical reactivity?

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15. Halogens and chalcogens have highly negative electron gain enthalpies. Why?

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16. What are d-block elements? Why are they called so?

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17. Elements Zn, Cd and Hg with electronic configuration $(n-1)d^{10}ns^2$ do not show most of transition elements properties. Give reason.

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18. Why Zn, Cd and Hg are considered as soft metals?

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19. Why d- block elements are known as transition element ?

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20. What are f-block elements? How many series are there? Why they are called f-block elements?

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21. Give the general electronic configuration of lanthanides and actides?

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22. What are lanthanides and actinides?

Watch Video Solution

23. What are semi - metal ? Give example.

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24. What are periodic properties ? Give example.

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25. Define ionic radius.

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26. Cationic radius is smaller than its corresponding neutral atom. Justify this statement.

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27. Anionic radius is higher than the corresponding neutral atom. Give reason.

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28. What are isoelectronic ions ? Give examples.

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29. Define Ionization energy. Give its unit.

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30. Ionization energy of beryllium is greater than the ionization energy of boron. Why?

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31. Ionization energy of nitrogen is greater than the ionization energy of oxygen. Give reason.

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32. Define electron gain enthalpy or electron affinity. Give its unit.

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33. Electron gain enthalpy is F is less negative than Cl Why ?

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34. Electron affinity of oxygen is less negative than sulphur. Justify this statement.

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35. Explain about the factors that affect electronegativity.

Watch Video Solution

36. Explain about periodic variation of electronegativity across a period.

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37. Explain about the period variation of electronegativity along a group.

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38. Define valency . How is it determined ?

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39. What is the basic difference in approach between Mendeleev's periodic table and

modern periodic table?

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

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

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

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43. Explain why cation are smaller and anions are larger in radii than their parent atoms?

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

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45. Would you expect the first lonization enthalpies of two isotopes of the same element to be the same or different? Justify your answer.

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46. Write the general electronic configuration of sp-d-, and f-block elements?

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Additional Questions 3 Mark Questions

1. Why there is a need for classification of elements?

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2. Prove that the halogens, chlorine, bromine and iodine follow the law of triads.

Watch Video Solution

3. What are the salient features of Newland's law of octaves?

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4. How the properties of Eka-silicon was related to germanium?

5. Compare the properties of Eka-aluminium and gallium.

6. Explain about the relationship between the atomic number of an element and frequency of the X-ray emitted from the elements.

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7. What are the reasons behind the Moseley's attempt in finding atomic number?

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8. Draw a simplified form of periods and elements present in modern period table.

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9. Write the electronic configuration of alkali metals ${}_3Li, {}_{11}Na, {}_{19}K, {}_{37}Rb, {}_{55}Cs$ and ${}_{87}Fr$

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10. Explain about the classification of elements based on electronic configuration.

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11. Write about the electronic configuration of 1^{st} and 2^{nd} period.

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12. How many elements are there in 4^{th} period? Prove it.

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13. How many elements are there in 6^{th} period? Prove it.

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14. What are the two exceptions of block division in the periodic table?

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15. Explain about the salient features of metals.

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16. Explain about the characteristic of non - metals.

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17. Periodic change in electronic configuration is responsible for the physical and chemical properties of element. Justify this statement.

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18. What is covalent radius ? . How would you determine the covalent radius of chlorine atom .

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19. Define metallic radius.

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20. Arrange Na^+, Mg^{2+} and Al^{3+} in the increasing order of ionic radii.Give reason.

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21. Arrange the ions F^-, O^{2-} and N^{3-} in the increasing order of their ionic radii. Give reason

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22. Mention some characteristics of ionization energy.

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23. Why ionization energy and electron affinity are calculated in gaseous state?

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24. How does the shielding effect caused by inner electrons affect the ionisation energy?

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25. Ionization energy of Mg is greater than that of Al. Why?

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26. What are factors which influence the electron gain enthalpy ?

Watch Video Solution

27. Give the general variation of electron gain enthalpies in the periodic table.

Watch Video Solution

28. Explain about the electronegativity and non-metallic character across the period and down the group.

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29. Prove that valency is a periodic property.

Watch Video Solution

30. Write a note about periodic trends and chemical reactivity.

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31. Why the first ionisation enthalphy of sodium is lower than that of magnesium while its second ionisation enthlpy is higher than that of magnesium ?

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32. What are the various factors due to which the ionization enthalpy of the main group elements tends to decrease down the group?

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33. Which of the following pairs of elements would have more negative electron gain enthalpy? (i) O or F (ii) F or CI.

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34. 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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35. What are major differences between metals and non-metals?

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36. The increasing order of reactivity among group 1 elements is $Li < Na < K < Rb < Cs$ whereas in group 17 $F > Cl > Br > I$ Explain.

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37. Arrange the following as stated: (i) $N_2, O_2, F_2, CI_2,$ (Increasing order of bond dissociation energy) (ii) F,CI, Br, 1 (Increasing order of electron gain enthalpy) (iii)

$F_2, N_2, CI_2, O_2,$ (Increasing order of bond length).

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38. Why the first ionisation enthalphy of sodium is lower than that of magnesium while its second ionisation enthlpy is higher than that of magnesium ?

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39. Give reasons:

(i) IE_1 of sodium is lower than that of magnesium whereas IE_2 of sodium is higher than that of magnesium.

(ii) Noble gases have positive value of electron gain enthalpy.

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Additional Questions 5 Mark Questions

1. (a) State Mendeleev's periodic law.

(b) Describe about the merits of Mendeleev's periodic table.

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2. Mention Anomalies of Mendeleev 's periodic table.

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3. Explain about the structural features of Moseley's long form of periodic table.

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4. Explain the merits of Moseley's long form of periodic table.

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5. Explain about the general characteristics of periods.

 Watch Video Solution

6. Explain about the salient features of groups.

 Watch Video Solution

7. Explain the classification of elements based on chemical behavior and on physical

properties.

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8. (a) Define atomic radius.

(b) What are the difficulties in determining atomic radius?

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9. Prove that the atomic radii is a periodic property.

Watch Video Solution

10. What are the factors influencing ionization enthalpy.

Watch Video Solution

11. (a) Define ionization energy.

(b) Prove that ionization energy is a periodic property.

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12. Distinguish between electron affinity and electron negativity.

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13. What are the anomalous properties of second period elements?

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Higher Order Thinking Skills Hots Questions

1. Consider the isoelectronic species Na^+, Mg^{2+}, F^- and O^{2-}.The correct order of increasing length of their radii is:

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

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

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

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

Answer: b

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2. The order of screening effect of electron of s, p, d and f orbits of a given shell of an atom on its outershell electrons is:

A. s>p>d>f

B. f>d>p>s

C. p>d>s>f

D. f>p>s>d

Answer: a

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3. The first ionization enthalpy of Na, Mg, Al and Si are in order.

A. $Na < Mg < Al > Si$

B. $Na > Mg > Al > Si$

C. $Na < Mg < Al < Si$

D. $Na < Mg > Al < Si$

Answer: b

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4. Among halogens, the correct order of amount of energy released in electron gain enthalpy is:

A. $F > Cl > Br > I$

B. $F > Cl < Br < I$

C. $F < Cl > Br > I$

D. $F < Cl > Br < I$

Answer: c

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5. Hydrogen by donating one electron forms H^+. In this property, it resembles with .....

A. Transition metals

B. Alkaline earth metals

C. Alkali metals

D. Halongens

Answer: c

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

A. increases

B. decreases

C. remains constant

D. first increases and then decreases

Answer: b

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7. The most electronegative element possess the electronic configuration.....

A. ns^2np^2

B. ns^2np^4

C. ns^2np^5

D. ns^2np^3

Answer: c

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8. Choose the correct order of ionization energy.

A. $N > O > F$

B. $F > O > N$

C. $N > O < F$

D. $O > F > N$

Answer: c

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9. The element with highest electron affinity belongs to .....

A. period 1 group 1

B. period 3 group 17

C. period 2 group 17

D. period 2 group 16

Answer: B

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10. Which of the following ions are not isoelectronic with Ar?

A. Na^+

B. Ca^{2+}

C. Cl^-

D. K^+

Answer: a

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Activity 3 1

1. Covalent radii (in A) for some elements of different groups and periods are listed below. Plot these values against atomic number. From the plot, explain the variation along a period and a group.

$2^n d$ group elements : Be (0.89), Mg (1.36), Ca (1.74), Sr (1.91) Ba(1.98)

$17^t h$ group elements : F (0.72), CI (0.99), Br(1.14). T (1.33)

$3^r d$ Period elements : Na(1.57), Mg(1.36). Al

(1.25), Si(1.17). P(1.10), S(1.04). C1(0.99)

4^th period elements : K(2.03), Ca(1.74). Sc(1.44). Ti(1.32), V(1.22), Cr(1.17), Mn(1.17) Fe(1.17). Co(1.16). Ni(1.15). Cu(1.17). Zn(1.25), Ga(1.25). Ge(1.22). As(1.21). Se(1.14). Br(1.14)

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Activity 3 2

1. The electronegativity for some elements on pauline scale of different groups and periods

are listed below. Plot these values against atomic number. From the pattern, explain the variation along a period and a group.

$2^n d$ group elements : Be (1.6), Mg (1.2). Ca (1.0), Sr (1.0) Ba(0.9)

17^{th} group elements : F (4.0), CI (3.0), Br (2.8). I (2.5)

$3^r d$ Period elements : Na(0.9), Mg(1.2), AI (1.5), Si(1.8), P(2.1), S(2.5), CI(3.0)

$4^t h$ period elements : K(0.8), Ca(1.0). Sc(1.3), Ti(1.5), V(1.6), Cr(16), Mn(1.5), Fe(1.8). Co(1.9), Ni(1.9). Cu(1.9). Zn(16), Ga(16), Ge(1.8), As(2.0), Se(2.4), Br(2.8)

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