IV. Multiple Choice Questions

Question 1. The highest ionization energy is exhibited by
(a) halogens
(b) alkaline earth metals
(c) transition metals
(d) noble gases
Question 2. Which of the following oxides is neutral?
(a) SnO_2
(b) CO
(c) Al_2O_3
(d) Na_2O
Question 3. Which of the following is arranged in order of increasing radius?
(a) K^+ (aq) < Na^+ (aq) < Li^+ (aq)
(b) K^+ (aq) > Na^+ (aq) > Zn^{2+} (aq)
(c) K^+ (aq) > Li^+ (aq) > Na^+ (aq)
(d) Li^+ (aq) < Na^+ (aq) < K^+ (aq)
Question 4. What is the electronic configuration of the elements of group 14?
(a) $ns^2\ np^4$
(b) $ns^2\ np^6$
(c) $ns^2\ np^2$
(d) ns^2
Question 5. Among the following elements, which has the least electron affinity?
(a) Phosphorous
(b) Oxygen
(c) Sulphur
(d) Nitrogen
Question 6. In halogens, which of the following, increases from iodine to fluorine?
(a) Bond length
(b) Electronegativity
(c) The ionization energy of the element
(d) Oxidizing power
Question 7. Diagonal relationships are shown by
(a) Be and Al
(b) Mg and Al
(c) Li and Mg
(d) B and P
Question 8. Which of the following species are not known?
(a) AgOH
(b) PbI_4
(c) PI_5
(d) SH_6
(e) All of the above
Question 9. Which one of the following is isoelectronic with Ne?
(a) N^{3-}
(b) Mg^{2+}
(c) Al^{3+}
(d) all of the above
Question 10. Which element has smallest size?

(a) B (b) N (c) Al (d) P
Answer:
1. (b)
2. (b)
3. (d)
4. (c)
5. (d)
6. (b) (c) and (d)
7. (a) and (c)
8. (e)
9. (d)
10. (b)

V. Hots Questions

Question 1. Arrange the following as stated: (i) N_2, O_2, F_2, Cl_2 (Increasing order of bond dissociation energy) (ii) F, Cl, Br, I (Increasing order of electron gain enthalpy) (iii) F_2, N_2, Cl_2, O_2 (Increasing order of bond length).
Answer:
(i) $F_2 < Cl_2 < O_2 < N_2$
(ii) I < Br < F < Cl
(iii) $N_2 < 0_2 < F_2 < Cl_2$

Question 2. The first ionisation enthalpy of magnesium is higher than that of sodium. On the other hand, the second ionisation enthalpy of sodium is very much higher than that of magnesium. Explain.
Answer: The 1st ionisation enthalpy of magnesium is higher than that of Na due to higher nuclear charge and slightly smaller atomic radius of Mg than Na. After the loss of first electron, Na^+ formed has the electronic configuration of neon (2, 8). The higher stability of the completely filled noble gas configuration leads to very high second ionisation enthalpy for sodium. On the other hand, Ma^+ formed after losing first electron still has one more electron in its outermost (3s) orbital. As a result, the second ionisation enthalpy of magnesium is much smaller than that of sodium.

Question 3. Give reasons:
(i) $IE_1$of sodium is lower than that of magnesium whereas IE_2 of sodium is higher than that of magnesium.
(ii) Noble gases have positive value of electron gain enthalpy.
Answer:
(i) The effective nuclear charge of magnesium is higher than that of sodium. For these reasons, the energy required to remove an electron from magnesium is more than the energy required in sodium. Hence, the first ionization enthalpy of sodium is lower than that of magnesium.
However, the second ionization enthalpy of sodium is higher than that of magnesium.
This is because after losing an electron, sodium attains the stable noble gas configuration. On the other hand, magnesium, after losing on electron still has one electron.
(ii) Because of stable configuration.

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