II. Short Answer Type Questions

Question 1. What is the cause of periodicity in properties of the elements? Explain with two examples.
Answer:
The cause of periodicity in properties is the repetition of similar outer electronic configuration after certain regular intervals.
For example, all the elements of group LA i.e., alkali metals, have similar outer electronic configuration as ns^1.
Where n refer to the number of outermost principal shell.
In a similar manner all the halogens i.e., elements of group VILA have similar other electronic configuration i.e., ns^2 ns^5 and hence possess similar properties.

Question 2. Show by a chemical reaction with water that Na_2O is a basic oxide and Cl_2O_7 is an acidic oxide.
Answer: Na_2Oreacts with water to form sodium oxide which turns red litmus blue.
$Na_2O + H_2O \rightarrow 2NaOH$
Sod.oxide Sod.hydroxide
Therefore, Na_2O is a basic oxide
In contrast,Cl_2O_7 reacts with water to form perchloric acid which turns blue litmus red.
$Cl_2O_7 + H_2O \rightarrow 2HClO_4$
perchloric acid
Therefore, Cl_2O_7 is an acidic oxide.

Question 3. What do you understand by 'Representative elements'? Name the groups whose elements are called representative elements.
Answer: The elements of s and p-block are collectively called representative or main group elements. These include elements of group I (alkali metals), group 2 (alkaline earth metals). .

Question 4. Name different blocks of elements in the periodic table. Give general electronic configuration of each block.
Answer: Elements in the long form of the periodic table have been divided into four blocks i.e., s, p, d and f. This division is based upon the name of the orbital which receives the last electron. General electronic configuration of s-block elements: ns^{1-2} where n = 2 - 7
p-block elements: ns^2 np^{1-6} where n = 2 - 6
d-block elements: (n -1) d^{1-10} ns^{0-2} where n = 4 - 7
f-block elements: (n - 2) f^{0-14}(n -1) d^{0-1} ns^2 where n = 6 - 7

Question 5. Elements A, B, C and D Iwoe atomic numbers 12,19, 29, and 36 respectively. On the basis of electronic configuration, write to which group of the periodic table each element belongs.
Answer:
Electronic configuration of A (Z = 12)
$=1s^2\ 2s^2\ 2p^6\ 3s^2$
period = 3, Element's name = Mg block = s, Group = II Electronic configuration of B (Z = 19)
Element's name = K (potassium)
$=1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ n = 4, period = 4 Block = s, Group = I

Electronic configuration of C (Z = 29)
$=1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$ n - 4, period = 4 Block = d Electronic configuration of D (Z = 36)
$=1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6$ period = 4 Block = p-Block group = 18

Question 6. Define the term ionization enthalpy? How does it vary along a period and along a group?
Answer:
Ionization Enthalpy: The minimum amount of energy required to remove the most loosely bound electron from an isolated gaseous atom so as to convert it into a gaseous cation is called its ionization enthalpy or energy. It is represented by $\Delta_i H$.
This process may be represented as
$M(g) + \Delta_i H \rightarrow M^+(g) + e^-(g)$
where M (g) is isolated gaseous atom.
M^+ (g) is the resultant cation (a position ion)
Variation along a period. Moving from left to right in a period, the ionization enthalpy increases with atomic number.
Variation within a group. The ionization enthalpies keep on decreasing regularly as we move down a group from one element to the other.

Question 7. Discuss briefly the various factors on which ionization enthalpy depends.
Answer:

1. Atomic size. With the increase in the atomic size, the number of electron shells
   increases. Therefore, the force that binds the electrons with the nucleus decreases. Thus, the ionization enthalpy decreases with increase in atomic size.
2. Nuclear charge. As the magnitude of the positive charge on the nucleus of an atom increases, the attraction with the electrons also increases. Therefore, the ionization enthalpy increases with the increase in the magnitude of the nuclear charge.
3. Screening or shielding effect. Greater the magnitude of the screening effect, less will be the value of ionization enthalpy or potential.

Question 8. What are Dobereiner's triads? Name two such triads.
Answer: Dobereiner arranged certain elements with similar properties in groups of three in such a way that the atomic mass of the middle element was nearly the same as the average atomic masses of the first and third elements.
For example:
Triad: lithium sodium potassium
Atomic mass: 7 23 39
Atomic mass of Na =(39+7)/2= 23
Triad: Chlorine Bromine Iodine
Atomic mass: 35.5 80 127
Atomic mass of Br =127 + 35.5/2 = 81.25

Question 9. Give the electronic configuration of the transition elements. Write their four important characteristics.
Answer:
The d-block elements are known as transition elements.
Electronic configuration = $(n - 1)\ d^{1\text{-}10}\ ns^{1\ -2}$
Characteristics of d-block elements:

- They show variable oxidation states.
- Their compounds are generally paramagnetic in nature.
- Most of the transition elements form coloured compounds.
- They are all metals with high melting and boiling points.

Question 10. What is screening or shielding effect? How does it influence the ionization enthalpy ?
Answer: In a multielectron atom, the electrons present in the inner shells shield the electrons in the valence shell from the attraction of the nucleus or they act as a screen between the nucleus and these electrons. This is known as shedding effect or screening effect. As the screening effect increases, the effective nuclear charge decreases. Consequently, the force of attraction by the nucleus for the valence shell electrons decreases and hence the ionization enthalpy decreases.

Question 11. Define electron gain enthalpy. What are its units?
Answer:
The energy which is released by an atom in gaining an electron from outside atom or ion to form negative ion (or anion) is called electron gain enthalpy ($\Delta_{eg}H$).
Unit of electron gain enthalpy is kJ/ mol.
In some cases, like in noble gas, atoms do not have any attraction to gain an electron. In that case energy has to be supplied.
For example,
$Ne\ (g) + e^- \rightarrow Ne^-\ (g)$
$\Delta_{eg}H = +\ 116\ kJ\ mol^{-1}$

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