



INDIAN SCHOOL MUSCAT

CLASS: XI

CHEMISTRY



CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES

I. Choose The Best Answer

1. According to modern periodic law, the physical and chemical properties of elements are the periodic functions of them?

- (a) Density (b) Atomic Number (c) Mass Number (d) Atomic Mass

2. Highest electropositive element in the periodic table is

- (a) Cs (b) Rb (c) K (d) Na

3. The correct order of the size of C, N, P, S follows the order

- (a) $N < C < P < S$ (b) $C < N < S < P$ (c) $C < N < P < S$ (d) $N < C < S < P$

4. Which of the following oxide is most acidic?

- (a) Na_2O (b) Al_3O_2 (c) P_2O_5 (d) SO_3

5. The ionization enthalpy of nitrogen is more than that of oxygen molecules because of

- (a) greater attraction of electrons by the nucleus (b) extra stability of the half-filled p-orbitals
(c) smaller size of nitrogen (d) more penetrating effect

II. Fill in the Blanks

1. Lightest metal in s-block elements is _____ .

2. Most electronegative elements belong to _____ group.

3. The elements above atomic number 92 are called _____ .

4. The inner-transition elements belong to _____ block of the periodic table and are shown separately at the _____ of the periodic table.

5. Ca^{2+} has smaller ionic radius than K^+ ion because it has _____.

III. Assertion and Reasoning Questions:

Directions: (Questions 1 to 4).

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion.

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

C. If Assertion is true statement but Reason is false.

D. If both Assertion and Reason are false statements.

1. Assertion: Ionic radius of Na^+ is smaller than Na

Reason: Effective nuclear charge of Na^+ is higher than Na

2. Assertion: First ionization enthalpy of N is higher than O.

Reason: Extra stability of fully filled up 2p subshell of N atom

3. Assertion: Electron gain enthalpy of Cl is more negative than F atom.

Reason: F is more electronegative than Cl atom.

4. Assertion: First ionization enthalpy of Gallium is higher than aluminum.

Reason: Weak shielding effect of 3d subshell in Gallium.

IV Descriptive Questions:

1. Cations are smaller than their parent atom whereas anions are larger in size than their parent atom. Explain.

2. Among the elements of the third period, pick out the element with

- a) Highest first IE b) Largest atomic radius

c) Most reactive non-metal d) Most reactive metal

3. The reactivity of halogens decrease down the group but of alkali metals increases down the group. Why?

4. Which atom in each of the following pairs has greater first IE? Give reasons.

a) B or C b) N or O c) F or Ne d) Cl or F e) K or Ar f) Kr or Xe

5. Electron gain enthalpy of Mg is positive. Explain.

6. Predict the position in the periodic table

a) $(n-1)d^1 ns^2$ where $n=4$ b) $(n-1)d^2 ns^2$ where $n=5$

7. What is the formula of binary compound formed between:

(a) 1st element of I group and iodine?

(b) 2nd element of II group and 1st element of 17th group?

8. If $A = 1s^2, 2s^2, 2p^1$ $B = 1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

$C = 1s^2, 2s^2, 2p^6, 3s^2, 3p^3$ $D = 1s^2, 2s^2, 2p^6, 3s^2, 3p^5$

$E = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2$ $F = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^1$

a) Which is the most metallic?

b) Which has the highest negative value for electron gain enthalpy?

c) Which one belongs to the d-block?

d) Which is a halogen?

e) Which two elements are in the same group?

f) Which element belongs to the 13th group?

9. Arrange in the following in increasing order of property indicated:

(a) Size I, F, Cl, Br (b) Oxidizing power I, F, Br, Cl

10. The first & second ionization enthalpies & electron gain enthalpies of elements A, B, C & D are as follows

Element	$\Delta_i H_1$	$\Delta_i H_2$	$\Delta_{eg} H$
A	419	3051	-48
B	1681	3374	-328
C	738	1451	-40
D	2372	5251	+49

Identify the element which is likely to be

- (i) A most reactive non-metal ii) A most reactive metal
(iii) a noble gas (iv) metal forming binary halide (MX_2)

11. Element 'A' 13 group forms ionic compounds. Write the:

- (a) Formula of its oxide.
(b) Arrange the following in their decreasing electro-positive character Mg, Na, Al, Si.

12. Explain why?

- a) Lanthanides and actinides are placed separately in the periodic table
b) IE of Na^+ is almost double that of Ne.
c) Third period contains only 8 elements.
d) Cl^- is larger than Cl.
e) IE_2 of Na is greater than IE_2 of Mg.
f) IE_1 of B is 800kJ/mole while IE_1 of Be is 900kJ/mole.
g) $\Delta_{eg} H$ of F is less negative than that of Cl.
h) IE_1 of N is 1402kJ while that of O is 1314kJ.
i) Li & Mg resemble in many of their properties.

13. Explain the following:

- (a) Modern Periodic law (b) Electro-negativity (c) Shielding effect

14. Arrange the following elements S, P, O, N in the increasing order of non-metallic character

15. What do you understand by the isoelectronic species? Name a species that will be isoelectronic with each of the following atoms or ions.

(i) F^- (ii) Ar (iii) Ca^{2+} (iv) Rb^+

16. Define ionization enthalpy. What are the various factors due to which the ionization enthalpy of the main group elements tends to increase across a period?

17. (A) Which of the following have same chemical properties:

(a) Atomic number 17, 53 (b) Atomic number 8, 52 (c) Both (d) None

(B) Answer the following:

(i) B, Al, Ga (decreasing order of atomic radii). (ii) C, S, N (decreasing order of $(DHeg)_1$)

(iii) Al forms amphoteric oxide. Why?

(iv) Si is a semiconductor while 'C' is a non-metal, why?

18. Write the general characteristics and the outer electronic configuration of the following

- i. s block elements
- ii. p block elements
- iii. d block elements
- iv. f block elements

19. What are the d- block elements? Write any four properties of d - block elements and give their general outer electronic configuration.

20. To which group and period will the element with atomic number 111 belong?

21. Out of group 17, 18 and I, predict:

- (a) Which has most negative first electron gain enthalpy?
- (b) Which shows most metallic behavior?
- (c) Which has highly positive electron gain enthalpy?

