Classification Of Elements & Periodicity In Properties

Short Answer Type Questions

1. Explain why the electron gain enthalpy of fluorine is less negative than that of chlorine.
2. All transition elements are d-block elements, but all d-block elements are not transition elements. Explain.
3. Identify the group and valency of the element having atomic number 119. Also predict the outermost electronic configuration and write the general formula of its oxide.
4. Ionisation enthalpies of elements of second period are given below :
   Ionisation enthalpy/ k cal mol^{-1} : 520, 899, 801, 1086, 1402, 1314, 1681, 2080.
   Match the correct enthalpy with the elements and complete the graph given in Fig. 3.1.
   Also write symbols of elements with their atomic number.

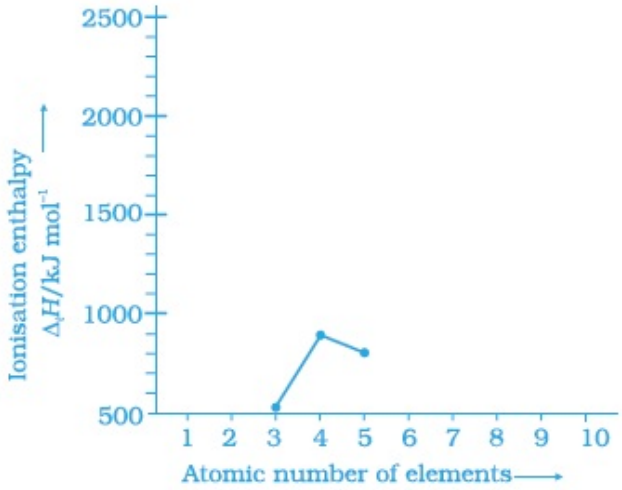

Fig. 3.1

5. Among the elements B, Al, C and Si,
   (i) which element has the highest first ionisation enthalpy?
   (ii) which element has the most metallic character?
   Justify your answer in each case.
6. Write four characteristic properties of p-block elements.

7. Choose the correct order of atomic radii of fluorine and neon (in pm) out of the options given below and justify your answer.
    - (i) 72, 160
    - (ii) 160, 160
    - (iii) 72, 72
    - (iv) 160, 72

8. Illustrate by taking examples of transition elements and non-transition elements that oxidation states of elements are largely based on electronic configuration.
9. Nitrogen has positive electron gain enthalpy whereas oxygen has negative. However, oxygen has lower ionisation enthalpy than nitrogen. Explain.
10. First member of each group of representative elements (i.e., s and p-block elements) shows anomalous behaviour. Illustrate with two examples.
11. p-Block elements form acidic, basic and amphoteric oxides. Explain each property by giving two examples and also write the reactions of these oxides with water.
12. How would you explain the fact that first ionisation enthalpy of sodium is lower than that of magnesium but its second ionisation enthalpy is higher than that of magnesium?
13. What do you understand by exothermic reaction and endothermic reaction?
    Give one example of each type.
14. Arrange the elements N, P, O and S in the order of-
    (i) increasing first ionisation enthalpy.
    (ii) increasing non metallic character.
    Give reason for the arrangement assigned.
15. Explain the deviation in ionisation enthalpy of some elements from the general trend by using Fig. 3.2.

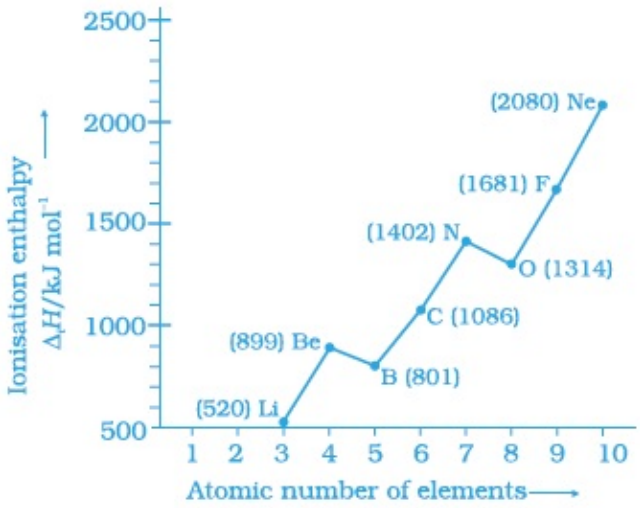

Fig. 3.2

16. Explain the following:
    - (a) Electronegativity of elements increase on moving from left to right in the periodic table.
    - (b) Ionisation enthalpy decrease in a group from top to bottom?

17. How does the metallic and non metallic character vary on moving from left to right in a period?
18. The radius of Na+ cation is less than that of Na atom. Give reason.
19. Among alkali metals which element do you expect to be least electronegative and why?

Matching Type Questions

1. Match the correct atomic radius with the element.

Element	Atomic radius (pm)
Be	74
C	88
O	111
B	77
N	66

2. Match the correct ionisation enthalpies and electron gain enthalpies of the following elements.

	Elements		ΔH_1	ΔH_2	$\Delta_{eg} H$
(i)	Most reactive non metal	A.	419	3051	– 48
(ii)	Most reactive metal	B.	1681	3374	– 328
(iii)	Least reactive element	C.	738	1451	– 40
(iv)	Metal forming binary halide	D.	2372	5251	+ 48

3. Electronic configuration of some elements is given in Column I and their electron gain enthalpies are given in Column II. Match the electronic configuration with electron gain enthalpy.

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

Assertion and Reason Type Questions

In the following questions a statement of Assertion (A) followed by a statement of reason (R) is given. Choose the correct option out of the choices given below each question.

1. Assertion (A) : Generally, ionisation enthalpy increases from left to right in a period.
   Reason (R) : When successive electrons are added to the orbitals in the same principal quantum level, the shielding effect of inner core of electrons does not increase very much to compensate for the increased attraction of the electron to the nucleus.
   - (i) Assertion is correct statement and reason is wrong statement.
   - (ii) Assertion and reason both are correct statements and reason is correct explanation of assertion.
   - (iii) Assertion and reason both are wrong statements.
   - (iv) Assertion is wrong statement and reason is correct statement.

2. Assertion (A) : Boron has a smaller first ionisation enthalpy than beryllium.
   Reason (R) : The penetration of a 2s electron to the nucleus is more than the 2p electron hence 2p electron is more shielded by the inner core of electrons than the 2s electrons.
   - (i) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
   - (ii) Assertion is correct statement but reason is wrong statement.
   - (iii) Assertion and reason both are correct statements and reason is correct explanation for assertion.
   - (iv) Assertion and reason both are wrong statements.

3. Assertion (A) : Electron gain enthalpy becomes less negative as we go down a group.
   Reason (R) : Size of the atom increases on going down the group and the added electron would be farther from the nucleus.
   - (i) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
   - (ii) Assertion and reason both are correct statements and reason is correct explanation for assertion.
   - (iii) Assertion and reason both are wrong statements.

- (iv) Assertion is wrong statement but reason is correct statement.

Long Answer Type Questions

1. Discuss the factors affecting electron gain enthalpy and the trend in its variation in the periodic table.
2. Define ionisation enthalpy. Discuss the factors affecting ionisation enthalpy of the elements and its trends in the periodic table.
3. Justify the given statement with suitable examples— "the Properties of the elements are a periodic function of their atomic numbers".
4. Write down the outermost electronic configuration of alkali metals. How will you justify their placement in group 1 of the periodic table?
5. Write the drawbacks in Mendeleev's periodic table that led to its modification.
6. In what manner is the long form of periodic table better than Mendeleev's periodic table? Explain with examples.
7. Discuss and compare the trend in ionisation enthalpy of the elements of group 1 with those of group 17 elements.