Classification of Elements & Periodicity in Properties

Date Planned : __ / __ / __	CBSE Pattern	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 0	Exact Duration :_____

Very Short Answer Type (1 Mark)

1. How many groups and periods are there in the long form of periodic table?

2. Which element has highest first ionization energy?

3. Which is the shortest period?

4. Which is the largest period?

5. Which are the short periods?

6. What would be the IUPAC name and symbol for the element with atomic number 120?

7. What was the basis of classification of elements by Lother Meyer?

Short Answer Type-I (2 marks)

8. What is meant by periodicity of properties?

9. Why do elements with similar properties occur in the same group?

10. What is the importance of periodic classification of elements?

11. What were the drawbacks of Newlands' law of octaves?

12. What were the merits of Mendeleev's periodic table?

13. What were the limitations of Mendeleev's periodic table?

Short Answer Type-II (3 Marks)

14. Calculate the energy in joules required to convert all the atoms of sodium to sodium ions present in 2.3 mg of sodium vapours? Ionization enthalpy of sodium is 495 kJ mol^{-1} (Atomic mass of Na = 23)

15. The ionization potential of hydrogen is 13.60 eV. Calculate the energy in kJ required to produce 0.1 mole of H^+ ions. Given, 1 eV = 96.49 kJ mol^{-1}.

16. The first and second ionization potentials of helium atoms are 24.58 eV and 54.4 eV respectively. Calculate the energy in kJ required to produce 1 mole of He^{2+} ions.

17. The IE_1 and IE_2 of Mg (g) are 740 and 1450 kJ mol^{-1}. Calculate the percentage of Mg^+ (g) and Mg^{2+} (g) if 1g of Mg (g) absorbs 50 kJ of energy.

18. Which of the following pairs of elements would have more negative electron gain enthalpy.

(i) N or O **(ii)** F or Cl **(iii)** S or O **(iv)** C or Si

19. Arrange the elements with the following electronic configurations in order of increasing electron gain enthalpy.

(i) $1s^2 2s^2 2p^5$ **(ii)** $1s^2 2s^2 2p^4$ **(iii)** $1s^2 2s^2 2p^3$ **(iv)** $1s^2 2s^2 2p^6 3s^2 3p^4$

Long Answer Type (5 Marks)

20. The electronic configurations of a few elements are listed:

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

(iv) $1s^2 2s^2 2p^6 3s^2 3p^6$ **(v)** $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$ **(vi)** $1s^2 2s^2 2p^3$

From the above electronic configuration predict which one is

(a) a halogen **(b)** noble gas element **(c)** an alkaline earth element

(d) present in group 14 **(e)** a transition metal **(f)** a member of group 15

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

(i) Lithium and Oxygen **(ii)** Magnesium and Nitrogen

(iii) Aluminum and Iodine **(iv)** Silicon and Oxygen

(v) Phosphorus and Fluorine

22. Find out total number of representative elements in the given elements:
Cd, Nb, Ta, Te, Ra, Mo, Po, Pd, Tc

23. The electronic configuration for the following neutral atoms are given for use in question.

(a) $1s^2\ 2s^2\ 2p^6\ 3s^2$ **(b)** $1s^2\ 2s^2\ 2p^6\ 3s^1$ **(c)** $1s^2\ 2s^2\ 2p^4$

(d) $1s^2\ 2s^2\ 2p^5$ **(e)** $1s^2\ 2s^2\ 2p^6$

(i) Which of the electronic configuration given above would you expect for the noble gas?

(ii) Which of the electronic configurations given above would you expect to have the lowest ionization enthalpy?

(iii) List the above configurations in order of increasing ionization enthalpy.

24. The electron gain enthalpy of chlorine is –349 kJ mol^{-1}. How much energy in kJ is released when 3.55 g of chlorine is converted completely into Cl^{-1} ion in the gaseous state?

25. The amount of energy released when 1×10^{10} atoms of chlorine in vapour state are converted to Cl^{-1} ions according to the equation, $Cl(g) + e^- \rightarrow Cl^-(g)$ is 57.86×10^{-10} J

Calculate the electron gain enthalpy of chlorine atom in terms of kJ mol^{-1} and eV per atom.