

Periodic Table

1. Development of P.T.

Effective Nuclear Charge

- Q 1. Which of the following is/are Doberiner's triad?
 (1) P, As, Sb (2) Cu, Ag, Au
 (3) Fe, Co, Ni (4) S, Se, Te
 Correct answer is
 (A) 1 & 2 (B) 2 & 3
 (C) 1 & 4 (D) All of these
- Q 2. Atomic number of P is 31 and Sb is 120. What will be the atomic wt. of As, as per Doberiner's triad rule
 (A) 151 (B) 75.5
 (C) 89.5 (D) unpredictable
- Q 3. The law of triads is not applicable on
 (A) Cl, Br, I (B) Na, K, Rb
 (C) S, Se, Te (D) Ca, Sr, Ba
- Q 4. Which of the following sets of elements follows Newland's octave rule?
 (A) Be, Mg, Ca (B) Na, K, Rb
 (C) F, Cl, Br (D) B, Al, Ga
- Q 5. The discovery of which of the following group of elements gave a death blow to the Newlands law
 (A) Inert gases (B) alkali metals
 (C) transuranic elements (D) Halogen
- Q 6. Which are correct match
 (1) Eka silicon –Be (2) Eka aluminium –Ga
 (3) Eka Manganese –Tc (4) Eka scandium – B
 (A) 2 & 3 (B) 1, 2 & 4
 (C) 1 & 4 (D) All of these
- Q 7. The places that were left empty by Mendeleev were, for
 (A) Aluminum & Silicon
 (B) Gallium and Germanium
 (C) Arsenic and antimony
 (D) Molybdenum and tungsten
- Q 8. Which is not an anomalous pair of element in the Mendeleev's periodic table?
 (A) Ar and k (B) Co and Ni
 (C) Te and I (D) Al and Si
- Q 9. Modern periodic table is based on atomic no. experiments which proved importance of at no.
 (A) Bragg's work on X-ray diffraction
 (B) Moseley's works on X-ray spectrum
 (C) Mullikan's oil drop experiment
 (D) Lothar Meyer curve plotted between At. volume & At. Wt.
- Q 10. What is the Mosley law of periodic table? How it is better than Mendeleev law of periodicity.
- Q 11. The period number in the long form of periodic table is equal to **[AIIMS 2012]**
 (A) ml value of any element of the period
 (B) atomic number of any element in the period
 (C) highest principle quantum number of any element of the period
 (D) maximum l value of element of the period
- Q 12. The screening effect of d electrons is ?
 (A) equal to P e (B) more than P e
 (C) same as f e (D) less than P e
- Q 13. In the Li atom screening effect of valence shell electrons is caused by
 (A) K & L shell electrons
 (B) K shell electrons
 (C) Two electrons of K shell & 1 of L shell
 (D) None
- Q 14. The order of screening effect of electrons in S, P, d & f orbitals of a given shell of an atom on its outer shell electrons is **[NCERT Exemplar]**
 (A) $s > p > d > f$ (B) $f > d > p > s$
 (C) $p < d < s > f$ (D) $f > p > s > d$
- Q 15. Which of the following option is correct?
 (1) On moving from left to right in a period screening constant value increases
 (2) In a S, P, d, f – orbital the order of screening effect is $S > P > d > f$ in a given shell
 (3) In any period from left to right effective Nuclear charge increases
 (4) When σ increases Z_{eff} also increases.
 (A) TTTF (B) FFFT
 (C) FFTT (D) TTFF
- Q 16. What is screening effect & how it is theoretically determined. Based on the rules for calculating Screening constant (σ) calculate $Z_{\text{effective}}$ for the following elements for their last electrons
 (A) Na (B) Zn
 (C) Cu (D) P
 (E) Br (F) Mn

2. Modern Periodic Table – I

- Q 1. The last electron in each normal element of a period is filled in
 (A) The same energy sublevel
 (B) The same energy level
 (C) The same orbital
 (D) Successive energy level
- Q 2. On the basis of quantum numbers, justify that sixth period of the periodic table have 32 elements. [NCERT]
- Q 3. The eighteenth element of the periodic table with
 (A) 11th element (B) 2nd element
 (C) 10th family (D) 2nd and 10th element
- Q 4. Which group of the periodic table contains no metal? [AIIMS 1999]
 (A) IA (B) IIIA
 (C) VIIA (D) VIII
- Q 5. The element with atomic number $z = 115$ will be placed in
 (A) 7th period, 1 A group
 (B) 8th period, 4 A group
 (C) 7th period and 5A group
 (D) 6th period, 5B group
- Q 6. The element $Z = 114$ has been discovered recently. It will belong to which of the following family/Group and electronic configuration? [NEET 2017]
 (A) Halogen Family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^5$
 (B) Carbon Family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^2$
 (C) Oxygen Family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^4$
 (D) Nitrogen Family, $[\text{Rn}]5f^{14}6d^{10}7s^27p^6$
- Q 7. The element with atomic number 118 will be [AIIMS 1195]
 (A) Transition Metal (B) Alkali Metal
 (C) Alkaline earth Metal (D) Noble gas
- Q 8. The elements $Z = 117$ & $Z = 120$ have not been discovered. In which family/Group would you place these elements and also give electronic configuration in each case. [NCERT Solved]
- Q 9. Write the atomic number of the element present in the third period and seventeenth group of the periodic table. [NCERT]
- Q 10. $4d^35s^2$ configuration belongs to which group
 (A) 2A (B) 2B
 (C) 5B (D) 3B
- Q 11. Which of the following statement is incorrect about modern Periodic Table? [NCERT]

- (A) The p – Block has 6 column, because a maximum o electrons can occupy all the orbitals in a P – Subshell.
 (B) The d – block has 8 column, because a maximum of 8 electrons can occupy all orbitals of d subshell
 (C) Each block contains a number of columns equal to the number of electrons that can occupy the subshell.
 (D) The block indicates value of Azimuthal quantum number (l) for the last subshell that received electrons in building up the electronic configuration.
- Q 12. An element with atomic no. 29 belongs to
 (A) S Block (B) P Block
 (C) d Block (D) f Block
- Q 13. If atomic number of an element is 33, it will be placed in Periodic Table in [CBSE PMT 1993]
 (A) 1st Group (B) 3rd Group
 (C) 5th Group (D) 7th Group

3. Modern Periodic Table – II

- Q 1. Match List-I (Atomic Number of Element) with List-II (Block to which the Element Belongs) and select the correct answer using the codes given below the lists.

	List-I		List-II	
	(Atomic Number of Element)		(Block to which the Element Belongs)	
	a. 24		1. P	
	b. 38		2. f	
	c. 49		3. s	
	d. 59		4. d	
	a	b	c	d
(A)	2	1	3	4
(B)	4	3	1	2
(C)	2	3	1	4
(D)	4	1	3	2

- Q 2. Match List-I with List-II (Block to which the Element Belongs) and select the correct answer using the codes given below the lists.

List I

- a. 19
b. 22
c. 32
d. 64

	a	b	c	d
(A)	1	2	3	4
(B)	4	3	1	2
(C)	4	1	3	2
(D)	2	1	3	4

List II

1. p-block
2. f-block
3. d-block
4. s-block

- Q 3. Match List-I (Type of element) with List-II (Electronic configuration) and select the correct answer using the codes given below the lists:

List I

- a. Inert gas elements
b. Main group elements
c. Transition elements

List II

1. ns^1 to $ns^2 np^5$
2. $1s^2$ to $ns^2 np^6$
3. $(n-2)f^{1-14} (n-1) s^2 p^6 d^1 ns^2$
4. $(n-1) d^{1-9} ns^2$
5. $(n-1) d^{10} ns^2$

	a	b	c	d
(A)	1	2	3	5
(B)	4	1	2	3
(C)	2	1	4	2
(D)	2	5	4	1

- Q 4. The elements in which electrons are progressively filled in 4f orbitals are called

[NCERT Exemplar]

- (A) Actinoids (B) Transition Elements
(C) Lanthnoids (D) Halogen

- Q 5. The electronic configuration of Gadolinium (Z = 64) is

[NCERT Exemplar]

- (A) $[Xe]4f^3 5d^5 6s^2$
(B) $[Xe]4f^7 5d^2 6s^1$
(C) $[Xe]4f^7 5d^1 6s^2$
(D) $[Xe]4f^8 5d^6 6s^2$

- Q 6. Which of the following elements is not an actinoid?

[NCERT Exemplar]

- (A) Curium (Z = 96)
(B) Californium (Z = 98)
(C) Uranium (Z = 92)
(D) Terbium (Z = 65)

- Q 7. Two new elements with atomic number 113 and 115 are to be placed in

- (A) s-block (B) p-block
(C) d-block (D) f-block

- Q 8. Which set does not show correct matching?

- (A) $Sc^{3+} [Ne] 3s^2 3p^6$ zero group
(B) $Fe^{2+} [Ar] 3d^6$ VIII group
(C) $Cr[Ar] 3d^5 4s^1$ VIB group
(D) All of the above

- Q 9. On August 2003, IUPAC approved the name of the element with atomic no. 110 as

- (A) Ds (B) Uuu
(C) Uun (D) nnu

- Q 10. What would be the IUPAC name & Symbol for the element with atomic number 120?

[NCERT Solved]

- Q 11. The notation of element with atomic Number 125 will be

- (A) UBC (B) UBP
(C) UCA (D) UBI

- Q 12. Find the position of elements in modern periodic table having atomic number given as follows

- (1) 54 (2) 47 (3) 87 (4) 69
(5) 99 (6) 111

Find the elements name also if the element is present in S, P or d block.

4. Atomic Volume & Atomic Radius

- Q 1. Which of the following elements have maximum atomic volume?

- (A) Halogen (B) Alkali Metal
(C) Alkaline earth Metal (D) Transition Metal

- Q 2. Which of the following elements have minimum atomic volume?

- (A) Halogen (B) Alkali Metal
(C) Alkaline earth Metal (D) Transition Metal

- Q 3. Atomic Volume of an element is defined as

$$(A) \text{At. Volume} = \frac{4}{3} \pi (\text{At. radius})^3$$

$$(B) \text{At. Volume} = \frac{\text{Mass}_{\text{atom}}}{\text{density}}$$

- (C) both A & B
(D) None of these

- Q 4. Anything that influences the valence electrons will affect the chemistry of the element. Which

- one of the following factors does not affect valence shell? [NCERT]
- (A) Valence Principle quantum number (n)
 (B) Nuclear Charge
 (C) Nuclear mass
 (D) Number of core electrons
- Q 5. Atomic radii of Fluorine and Neon in Angstrom units are given by
 (A) 0.72, 1.60 (B) 1.60, 1.60
 (C) 0.72, 0.72 (D) None of these
- Q 6. Which of the following has maximum size?
 (A) P (B) S
 (C) Cl (D) Ar
- Q 7. Atomic radii of Fluorine & Neon in Angstrom units are respectively given by [IIT –JEE 1987]
 (A) 0.72, 1.60 (B) 1.60, 1.60
 (C) 0.72, 0.72 (D) None of these
- Q 8. The correct order of increasing radius of the following elements is
 (A) S < O < Se < C (B) O < C < S < Se
 (C) O < S < Se < C (D) C < O < S < Se
- Q 9. If the difference in atomic size of Na – Li = X; Rb – K = Y ; Fr – Cs = Z; Then correct order will be
 (A) X – y = z (B) x > y > z
 (C) x < y > z (D) x < y < z
- Q 10. The covalent radius of potassium atom is 0.203 nm. The radius of the K⁺ in nm will be
 (A) 0.133 (B) 0.231
 (C) 0.234 (D) 0.251
- Q 11. The ionic radii of N³⁻, O²⁻ and F⁻ are respectively given by
 (A) 1.36, 1.40, 1.71 (B) 1.36, 1.71, 1.40
 (C) 1.71, 1.40, 1.36 (D) 1.71, 1.36, 1.40
- Q 12. **Assertion (A):** Na⁺ & Al³⁺ are isoelectronic species but the magnitude of ionic radius of Al³⁺ is less than that of Na⁺.
Reason (R): The magnitude of effective Nuclear Charge on the outer shell electrons in Al³⁺ is greater than that in Na⁺. [AIIMS 2016]
 (A) Both assertion and reason are true and the reason is the correct explanation of assertion
 (B) Both assertion and reason are true and reason is not the correct explanation of assertion
 (C) Assertion is true but the reason is false
 (D) Both assertion and reason are false
- Q 13. Which of the following order of radii is correct?
 (A) Li < Be < Mg (B) H⁺ < Li⁺ < H⁻
 (C) O < F < Ne (D) Na⁺ > F⁻ > O²⁻
- Q 14. The ionic radii of K⁺ & F⁻ are about 1.34 Å each, then expected value of atomic radii of K⁺ & F⁻ are respectively
 (A) 1.34 Å & 1.34 Å (B) 2.31 Å & 0.64 Å
 (C) 0.64 Å & 2.31 Å (D) 2.31 Å & 1.34 Å
- Q 15. Which one of the following is correct order of increase in Size?
 (A) Cs⁺ > K⁺ > Ca²⁺ > Be²⁺
 (B) K⁺ > Cs⁺ > Ca²⁺ > Be²⁺
 (C) Be²⁺ > Cs⁺ > K⁺ > Ca²⁺
 (D) Cs⁺ > Be²⁺ > K⁺ > Ca²⁺
- Q 16. The correct order of ionic size of N³⁻, Na⁺, F⁻, Mg²⁺ & O²⁻ is
 (A) Mg²⁺ > Na⁺ > F⁻ > O²⁻ < N³⁻
 (B) Mg²⁺ < O²⁻ < F⁻ < N³⁻
 (C) Mg²⁺ < Na⁺ < F⁻ < O²⁻ < N³⁻
 (D) Mg²⁺ > Na⁺ < F⁻ < O²⁻ < N³⁻
- Q 17. The size of the species Pb, Pb²⁺, Pb⁴⁺ decreases as
 (A) Pb⁴⁺ > Pb²⁺ > Pb (B) Pb > Pb²⁺ > Pb⁴⁺
 (C) Pb > Pb⁴⁺ > Pb²⁺ (D) Pb⁴⁺ > Pb > Pb²⁺
- Q 18. An increase in both atomic and ionic radii with atomic number occurs in any group of the Periodic Table and in accordance with this the ionic radii of Ti (IV) and Zr (IV) ions are 0.68 Å & 0.74 Å respectively, but for Hf (IV) ion the ionic radius is 0.75 Å which is almost the same as that for Zr (IV) ion. This is due to
 (A) higher degree of covalency in compound of Hf⁴⁺
 (B) lanthanide contraction
 (C) difference in the coordination number of Zr⁴⁺ and Hf⁴⁺ in their compounds
 (D) actinide contraction
- Q 19. In general the configuration of lanthanoid (n-2)f¹⁻¹⁴ (n-1)s²p⁶ d^{1 or 0}. It is observed that, with increase in atomic number of lanthanides, there is a decrease of ionic radii from a La : 1.22 to Lu : 0.99 Å. The reason for decrease in ionic radii is increase in
 (A) valency electrons
 (B) electronegative character
 (C) nuclear attraction for valence electrons lead to inward shrinking of shells
 (D) atomic volume

- Q 20. Consider the following pairs of ions
 1. Sc^{3+} and Ti^{4+} 2. Mn^{2+} and Fe^{2+}
 3. Fe^{2+} and Co^{3+} 4. Cu^+ and Zn^{2+}
 among these pairs of ions, isoelectronic pairs would include
 (A) 2, 3 and 4 (B) 1, 3 and 4
 (C) 1, 2 and 4 (D) 1, 2 and 3

5. Ionisation Energy – I

- Q 1. IP is influenced by
 (A) Size of atom (B) Charge of nucleus
 (C) electrons present in inner shell
 (D) all
- Q 2. Which one of the following statements is incorrect for ionization enthalpy? [NCERT]
 (A) ionization energy increases for successive electrons.
 (B) The greatest increase in ionization energy is experienced on removal of electrons from core Noble gas configuration
 (C) End of valence electrons is marked by a big jump in ionization enthalpy.
 (D) Removal of electrons from orbitals bearing lower n value is easier than orbital having higher n value.
- Q 3. Among the elements with following electronic Configurations, which one may have highest Ionisation energy? [CBSE PMT 2009]
 (A) $[\text{Ne}]3\text{S}^23\text{P}^3$ (B) $[\text{Ne}]3\text{S}^23\text{P}^2$
 (C) $[\text{Ne}]3\text{d}^{10}4\text{S}^24\text{P}^3$ (D) $[\text{Ne}]3\text{S}^23\text{P}^1$
- Q 4. **Assertion (A):** The I.E.₁ of Be is greater than that of B.
Reason (R): lesser amount of energy is required to remove an electron from 2p orbital than from 2S orbital. [AIIMS 2002]
 (A) Both assertion and reason are true and the reason is the correct explanation of assertion
 (B) Both assertion and reason are true and reason is not the correct explanation of assertion
 (C) Assertion is true but the reason is false
 (D) Both assertion and reason are false
- Q 5. Energy of an electron in Ground state of the H – atom is $-2.18 \times 10^{-18} \text{ J}$. Calculate the ionization energy of atomic Hydrogen in terms of J/mol. [NCERT]

- Q 6. Correct order of 1st I.P. are –
 (1) $\text{Li} < \text{B} < \text{Be} < \text{C}$ (2) $\text{O} < \text{N} < \text{F}$
 (3) $\text{Be} < \text{N} < \text{Ne}$
 (A) 1, 2 (B) 2, 3
 (C) 1, 3 (D) 1, 2 & 3
- Q 7. The first I.E. of electron in eV of Nitrogen & Oxygen atom is [IIT-JEE 1987]
 (A) 14.6, 13.6 (B) 13.6, 14.6
 (C) 13.6, 13.6 (D) 14.6, 14.6
- Q 8. Which of the following has 2nd IP < 1st IP
 (A) Mg (B) Ne
 (C) C (D) None
- Q 9. Among the elements A, B, C & D having atomic number 9, 10, 11 and 12 respectively, the correct order of ionization energies is
 (A) $\text{A} > \text{B} > \text{C} > \text{D}$ (B) $\text{B} > \text{A} > \text{D} > \text{C}$
 (C) $\text{B} > \text{A} > \text{C} > \text{D}$ (D) $\text{D} > \text{C} > \text{B} > \text{A}$
- Q 10. The first ionization potentials of Na, Mg, Al and Si are such that
 (A) $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$ (B) $\text{Na} < \text{Al} < \text{Mg} < \text{Si}$
 (C) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (D) $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$
- Q 11. The second Ionisation potentials of C, N, O and F are such that
 (A) $\text{C} > \text{N} > \text{O} > \text{F}$ (B) $\text{O} > \text{N} > \text{F} > \text{C}$
 (C) $\text{O} > \text{F} > \text{N} > \text{C}$ (D) $\text{F} > \text{O} > \text{N} > \text{C}$
- Q 12. 2nd Ionisation energy of Li, Be & B is in order
 (A) $\text{Li} > \text{Be} > \text{B}$ (B) $\text{Li} > \text{B} > \text{Be}$
 (C) $\text{Li} > \text{Be} > \text{B}$ (D) $\text{B} > \text{Be} > \text{Li}$
- Q 13. The 2nd ionization energy is maximum for
 (A) B (B) Be (C) Mg (D) Al

6. Ionisation Energy – II

- Q 1. The first four Ionisation energies of an element are 284, 412, 656 & 3210 KJ/mol. The number of valence electrons in the element are
 (A) 1 (B) 2 (C) 3 (D) 4
- Q 2. Which of the following electronic configuration is associated with the biggest jump between the second & third ionization energies?
 (A) $1\text{S}^22\text{S}^22\text{P}^2$ (B) $1\text{S}^22\text{S}^22\text{P}^63\text{S}^1$
 (C) $1\text{S}^22\text{S}^22\text{P}^63\text{S}^2$ (D) $1\text{S}^22\text{S}^22\text{P}^1$

- Q 3. Which represents I.E.₁ & I.E.₂ (KJ/mol) respectively of IIA Metals?
 (A) 100, 110 (B) 95, 120
 (C) 195, 500 (D) 200, 250
- Q 4. Which of the following transitions require maximum amount of energy? [AIIMS 2006]
 (A) $M^-(g) \rightarrow M(g)$ (B) $M(g) \rightarrow M^+(g)$
 (C) $M^+(g) \rightarrow M^{2+}(g)$ (D) $M^{2+}(g) \rightarrow M^{3+}(g)$
- Q 5. Select correct statement:
 (A) I.E.₁ of the corresponding elements of 3d & 4d series are almost similar
 (B) I.E.₁ of 5d series elements are greater than the corresponding elements of 3d & 4d series
 (C) both are correct
 (D) both are incorrect
- Q 6. Higher value of I.E. of 5d series of Transition metal are consistent with the
 (A) Relatively smaller Z_{eff}
 (B) Relatively smaller size of atoms
 (C) Relatively higher penetration power
 (D) all are correct

- Q 7. The first I.E. value (in KJ/mol) of group 13 elements are given below: [NCERT]

B	Al	Ga	In	Tl
801	577	579	558	589

Explain the deviation in general trend?

- Q 8. Following the transition metals, I.E.₁ drops abruptly in Ga, In & Tl. This is due to
 (A) decrease in Z_{eff}
 (B) Increase in atomic radius
 (C) removal of electron from the singly occupied np orbitals of higher energy than the ns – orbitals of Zn, Cd & Hg
 (D) none is correct
- Q 9. The ionization potential of isotopes of an element will be
 (A) same (B) different
 (C) depends on atomic masses
 (D) depends on number of neutrons
- Q 10. 1st & 2nd of few elements have been given below

	IE ₁ (KJ/mol)	IE ₂ (KJ/mol)
(a)	520	7300
(b)	1680	3380
(c)	2370	5280
(d)	900	1760

- (1). Which is reactive metal?
 (2). Which is reactive non metal?
 (3). Which in inert gas?
 (4). A metal that form a stable binary halide of formulae AX₂

- Q 11. **Assertion (A):** Electrons are ejected from a metal when either blue or violet light strikes the metal surface. However, only violet light causes electron ejection from second metal.

Reason (R): The electron in the first metal require less energy for ejection. [AIIMS 2012]

- (A) Both assertion and reason are true and the reason is the correct explanation of assertion
 (B) Both assertion and reason are true and reason is not the correct explanation of assertion
 (C) Assertion is true but the reason is false
 (D) Both assertion and reason are false
- Q 12. First and second ionization energies of Mg(g) are 740 and 1450 KJ/mol. Calculate the % of Mg⁺ (g) and Mg²⁺ (g), if 1 gm of Mg(g) absorbs 50 KJ of energy?

7. Electron Affinity – I

- Q 1. Which of the following relation is correct?
 (A) Electron Affinity = – Electron gain Enthalpy
 (B) Hydration Energy = – Enthalpy of Hydration
 (C) both A & B
 (D) None of these
- Q 2. To which of the following atom, attachment of electron is most difficult?
 (A) Radon (B) Nitrogen
 (C) Oxygen (D) Phosphorous
- Q 3. Which of the following will have the most negative electron gain enthalpy and which is least negative? [NCERT Solved]
 P, S, Cl, F. Explain your answer.
- Q 4. Be & Mg have zero value of electron affinity, because
 (A) Be & Mg have [He]2S² & [Ne]3S² Configuration respectively
 (B) 2S & 3S orbitals are filled to their capacity
 (C) Be & Mg are unable to accept electron
 (D) All of the above are correct

Q 5. The first I.E. of Na is 5.1 eV. The value of Electron gain enthalpy of Na^+ will be

[JEE Main 2013]

- (A) -2.55 eV (B) -5.1 eV
(C) -10.2 eV (D) $+2.55$ eV

Q 6. **Assertion (A):** Electron gain enthalpy becomes less negative as we go down in a group

Reason (R): Size of an atom increases on going down the group and the added electrons would be farther from the Nucleus. [NCERT Exemplar]

- (A) Both assertion and reason are true and the reason is the correct explanation of assertion
(B) Both assertion and reason are true and reason is not the correct explanation of assertion
(C) Both assertion and reason are false
(D) Assertion is false but the reason is correct

Q 7. The correct order of electron affinity is

- (A) $\text{Be} < \text{B} < \text{C} < \text{N}$ (B) $\text{Be} < \text{N} < \text{B} < \text{C}$
(C) $\text{N} < \text{Be} < \text{C} < \text{B}$ (D) $\text{N} < \text{C} < \text{B} < \text{Be}$

Q 8. Which of the following represent the correct order of the properties indicated? [AIIMS 2016]

- (A) $\text{O}^{2-} > \text{Ne} > \text{Mg}^{2+} > \text{Al}^{3+}$ (Size)
(B) $\text{N}^{3-} < \text{O}^{2-} < \text{F}^- < \text{Na}^+$ (Nuclear Charge)
(C) $\text{Li} > \text{Be} > \text{B} > \text{C}$ (Electron Gain Enthalpy)
(D) $\text{Li} < \text{Na} > \text{K} > \text{Cs}$ (I.E.)

Q 9. In which of the following options the order of arrangement does not agree with the variation of property indicated against it? [NEET 2016 – I]

- (A) $\text{B} < \text{C} < \text{N} < \text{O}$ (Increasing I.E.)
(B) $\text{I} < \text{Br} < \text{Cl} < \text{F}$ (Increase Electron gain enthalpy)
(C) $\text{Li} < \text{Na} < \text{K} < \text{Rb}$ (Increasing Metallic Radius)
(D) $\text{Al}^{3+} < \text{Mg}^{2+} < \text{Na}^+ < \text{F}^-$ (Increase ionic Size)

Q 10. Among Halogen, E.A. has following trend

- (A) $\text{F} < \text{Cl} > \text{Br} > \text{I}$ (B) $\text{F} < \text{Cl} < \text{Br} < \text{I}$
(C) $\text{F} > \text{Cl} > \text{Br} > \text{I}$ (D) $\text{F} < \text{Cl} > \text{Br} < \text{I}$

Q 11. The correct order of E.A. of following elements

- (A) $\text{O} < \text{S} < \text{F} < \text{Cl}$ (B) $\text{O} < \text{S} < \text{Cl} < \text{F}$
(C) $\text{S} < \text{O} < \text{F} < \text{Cl}$ (D) $\text{S} < \text{O} < \text{Cl} < \text{F}$

Q 12. Electronic configuration of four elements A, B, C & D are given below: [NCERT Exemplar]

- (A) $1\text{S}^2 2\text{S}^2 2\text{P}^6$ (B) $1\text{S}^2 2\text{S}^2 2\text{P}^4$
(C) $1\text{S}^2 2\text{S}^2 2\text{P}^6 3\text{S}^1$ (D) $1\text{S}^2 2\text{S}^2 2\text{P}^5$

Which of the following is correct order of increasing tendency to gain electron?

- (A) $\text{A} < \text{C} < \text{B} < \text{D}$ (B) $\text{A} < \text{B} < \text{C} < \text{D}$
(C) $\text{D} < \text{B} < \text{C} < \text{A}$ (D) $\text{D} < \text{A} < \text{B} < \text{C}$

8. Electron Affinity & Electronegativity

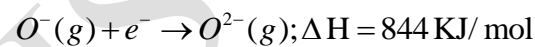
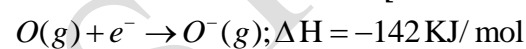
Q 1. Second electron affinity of an element is

- (A) Always exothermic
(B) Endothermic for few elements
(C) Exothermic for few elements
(D) Always endothermic

Q 2. Electron affinity is positive when

- (A) O^- is formed from O
(B) O^{2-} is formed from O^-
(C) O^+ is formed from O
(D) Electron affinity is always a negative value

Q 3. The formation of the oxide O^{2-} ion requires first an exothermic and then an endothermic step as shown below: [JEE Main 2004]



This is because

- (A) O^- ion will tend to resist the addition of another electrons
(B) Oxygen has higher electron affinity
(C) Oxygen is more electronegative
(D) O^- ion has comparatively larger size than Oxygen atom

Q 4. How many Cl atom can you ionize in the process $\text{Cl} \rightarrow \text{Cl}^+ + e^-$ the energy liberated for the process $\text{Cl} + e^- \rightarrow \text{Cl}^-$ for one Avogadro number of atom. Given IP = 13.0 eV and EA = 3.60 eV.

- (A) 1.66×10^{23} (B) 1.66×10^{22}
(C) 3.32×10^{23} (D) None of these

Q 5. Pauling Scale of Electronegativity values for elements are useful in predicting

[CBSE PMT 1989]

- (A) Polarity of molecules
(B) Position in the emf series
(C) Co-ordination Numbers
(D) Dipole moment

Q 6. $N_0/2$ atom of X (g) are converted into X^+ (g) by energy E_1 . $N_0/2$ atoms of X (g) are converted into X^- (g) by energy E_2 . Hence ionization potential and electron affinity of X (g) are:

- (A) $2E_1/N_0, 2(E_1 - E_2)/N_0$ (B) $2E_1/N_0, 2E_2/N_0$
(C) $(E_1 - E_2)/N_0, 2E_2/N_0$ (D) None of these

Q 7. For some elements I.E. & Electron Gain enthalpy data are given below. [NCERT]

	IE ₁ (KJ/mol)	IE ₂ (KJ/mol)	E. G. E. (KJ/mol)
(I)	520	7300	- 60
(II)	419	3051	- 48
(III)	1681	3374	- 328
(IV)	1008	1846	- 295
(V)	2372	5251	+48
(VI)	738	1451	- 40

- (1). Which is least reactive element?
 (2). Which is the most reactive metal?
 (3). Which is the most reactive non-metal?
 (4). Which is the least reactive non-metal?
 (5). Which can form a binary halide MX₂?
 (6). Which metal will form stable halide of MX ?
- Q 8. If X, Y and Z are electronegativity, ionization potential & electron affinity respectively. Then the electron affinity (Z) in the terms of electronegativity (X) and ionization potential (Y) will be
 (A) $(X + Y)/Z$ (B) $(X - Y)/Z$
 (C) $(X^2 - Y^2)/2$ (D) $Z = 2X - Y$
- Q 9. Fluorine has the highest electronegativity among the halogen group on the Pauling scale, but the electron affinity of fluorine is less than that of chlorine because
 (A) The atomic number of fluorine is less than that of chlorine
 (B) Fluorine being the first member of the family behaves in an unusual manner
 (C) Cl can accommodate an electron better than F by utilizing its vacant 3d orbital
 (D) Small size, high electron density and an increased electron repulsion makes addition of an electron to fluorine less favorable than that in the case of chlorine
- Q 10. The electronegativities N, Si, C & P are such that
 (A) $P < Si < C < N$ (B) $Si < P < N < C$
 (C) $Si < P < C < N$ (D) $P < Si < N < C$
- Q 11. Which of the following sets of elements is arranged in order of increasing electronegativity?
 (A) S, Si, P (B) Si, P, S
 (C) S, P, Si (D) P, Si, S
- Q 12. The ionisation potential and electron affinity of an element are 15.0 eV and 4.6 eV respectively. The electronegativity of the element in Pauling's scale is
 (A) 4 (B) 3.5 (C) 3 (D) 2.5
- Q 13. The compound X - O - H is likely to act as a

base, if compared to hydrogen, X has -

- (A) Higher ionization potential
 (B) Lower ionization potential
 (C) higher electronegativity
 (D) Lower radius

- Q 14. The X-X bond length is 1.00 Å & C-C bond length is 1.45 Å. If electronegativities of X and C are 3.0 & 2.0 respectively, the C-X bond length is likely to be
 (A) 1.27 Å (B) 1.18 Å
 (C) 1.08 Å (D) 1.28 Å

9. Hydration Energy, Lattice Energy, Oxidising & Reducing Power

- Q 1. Hydration energy increases from left to right in a period for
 (A) Cation only (B) Anion only
 (C) All ions (D) No Ions
- Q 2. Extent of Hydration of Na⁺, Mg²⁺ & Al³⁺ is in order
 (A) $Na^+ < Al^{3+} < Mg^{2+}$ (B) $Na^+ < Mg^{2+} < Al^{3+}$
 (C) $Na^+ > Mg^{2+} > Al^{3+}$ (D) Equal for all ions
- Q 3. Which one of the following ionic solids has the highest lattice energy?
 (A) Be(OH)₂ (B) Mg(OH)₂
 (C) Ca(OH)₂ (D) Sr(OH)₂
- Q 4. From Born-Landé equation, lattice becomes stronger if inter-ionic distance
 (A) increases (B) decreases
 (C) it does not depend on inter-ionic distance
 (D) none of these
- Q 5. Energy is released when a substance dissolves in water if
 (A) the hydration energy is negative
 (B) the hydration energy is Positive
 (C) the hydration energy is greater than the lattice energy
 (D) the lattice energy is positive
- Q 6. The lattice energy of CsCl from the following equations will be
 $Cs(s) \rightarrow Cs(g); \rightarrow \Delta H = +79.9 \text{ kJ mol}^{-1}$
 $Cs(g) \rightarrow Cs^+(g); \rightarrow \Delta H = +375.05 \text{ kJ mol}^{-1}$

- $\text{Cl}_2(\text{g}) \rightarrow 2\text{Cl}(\text{g}); \rightarrow \Delta H = +241.84 \text{ kJ mol}^{-1}$
 $\text{Cl}(\text{g}) + \text{e} \rightarrow 1/2 \text{Cl}_2; \rightarrow \Delta H = -397.90 \text{ kJ mol}^{-1}$
 $\text{Cs} + 1/2 \text{Cl}_2 \rightarrow \text{CsCl}(\text{s}); \Delta H = -623.00 \text{ kJ mol}^{-1}$
 (A) 799 kJ mol^{-1} (B) $+799 \text{ kJ mol}^{-1}$
 (C) -447 kJ mol^{-1} (D) $+447 \text{ kJ mol}^{-1}$
- Q 7. The lattice energy of Na_2O from the following equations will be (in KJ/mol)
- $2\text{Na}(\text{s}) + 1/2 \text{O}_2 \rightarrow \text{Na}_2\text{O}(\text{s}); \Delta H = -350.00$
 $\text{Na}(\text{s}) \rightarrow \text{Na}(\text{g}); \Delta H = +90.00$
 $\text{Na}(\text{g}) \rightarrow \text{Na}^+(\text{g}) + \text{e}^-; \Delta H = +450.00$
 $\text{O}_2(\text{g}) \rightarrow 2\text{O}(\text{g}); \Delta H = +250.00$
 $\text{O}(\text{g}) + \text{e} \rightarrow \text{O}^-(\text{g}); \Delta H = -300.00$
 (A) 805 kJ mol^{-1} (B) $+715 \text{ kJ mol}^{-1}$
 (C) -715 kJ mol^{-1} (D) None of these
- Q 8. Read the following reactions –
- $\text{A}(\text{s}) \rightarrow \text{A}(\text{g}); \Delta Q \text{ Kcal/mol}$
 $\text{A}(\text{g}) \rightarrow \text{A}^{2+}(\text{g}) + \text{e}^-; \Delta R \text{ Kcal/mol}$
 $\text{B}_2(\text{g}) \rightarrow 2\text{B}(\text{g}); \Delta S \text{ Kcal/mol}$
 $\text{B}(\text{g}) + \text{e} \rightarrow \text{B}^-(\text{g}); \Delta T \text{ Kcal/mol}$
- If enthalpy of formation of electrovalent compound is $U \text{ Kcal/mol}$ and formula of electrovalent compound is AB_2 then find out the correct relation between energy value of AB_2 compound
- (A) $\Delta H = Q + R + \frac{S}{2} - T - U$
 (B) $\Delta H = Q + R + S - 2T - U$
 (C) $U = Q + \frac{R}{2} + \frac{S}{2} - 2T - \Delta H$
 (D) $U = Q + \frac{R}{2} + S - 2T - \Delta H$
- Q 9. Which of the following compound has maximum lattice energy?
- (A) LiCl (B) BeCl_2
 (C) AlCl_3 (D) TiC
- Q 10. Lattice energy depends on
- (I) Size of cation only
 (II) Size of anion only
 (III) Size of cation & Anion both
 (IV) Product of charge of cation & Anion
 (A) I & II (B) I & III
 (C) II & III (D) III & IV
- Q 11. Oxidizing power of an element is directly proportional to
- (A) Electron affinity (B) Hydration Energy
 (C) lattice Energy (D) Both A & B
- Q 12. Oxidising power of Fluorine is greater than chlorine because
- (A) E.A. of Cl is greater than E.A. of F
 (B) E.A. of Cl is smaller than E.A. of F
 (C) Hydration Energy of F^- is greater than Hydration Energy of Cl^-
 (D) Hydration Energy of F^- is smaller than Hydration Energy of Cl^-
- Q 13. Reducing power of an element is
- (A) directly proportional to electron affinity
 (B) Inversely proportional to electron affinity
 (C) Directly proportional to ionization energy
 (D) Inversely proportional to ionization energy
- Q 14. The correct reducing power order is
- (A) $\text{Cs} > \text{Rb} > \text{K} > \text{Na} > \text{Li}$
 (B) $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs}$
 (C) $\text{Li} > \text{Cs} > \text{Na} > \text{K} > \text{Rb}$
 (D) None of these
- Q 15. Considering the elements F, Cl, O & N, the correct order of their chemical reactivity in terms of oxidizing power is [NCERT]
- (A) $\text{F} > \text{Cl} > \text{O} > \text{N}$ (B) $\text{F} > \text{O} > \text{Cl} > \text{N}$
 (C) $\text{Cl} > \text{F} > \text{O} > \text{N}$ (D) $\text{O} > \text{F} > \text{N} > \text{Cl}$
- Q 16. In gaseous phase, the correct order of oxidizing power is
- (A) $\text{F}_2 > \text{Cl}_2$ (B) $\text{Cl}_2 > \text{F}_2$
 (C) $\text{F}_2 = \text{Cl}_2$ (D) None of these
- Q 17. In which of the following arrangements, the sequence is not according to the property written against it? [JEE Main 2008]
- (A) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$: Acidic Strength
 (B) $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3 < \text{SbH}_3$: Basic Strength
 (C) $\text{B} < \text{C} < \text{O} < \text{N}$: 1st I.E.
 (D) $\text{CO}_2 < \text{SiO}_2 < \text{SnO}_2 < \text{PbO}_2$: Oxidising power
- Q 18. The common oxidation state of lanthanides is
- (A) +3 (B) +2 (C) +1 (D) +4

10. Metallic & Non – Metallic Character

Nature of Oxides, Density, Diagonal Relation,
Inert Pair Effect

- Q 1. Which oxidation state is more stable?
(A) $\text{Sn}^{4+} > \text{Pb}^{4+}$ (B) $\text{Sn}^{2+} < \text{Pb}^{2+}$
(C) $\text{Sn}^{4+} < \text{Pb}^{4+}$ (D) Both A & B
- Q 2. Tl^+ is formed due to inert pair effect & its properties are identical to
(A) IA metal Cation (B) IB metal Cation
(C) IIIA metal Cation (D) None of these
- Q 3. Which statement is correct?
(A) Cs is most metallic & F_2 is the most non – metallic element
(B) Li is most metallic & F_2 is the most non – metallic element
(C) Cs is most metallic & Cl_2 is the most non – metallic element
(D) None of these
- Q 4. Considering the element B, Al, Mg & K, the correct order of their metallic character is
(A) $\text{B} > \text{Al} > \text{Mg} > \text{K}$ (B) $\text{Al} > \text{Mg} > \text{B} > \text{K}$
(C) $\text{Mg} > \text{Al} > \text{K} > \text{B}$ (D) $\text{K} > \text{Mg} > \text{Al} > \text{B}$
- Q 5. Considering the atomic number and position in the Periodic table, arrange the following elements in increasing order of metallic character
Si, Be, Mg, Na, P. [NCERT Solved]
- Q 6. One of the characteristic properties of non-metals is that they [CBSE PMT 1993]
(A) are reducing agent
(B) Form basic oxides
(C) Form cations by electron gain enthalpy
(D) Are electronegative
- Q 7. Considering the element B, C, N, F & K the correct order of their Non-metallic character is
(A) $\text{B} > \text{C} > \text{Si} > \text{N} > \text{F}$ (B) $\text{Si} > \text{C} > \text{B} > \text{N} > \text{F}$
(C) $\text{F} > \text{N} > \text{C} > \text{B} > \text{Si}$ (D) $\text{F} > \text{N} > \text{C} > \text{Si} > \text{B}$
- Q 8. The correct order of acidic strength is
(A) $\text{Cl}_2\text{O}_7 > \text{SO}_2 > \text{P}_4\text{O}_{10}$ (B) $\text{CO}_2 > \text{N}_2\text{O}_5 > \text{SO}_3$
(C) $\text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3$ (D) $\text{K}_2\text{O} > \text{CaO} > \text{MgO}$
- Q 9. Identify the correct order of acidic Strengths of CO_2 , CuO , CaO , H_2O ? [IIT JEE 2002S]
(A) $\text{CaO} < \text{CuO} < \text{H}_2\text{O} < \text{CO}_2$
(B) $\text{H}_2\text{O} < \text{CuO} < \text{CaO} < \text{CO}_2$
(C) $\text{CaO} < \text{H}_2\text{O} < \text{CuO} < \text{CO}_2$
(D) $\text{H}_2\text{O} < \text{CO}_2 < \text{CaO} < \text{CuO}$
- Q 10. Which of the following order is wrong? [CBSE PMT 2002]
(A) $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3$ (Acidic Strength)
(B) $\text{Li} < \text{Be} < \text{B} < \text{C}$ – (I.E.₁)
(C) $\text{Al}_2\text{O}_3 < \text{MgO} < \text{Na}_2\text{O} < \text{K}_2\text{O}$ (Basic Strength)
(D) $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Cs}^+$ (Ionic Radius)
- Q 11. The basic strength order of oxides of Mn is
(A) $\text{MnO} > \text{MnO}_2 > \text{MnO}_3 > \text{Mn}_2\text{O}_7$
(B) $\text{MnO} < \text{MnO}_2 < \text{MnO}_3 < \text{Mn}_2\text{O}_7$
(C) $\text{MnO}_3 < \text{Mn}_2\text{O}_7 < \text{MnO}_2 < \text{MnO}$
(D) None of these
- Q 12. Consider the sequences of oxides: [AIIMS 2009]
 Na_2O , SiO_2 , P_4O_{10} . Which factor decreases from Na_2O to SiO_2 and also from SiO_2 to P_4O_{10} .
(A) Covalent Character (B) Melting Point
(C) pH when dissolved in water
(D) Solubility in aqueous Solution
- Q 13. (A), (B), (C) are elements of the third short period. Oxides of (A) is Ionic, Oxides of (B) is Amphoteric & Oxides of (C) is a gaint molecule. (A), (B) & (C) will have atomic number in the order
(A) $(A) < (B) < (C)$ (B) $(C) < (B) < (A)$
(C) $(A) < (C) < (B)$ (D) $(B) < (A) < (C)$
- Q 14. The correct order of density of IA metal is
(A) $\text{Li} > \text{K} > \text{Na} > \text{Rb} > \text{Cs}$
(B) $\text{Li} < \text{K} < \text{Na} < \text{Rb} < \text{Cs}$
(C) $\text{Li} < \text{Na} < \text{K} < \text{Rb} < \text{Cs}$
(D) $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs}$
- Q 15. The incorrect statement among the following regarding halogens is
(A) order of electronegativity: $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
(B) order of electron affinity : $\text{Cl}_2 > \text{F}_2 > \text{Br}_2 > \text{I}_2$
(C) the order of bond energy: $\text{Cl}_2 > \text{F}_2 > \text{Br}_2 > \text{I}_2$
(D) order of hydration energy:
 $\text{F}^-(\text{g}) > \text{Cl}^-(\text{g}) > \text{Br}^-(\text{g}) > \text{I}^-(\text{g})$
- Q 16. The correct order of Bond Strength is
(A) $\text{Cl-Cl} > \text{F-F} > \text{Br-Br} > \text{I-I}$
(B) $\text{S-S} > \text{O-O} > \text{Se-Se} > \text{Te-Te}$
(C) $\text{S-S} > \text{Se-Se} > \text{O-O} > \text{Te-Te}$
(D) $\text{S-S} > \text{Se-Se} > \text{Te-Te} > \text{O-O}$
- Q 17. Digonal relationship is due to
(A) Identical Size
(B) Identical Charge by Size ratio
(C) Identical Charge
(D) Identical Reducing Power

- Q 18. The diagonal relation exist in between
 (A) Li & Mg (B) Be & Al
 (C) B & Si (D) All of these
- Q 19. Which one of the elements with the following outer orbital configurations may exhibit the largest number of oxidation states?
 (A) $3d^34s^2$ (B) $3d^54s^1$
 (C) $3d^54s^2$ (D) $3d^24s^2$
- Q 20. Which one of the following is an Amphoteric oxide?
 (A) ZnO (B) CrO_2
 (C) MnO_2 (D) all of these
- [CBSE PMT 2009]

Answer Key

1. Development of P.T. , Concept of Zeff

- (1). C (2). B (3). B
 (4). A (5). A (6). A
 (7). B (8). D (9). D
 (10). Theoretical (11).C
 (12). D (13). B (14). A
 (15). A
 (16). (A) 2.2 (B) 3.85 (C) 2.2
 (D) 4.8 (E) 6.1 (F) 2.85

2. Modern Periodic Table – I

- (1). B (2). In 6th period 6s, 4f, 5p & 5d orbitals are filled which can accommodate 2, 14, 6 & 10 electrons, total 32 electrons
 (3). B (4). C (5). C
 (6). B (7). D (8). Halogen & Alkaline earth metal Family Respectively
 (9). Cl, Z = 17 (10). C (11). B
 (12). C (13). C

3. Modern Periodic Table – II

- (1). B (2). B (3). C
 (4). C (5). C (6). D
 (7). B (8). A (9). C
 (10). Ubn (11). B

(12).

No.	1	2	3	4	5	6
period	5	5	7	6	7	7
Group	18	11	1	3	3	11
Block	P	d	S	f	f	d

4. Atomic Volume & Atomic Radius

- (1). B (2). D (3). B
 (4). C (5). A (6). D
 (7). A (8). B (9). D
 (10). A (11). C (12). A
 (13). B (14). B (15). A
 (16). C (17). B (18). B
 (19). D (20). B

5. Ionisation Energy – I

- (1). D (2). D (3). A
 (4). A (5). 1312 KJ/mol (6). D
 (7). A (8). D (9). B
 (10). B (11). C (12). B
 (13). A

6. Ionisation Energy – II

- (1). C (2). D (3). C
 (4). D (5). B (6). B

- (7). Due to poor shielding of 3d & 4f electrons
(8). C (9). A
(10). (1).A (2). B (3).C (4).D
(11).A (12). % Mg^+ = 68.35

7. Electron Affinity – I

- (1). C (2). A
(3). Most negative Cl, Least Negative P
(4). D (5). B (6). D
(7). B (8). A (9). A, B
(10). A (11). A (12). A

8. Electron Affinity & Electronegativity

- (1). D (2). A (3). A
(4). A (5). A (6). A
(7). V, II, III, IV, VI, I (8). D
(9). D (10). C (11). B
(12). B (13). B (14). B

9. Hydration & Lattice Energy, Oxidising & Reducing Power

- (1). A (2). B (3). A
(4). B (5). C (6). B
(7). A (8). B (9). D
(10). D (11). D (12). C
(13). D (14). B (15). B
(16). B (17). B (18). A

10. Metallic Character, Nature of Oxides, Density, Diagonal Relation, Inert Pair Effect

- (1). D (2). A (3). A
(4). D (5). $P < Si < Be < Mg < Na$
(6). D (7). C (8). A
(9). A (10). B (11). A
(12). C (13). A (14). B
(15). C (16). C (17). B
(18). D (19). C (20). D