CHEMISTRY-1

Classification of Elements and Periodicity in Properties

[Set-1]

SECTION-A

1. The modern periodic table has been divided into

   (i) seven periods and four blocks (ii) eighteen group and three blocks

   (iii) seven periods and eight groups (iv) seven periods and three blocks

2. The IUPAC symbol for the element with Z = 115 is

   (i) Uup (ii) Uus (ii) Uue (iv) Uuh

3. Which one of the following is the correct order of decreasing size of the ions?

   (i) $Na^+ > Mg^{2+} > F^- > O^{2-}$ (ii) $O^{2-} > F^- > Na^+ > Mg^{2+}$

   (iii) $Mg^{2+} > Na^+ > F^- > O^{2-}$ (iv) $O^{2-} > F^- > Mg^{2+} > Na^+$

4. The element with highest first ionisation enthalpy is

   (i) $1s^2\ 2s^2\ 2p^3$ (ii) $1s^2\ 2s^2\ 2p^5$ (iii) $1s^2\ 2s^2\ 2p^6\ 3s^1$ (iv) $1s^2\ 2s^2$

5. **Match the following:**

Column-I Electronic configuration	**Column-II** Electron gain enthalpy (kJ/mol)
A. $1s^2\ 2s^2\ 2p^6$	1. –53
B. $1s^2\ 2s^2\ 2p^6\ 3s^1$	2. –328
C. $1s^2\ 2s^2\ 2p^5$	3. –141
D. $1s^2\ 2s^2\ 2p^4$	4. +48

	A	B	C	D
(i)	4	1	3	2
(ii)	2	1	4	3
(iii)	1	4	2	3
(iv)	4	1	2	3

Assertion-Reason type Questions:

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

(b) Both A and R are true and R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

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6. A: Boron has a smaller first ionization then beryllium

   R: 2p electron in boron is shielded more by the inner core of electrons than the 2s electrons in beryllium.

7. A: Noble gases have very low boiling points.

   R: All noble gases have general electronic configuration of $ns^2\ np^6$ except Helium.

Passage based questions:

The tendency of an element to form a cation by the loss of electron is called electropositivity or metallic character. The tendency of an element to lose electron is closely connected to the ionization enthalpy of an element. The smaller the ionization enthalpy of an element, the greater will be its metallic character. Metallic character and the basicity of an oxide are also directly related. Metallic character increases down the group and decreases across the period.

8. Which of the following is the most metallic element?

   (i) Sodium (ii) Lead (iii) Cesium (iv) Magnesium

9. The most basic oxide is

   (i) Na_2O (ii) Al_2O_3 (iii) MgO (iv) K_2O

10. The correct order of decreasing stability of the cation formed is

    (i) B > Al > Mg > K (ii) Al > Mg > B > K (iii) Mg > Al > K > B (iv) K > Mg > Al > B

SECTION-B

11. Account for the following:

    (i) Gallium has a smaller atomic radius than aluminum.

    (ii) Oxygen has a lower first ionization enthalpy than nitrogen.

OR

You are given element with Z = 119

(i) write the name of this element

(ii) predict the group number, period number of this element.

(iii) write the formula of oxide of this element.

12. What are isoelectronic species?

    Among the following isoelectronic species, select the species with smallest ionic size and species with largest ionic size.

    Cl^-, Ca^{2+}, S^{2-}, K^+, P^{3-}

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13. Give reason:

(i) Oxygen is slightly larger in size than nitrogen

(ii) Fluorine has more negative electron gain enthalpy than oxygen

(iii) Fluorine is more electronegative than chlorine

OR

(i) Write general electronic configuration of d-block elements

(ii) What do you understand by diagonal relationship?

(iii) State two characteristics of f-block elements.

14. Given: A: $1s^2$ B: $1s^2\ 2s^2$ C: $1s^2\ 2s^2\ 2p^4$ D: $1s^2\ 2s^2\ 2p^6\ 3s^1$

(i) Element with highest ΔiH_1 is _____

(ii) Element with most negative $\Delta_{eg}H$ is _____

(iii) Most electropositive element is_____

(iv) Correct order of increasing atomic size is _____

15. Ionisation enthalpies and electron gain enthalpies of four elements A, B, C and D are given below:

Elements	Δ_iH_1 (kJ/mol)	Δ_iH_2 (kJ/mol)	$\Delta_{eg}H$ (kJ/mol)
A	419	3051	–48
B	1681	3374	–328
C	738	1451	–40
D	2372	5251	+48

(i) Name the most reactive metal

(ii) Name the most reactive non-metal

(iii) Name the least reactive element

(iv) Which element forms a binary halide?

(v) To which element, it is most difficult to add an electron?

OR

(i) First member of each group in the s and p block of the periodic table show anomalous behavior. Illustrate this with two examples.

(ii) Amongst the elements B, Al, C and Si,

(a) Which element has the highest first ionization enthalpy?

(b) Which element has most metallic character?

(c) Arrange in order of increasing $\Delta_{eg}H$. Justify your answer.

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