

- Q.1 Which of the following does not reflect the periodicity of element
(A) Bonding behaviour (B) Electronegativity (C) Ionisation potential (D) Neutron/ Proton ratio
- Q.2 Choose the s-block element in the following:
(A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5, 4s^1$ (B) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^1$
(C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$ (D) all of the above
- Q.3 False statement for periodic classification of elements is
(A) The properties of the elements are periodic function of their atomic numbers.
(B) No. of non-metallic elements is less than the no. of metallic elements.
(C) First ionization energy of elements does change continuously with increasing of atomic no. in a period.
(D) d-subshell is filled by final electron with increasing atomic no. of inner transition elements.
- Q.4 Pick out the isoelectronic structure from the following:
I. $^+CH_3$ II. H_3O^+ III. NH_3 IV. CH_3^-
(A) I and II (B) III and IV (C) I and III (D) II, III and IV
- Q.5 If there were 10 periods in the periodic table then how many elements would this period can maximum comprise of.
- Q.6 If $(n + l)$ rule for energy is not followed, what are the blocks of the following elements if they are filled according to increasing shell number
(a) K(19) (b) Fe(26) (c) Ga(31) (d) Sn(50)
- Q.7 Use the following system of naming elements in which first alphabets of the digits are written collectively,
0 1 2 3 4 5 6 7 8 9
nil uni bi tri quad pent hex sept oct enn
to write three-letter symbols for the elements with atomic number 101 to 109.
[Example : 101 is Unu....]
- Q.8 The size of the following species increases in the order:
(A) $Mg^{2+} < Na^+ < F^- < Ar$ (B) $F^- < Ar < Na^+ < Mg^{2+}$
(C) $Ar < Mg < F^- < Na^+$ (D) $Na^+ < Ar < F^- < Mg^{2+}$
- Q.9 Element in which maximum ionization energy of following electronic configuration would be
(A) $[Ne] 3s^2 3p^1$ (B) $[Ne] 3s^2 3p^2$ (C) $[Ne] 3s^2 3p^3$ (D) $[Ar] 3d^{10} 4s^2 4p^3$
- Q.10 The outermost electronic configuration of most electronegative element is:
(A) $ns^2 np$ (B) $ns^2 np^4$ (C) $ns^2 np^5$ (D) $ns^2 np^5$
- Q.11 The electron affinity of the members of oxygen of the periodic table, follows the sequence
(A) $O > S > Se$ (B) $S > O < Se$ (C) $O < S > Se$ (D) $Se > O > S$

- Q.12 The process of requiring absorption of energy is
 (A) $F \rightarrow F^-$ (B) $Cl \rightarrow Cl^-$ (C) $O^- \rightarrow O^{2-}$ (D) $H \rightarrow H^-$
- Q.13 In the following which configuration of element has maximum electronegativity.
 (A) $1s^2, 2s^2 2p^5$ (B) $1s^2, 2s^2 2p^6$ (C) $1s^2, 2s^2 2p^4$ (D) $1s^2, 2s^2 2p^6, 3s^2 3p^3$
- Q.14 Highest size will be of
 (A) Br^- (B) I (C) I^- (D) I^+
- Q.15 Atomic radii of fluorine and neon in Å units are respectively given by
 (A) 0.72, 1.60 (B) 1.60, 1.60 (C) 0.72, 0.72 (D) 1.60, 0.72
- Q.16 The correct order of second ionisation potential of C, N, O and F is:
 (A) $C > N > O > F$ (B) $O > N > F > C$ (C) $O > F > N > C$ (D) $F > O > N > C$
- Q.17 Decreasing ionization potential for K, Ca & Ba is
 (A) $Ba > K > Ca$ (B) $Ca > Ba > K$ (C) $K > Ba > Ca$ (D) $K > Ca > Ba$
- Q.18 Element Hg has two oxidation states Hg^{+1} & Hg^{+2} . the right order of radii of these ions.
 (A) $Hg^{+1} > Hg^{+2}$ (B) $Hg^{+2} > Hg^{+1}$ (C) $Hg^{+1} = Hg^{+2}$ (D) $Hg^{+2} \geq Hg^{+1}$
- Q.19 The ionization energy will be maximum for the process.
 (A) $Ba \rightarrow Ba^{++}$ (B) $Be \rightarrow Be^{++}$ (C) $Cs \rightarrow Cs^+$ (D) $Li \rightarrow Li^+$
- Q.20 Why the first ionisation energy of carbon atom is greater than that of boron atom whereas, the reverse is true for the second ionisation energy.
- Q.21 On the Pauling's electronegativity scale, which element is next to F.
- Q.22 $Mg^{2+}, O^{2-}, Na^+, F^-, N^{3-}$ (Arrange in decreasing order of ionic size)
- Q.23 Why Ca^{2+} has a smaller ionic radius than K^+ .
- Q.24 Which of the ions are paramagnetic
 $Sr^{2+}, Fe^{3+}, Co^{2+}, S^{2-}, Pb^{2+}$
- Q.25 Why do alkaline earth metals always form dipositive ions.
- Q.26 State giving reasons which one have higher value :
 (a) IE_1 of F or Cl (b) EA of O or O^-
 (c) ionic radius of K^+ or Cl^-
- Q.27 Explain why a few elements such as Be (+0.6), N(+0.3) & He(+0.6) have positive electron gain enthalpies

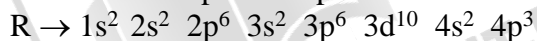
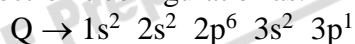
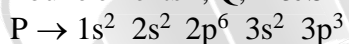
while majority of elements do have negative values.

- Q.28 From among the elements, choose the following: Cl, Br, F, Al, C, Li, Cs & Xe.
 (i) The element with highest electron affinity. (ii) The element with lowest ionisation potential.
 (iii) The element whose oxide is amphoteric. (iv) The element which has smallest radii.
 (v) The element whose atom has 8 electrons in the outermost shell.
- Q.29 Which property will increase and which will decrease for IA group as we go down the group.
 (a) Atomic size (g) E N
 (b) Ionic radii (h) At. mass
 (c) I E (i) Valance e⁻
 (d) Density (j) Metallic ch
 (e) Melting point (k) Chemical reactivity
 (f) Boiling point
- Q.30 The IE do not follow a regular trend in II & III periods with increasing atomic number. Why?
- Q.31 Arrange in decreasing order of atomic size : Na, Cs, Mg, Si, Cl.
- Q.32 In the ionic compound KF, the K⁺ and F⁻ ions are found to have practically radii, about 1.34 Å each. What do you predict about the relative covalent radii of K and F?
- Q.33 Does Na₂(g) molecule exhibit metallic properties.
- Q.34 Which will have a higher boiling point, Br₂ or ICl, & why?
- Q.35 Which bond in each pair is more polar
 (a) P – Cl or P – Br (b) S – Cl or S – O (c) N – O or N – F
- Q.36 Arrange noble gases, in the increasing order of b.p.
- Q.37 The ionisation potentials of atoms A and B are 400 and 300 kcal mol⁻¹ respectively. The electron affinities of these atoms are 80.0 and 85.0 kcal mol⁻¹ respectively. Prove that which of the atoms has higher electronegativity.
- Q.38 A mixture contains F and Cl atoms. the removal of an electron from each atom of the sample requires 284 kJ while the addition of an electron to each atom of the mixture releases 68.8 kJ. Determine the % composition of the mixture.
- | | (IE) per atom | (EA) per atom |
|----|----------------------------|-----------------------------|
| F | 27.91×10^{-22} kJ | $- 5.53 \times 10^{-22}$ kJ |
| Cl | 20.77×10^{-22} kJ | $- 5.78 \times 10^{-22}$ kJ |

- Q.39 Calculate the screening constant of Ca . (atomic number 20)
- Q.40 Calculate the effective nuclear charge on–
(i) 4s valency e^- in Bromine atom. and (ii) 3d electron in Bromine atom.
- Q.41 Arrange the following ions Na^+ , Mg^{2+} , Al^{3+} in increasing
(a) extent of hydration (b) hydration energy (c) size of hydrations
(d) Ionic mobility (e) size of gaseous ions.
- Q.42 Arrange following oxides in increasing acidic nature
 Li_2O , BeO , B_2O_3
- Q.43 Which oxide is more basic, MgO or BaO ? Why?
- Q.44 The basic nature of hydroxides of group 13 (III-A) decreases progressively down the group. Comment.
- Q.45 Based on location in P.T., which of the following would you expect to be acidic & which basic.
(a) CsOH (b) IOH (c) $\text{Sr}(\text{OH})_2$ (d) $\text{SeO}_3(\text{OH})_2$ (e) FrOH (f) BrOH

Question No. 46 and 47 are based on the following information.

Four elements P, Q, R & S have ground state electronic configuration as:



- Q.46 Comment which of the following option represent the correct order of true (T) & false (F) statement.
I size of P < size of Q
II size of R < size of S
III size of P < size of R (appreciable difference)
IV size of Q < size of S (appreciable difference)
(A) TTTT (B) TTTF (C) FFTT (D) TTFF
- Q.47 Order of IE_1 values among the following is
(A) $\text{P} > \text{R} > \text{S} > \text{Q}$ (B) $\text{P} < \text{R} < \text{S} < \text{Q}$ (C) $\text{R} > \text{S} > \text{P} > \text{Q}$ (D) $\text{P} > \text{S} > \text{R} > \text{Q}$

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Q.48 Match the various sequences with the appropriate orders:

Sequences	Orders
(I) $\text{Na}^+ \text{Mg}^{+2} \text{Al}^{+3}$	(a) increasing size of ion in gaseous state
(II) $\text{I}^- \text{S}^{2-} \text{N}^{3-}$	(b) decreasing size of ion in gaseous state
(III) $\text{O} \text{O}^- \text{O}^{2-}$	(c) increasing size of ions aqueous state.
(IV) $\text{N} \text{F} \text{O} (\text{IE}_2)$	(d) decreasing size of ions aqueous state.
	(e) increasing order of IE_2
	(f) decreasing order of electron affinity
(A) I-(b), II-(c), III-(e), IV-(f)	(B) I-(c), II-(b), III-(a), IV-(f)
(C) I-(b), II-(c), III-(f), IV-(e)	(D) I-(d), II-(c), III-(a), IV-(e)

Q.49 Moving from right to left in a periodic table, the atomic size is:

- (A) increased (B) decreased (C) remains constant (D) none of these

Q.50 The increasing order of electronegativity in the following elements:

- (A) C, N, Si, P (B) N, Si, C, P (C) Si, P, C, N (D) P, Si, N, C

Q.51 One element has atomic weight 39. Its electronic configuration is $1s^2, 2s^2 2p^6, 3s^2 3p^6 4s^1$. The true statement for that element is:

- (A) High value of IE (B) Transition element
(C) Isotone with ${}_{18}\text{Ar}^{38}$ (D) None

Q.52 The number of paired electrons in oxygen is:

- (A) 6 (B) 16 (C) 8 (D) 32

Q.53 The decreasing size of $\text{K}^+, \text{Ca}^{2+}, \text{Cl}^-$ & S^{2-} follows the order:

- (A) $\text{K}^+ > \text{Ca}^{+2} > \text{S}^{-2} > \text{Cl}^-$ (B) $\text{K}^+ > \text{Ca}^{+2} > \text{Cl}^- > \text{S}^{-2}$
(C) $\text{Ca}^{+2} > \text{K}^+ > \text{Cl}^- > \text{S}^{-2}$ (D) $\text{S}^{-2} > \text{Cl}^- > \text{K}^+ > \text{Ca}^{+2}$

Q.54 Which of the following oxide is neutral?

- (A) CO (B) SnO_2 (C) ZnO (D) SiO_2

Q.55 Which of the following has the maximum number of unpaired electrons

- (A) Mg^{2+} (B) Ti^{3+} (C) V^{3+} (D) Fe^{2+}

Q.56 The following acids have been arranged in the order of decreasing acid strength. Identify the correct order

- $\text{ClOH(I)} \qquad \qquad \text{BrOH(II)} \qquad \qquad \text{IOH(III)}$
- (A) I > II > III (B) II > I > III (C) III > II > I (D) I > III > II

Q.57 The incorrect statement among the following is:

- (A) the first ionisation potential of Al is less than that of Mg
(B) the second ionisation potential of Mg is greater than that of Na
(C) the first ionisation potential of Na is less than that of Mg

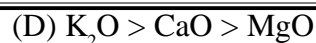
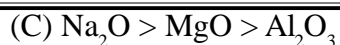
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(D) the third ionisation potential of Mg is greater than the third ionisation potential of Al

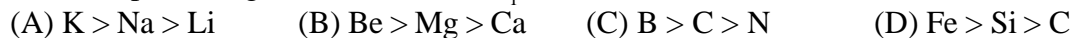
- Q.58 Which of the following are amphoteric?
 (A) $\text{Be}(\text{OH})_2$ (B) $\text{Sr}(\text{OH})_2$ (C) $\text{Ca}(\text{OH})_2$ (D) $\text{Al}(\text{OH})_3$
- Q.59 Li^+ , Mg^{2+} , K^+ , Al^{3+} (Arrange in increasing order of radii)
- Q.60 Property of the alkaline earth metals that increases with their atomic number is
 (A) IE (B) solubility of their hydroxides
 (C) solubility of their sulphates (D) electronegativity
- Q.61 Anhydrous AlCl_3 is covalent. From the data given below predict whether it would remain as a molecule or converts into ions in aqueous solution. [L.E. for Al = 5137 kJ/mol]
 ΔH hydration for $\text{Al}^{3+} = -4665$ kJ/mol; ΔH_{hydra} for $\text{Cl}^- = -381$ kJ/mol.
- Q.62 Which one of the following statement (s) is (are) correct?
 (A) The electronic configuration of Cr is $[\text{Ar}] 3d^5 4s^1$. (Atomic No. of Cr = 24)
 (B) The magnetic quantum number may have a negative value
 (C) In silver atom, 23 electrons have a spin of one type and 24 of the opposite type. (Atomic No. of Ag = 47)
 (D) The oxidation state of nitrogen in HN_3 is -3 .
- Q.63 Ionic radii of:
 (A) $\text{Ti}^{4+} < \text{Mn}^{7+}$ (B) $^{35}\text{Cl}^- > ^{37}\text{Cl}^-$ (C) $\text{K}^+ > \text{Cl}^-$ (D) $\text{P}^{3+} > \text{P}^{5+}$
- Directions:** The questions below to consist of an 'assertion in column-1 and the 'reason' in column-2. Against the specific question number, write in the appropriate space.
 (A) If both assertion and reason are CORRECT, and reason is the CORRECT explanation of the assertion. (B) If both assertion and reason are CORRECT, but reason is not the CORRECT explanation of the assertion. (C) If assertion if CORRECT but reason is INCORRECT (D) If assertion is INCORRECT reason in CORRECT.
- Q.64 **Assertion:** F atom has a less negative electron gain enthalpy than Cl atom.
Reason: Additional electron is repelled more efficiently by 3p electron in Cl atom than by 2p electron in F atom.
- Q.65 **Assertion:** $\text{Al}(\text{OH})_3$ is amphoteric in nature.
Reason: Al-O and O-H bonds can be broken with equal ease in $\text{Al}(\text{OH})_3$.
- Q.66 The correct order of radii is:
 (A) $\text{N} < \text{Be} < \text{B}$ (B) $\text{F}^- < \text{O}^{2-} < \text{N}^{3-}$ (C) $\text{Na} < \text{Li} < \text{K}$ (D) $\text{Fe}^{3+} < \text{Fe}^{2+} < \text{Fe}^{4+}$
- Q.67 The correct order of acidic strength is:
 (A) $\text{Cl}_2\text{O}_7 > \text{SO}_2 > \text{P}_4\text{O}_{10}$ (B) $\text{CO}_2 > \text{N}_2\text{O}_5 > \text{SO}_3$

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Q.68 The IE_1 of Be is greater than that of B. [T/F]

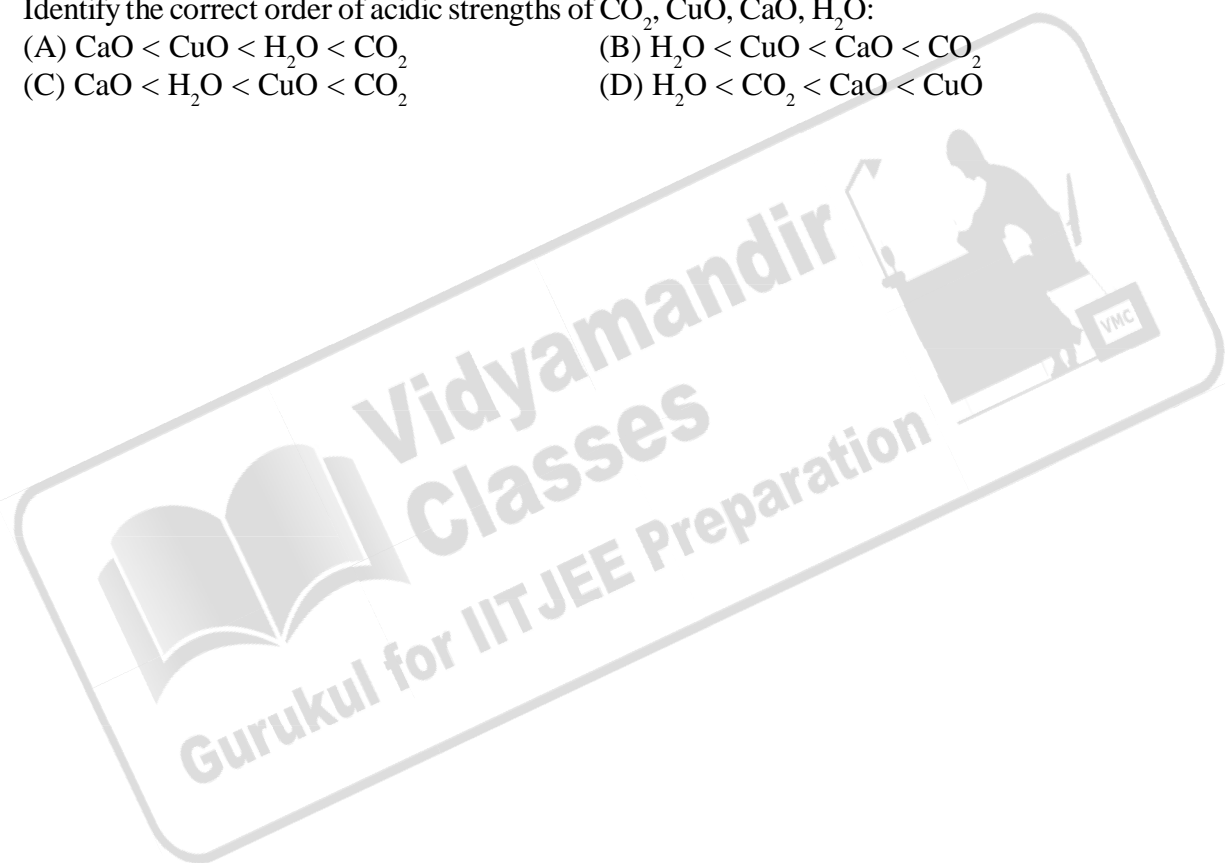
Q.69 The set representing correct order of IP_1 is



Q.70 Identify the least stable ion amongst the following:



Q.71 Identify the correct order of acidic strengths of CO_2 , CuO , CaO , H_2O :



ANSWER KEY

- Q.1 D Q.2 C Q.3 D Q.4 D
- Q.5 72 Q.6 (a) d block, (b) d block, (c) p block, (e) f block
- Q.7 101 102 103 104 105 106 107 108 109
 Unu Unb Unt Unq Unp Unh Uns Uno Une
- Q.8 A Q.9 C Q.10 C, D Q.11 C
- Q.12 C Q.13 A Q.14 C Q.15 A
- Q.16 C Q.17 B Q.18 A Q.19 B
- Q.20 Zeff & half filled config. Q.21 O
- Q.22 $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+}$ Q.23 Isolelectronic Ca^{+2} (higher)
- Q.24 Fe^{3+} , CO^{2+} Q.25 difference in $1E_1$ & $1E_2$ is less than 10ev.
- Q.26 (a) F (b) O (c) Cl^- Q.27 half filled and fully filled orbitals
- Q.28 (i) Cl (ii) Cs (iii) Al (iv) F (v) Xe
- Q.29 Increases \rightarrow a, b, d, h, j, k, Decrease \rightarrow c, e, f, g, Same \rightarrow i
- Q.30 half filled & fully filled orbitals Q.31 $Cs > Na > Mg > Si > Cl$
- Q.32 $r_k > 1.34\text{\AA} > r_f$ Q.33 No Q.34 ICl
- Q.35 (a) P-Cl (b) S-O, (C) N-F Q.36 $He < Ne < Ar < Kr < Xe < Rn$
- Q.37 $EN_1 > EN_2$
- Q.38 F = 37.81%, Cl = 62.19% Q.39 17.15 Q.40 (i) 7.6 (ii) 13.85
- Q.41 (a) $Al^{+3} > Mg^{+2} > Na^+$, (b) $Al^{+3} > Mg^{+2} > Na^+$, (c) $Al^{+3} > Mg^{+2} > Na^+$, (d) $Na^+ > Mg^{+2} > Al^{+3}$,
 (e) $Na^+ > Mg^{+2} > Al^{+3}$

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- Q.42 Li_2O < BeO < B_2O_3
 basic amphoteric acidic
- Q.43 BaO Q.44 False
- Q.45 (a) basic (b) acidic (c) basic (d) acidic (e) basic (f) acidic
- Q.46 B Q.47 A Q.48 C Q.49 A Q.50 C
 Q.51 C Q.52 A Q.53 D Q.54 A Q.55 D
 Q.56 A
- Q.57 B Q.58 A, D Q.59 $\text{Al}^{3+} < \text{Li}^+ < \text{Mg}^{2+} < \text{K}^+$
- Q.60 B Q.61 Ionic Q.62 A, B, C Q.63 D
- Q.64 C Q.65 C Q.66 B Q.67 A
- Q.68 True Q.69 B Q.70 A Q.71 A