

Solved Example

Q.1 The boiling point of Kr and Rn are -152°C and -62°C respectively. The approximate boiling point of Xe is
 [1] 107°C [2] -107°C [3] 50°C [4] 70°C **Ans. [2]**

Sol. According to law of triad, the properties of middle elements are average of rest two

\therefore boiling point of Xe in a triad of Kr, Xe Rn =

$$(\text{boiling point of Kr} + \text{boiling point of Rn}) / 2 = (-152 - 62) / 2 = -107^{\circ}\text{C}$$

Q.2 Which of the following atoms and ions are isoelectronic

- (a) Al^{3+} (b) F (c) Cl^{-} (d) O^{2-}
 (e) Na (f) Mg^{2+}

The correct answer is

- [1] Al^{3+} , O^{2-} , Mg^{2+} [2] F, Cl^{-} , Na [3] Al^{3+} , F, Cl^{-} [4] None of these **Ans. [1]**

Sol. Ion or atom Al^{3+} F Cl^{-} O^{2-} Na Mg^{2+}
 No. of electrons 10 9 18 10 11 10

So, Al^{3+} , O^{2-} & Mg^{2+} are isoelectronic.

Q.3 The bond distance between C–Cl in CCl_4 is 1.76 \AA . If atomic radius of C is 0.77 \AA , The atomic radius of Cl is
 [1] 0.95 \AA [2] 0.55 \AA [3] 0.99 \AA [4] 1.05 \AA **Ans. [3]**

Sol. Bond length of C–Cl = distance between the nuclei of two atoms

$$= r_{\text{C}} + r_{\text{Cl}}$$

Given $r_{\text{C}} = 0.77$ and $r_{\text{C}} + r_{\text{Cl}} = 1.76 \text{ \AA}$

$\therefore r_{\text{Cl}} = 1.76 - 0.77 = 0.99 \text{ \AA}$

Q.4 Ionization potential of Na would be numerically the same as

- [1] Electron affinity of Na^{+} [2] Electronegativity of Na^{+}
 [2] Electron affinity of He [4] Ionization potential of Mg **Ans. [1]**

Sol. $\text{Na} \rightarrow \text{Na}^{+} + e^{-}$; IE of Na = +ve

$\text{Na}^{+} + e^{-} \rightarrow \text{Na}$; IE of Na^{+} = -ve

Both are equal but opposite in nature

Q.5 How much energy in joules must be needed to convert all the atoms of sodium to sodium ions present in 2.3 mg of sodium vapours ? Ionisation energy of sodium is 495 kJ mole^{-1}

- [1] $495 \times 10^{-4} \text{ kJ/mol}$. [2] $395 \times 10^{-4} \text{ kJ/mol}$. [3] 495 kJ/mol . [4] 300 kJ/mol . **Ans. [1]**

Sol. According to the definition of ionisation energy,



The amount of energy needed to ionise 1 mole of sodium vapours = 495 kJ mole^{-1}

Moles of sodium vapours present in given sample = $\frac{2.3 \times 10^{-3}}{23} = 1 \times 10^{-4} \text{ mol}$

\therefore Amount of energy needed to ionise $1 \times 10^{-4} \text{ mol}$ of sodium vapours are $495 \times 10^{-4} \text{ kJ/mol}$.

Q.11 Which of the following relation is correct

[1] $2 \text{ I.P.} - \text{E.A.} - \text{E.N.} = 0$

[2] $2 \text{ I.P.} - \text{E.N} + \text{E.A.} = 0$

[3] $2 \text{ E.N.} - \text{I.P.} - \text{E.A.} = 0$

[4] $\text{E.N.} - \text{I.P.} - \text{E.A} = 0$

Ans. [3]

Where E.N. stands for electronegativity. E.A. stands for electron affinity and I.P. stands for ionization potential

Sol. $\therefore \text{E.N.} = \frac{\text{I.P.} + \text{E.A.}}{2}$

$\therefore 2\text{E.N.} = \text{I.P.} + \text{E.A.}$ or $2 \text{ E.N.} - \text{I.P.} - \text{E.A.} = 0$

Q.12 Find out the value of Z_{eff} for nitrogen

[1] 7

[2] 3.1

[3] 3.90

[4] None

Ans. [3]

Sol. Configuration of N ($Z = 7$)

$(1s^2), (2s^2 2p^3)$

There are five electrons in the valence shell ($n=2$)

This is n^{th} shell

\therefore The shielding effect of all electrons excepting one = $4 \times 0.35 = 1.40$

The shielding effect of two electrons present in the $(n-1)$ shell

$(1s^2) 2 \times 0.85 = 1.70$

Thus the screening constant $\sigma = 1.40 + 1.70 = 3.10$

Hence $Z_{\text{eff}} = Z - \sigma = 7 - 3.10 = 3.90$

Q.13 The ionization energy of lithium is 520 kJ mol^{-1} . The amount of energy required to convert 70 mg of lithium atoms in gaseous state into Li^+ ions is :

[1] 5.2 kJ

[2] 52 kJ

[3] 520 kJ

[4] 52 J

Ans. [1]

Sol. $70 \text{ mg} = 70 \times 10^{-3} \text{ g} = \frac{70 \times 10^{-3}}{7} \text{ mol} = 1 \times 10^{-2} \text{ mol}$

\therefore Amount of energy required = $1 \times 10^{-2} \times 520 \text{ kJ} = 5.2 \text{ kJ}$

Q.14 The ionization potential of X^- ion is numerically equal to :

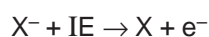
[1] The electron affinity of X atom

[2] The electronegativity of X atom

[3] The ionization potential of X

[4] None of these

Ans. [1]



Exercise # 1

- Q.1** Element A of group VA combines with element B of group VI A. The resulting compound may have the formula ?
 [1] A_2B_3 [2] A_3B_2 [3] A_5B_6 [4] A_6B_5
- Q.2** According to periodic law, the chemical properties of elements are the periodic function of their ?
 [1] Density [2] Atomic Number [3] Mass number [4] Atomic mass
- Q.3** Zero group was introduced by ?
 [1] Lothar Meyer [2] Mendeleev [3] Ramsay [4] Lockyer
- Q.4** In a periodic table from I group to group VII electronegativity of elements ?
 [1] Decreases [2] Increases [3] Remains constant [4] All
- Q.5** Highest ionisation potential in a period is shown by ?
 [1] Alkali metals [2] Transition elements
 [3] Halogen [4] Alkaline earth metals
- Q.6** Halogens have been placed in the VII group of the periodic table because ?
 [1] They are non-metals [2] They are very reactive
 [3] They are electronegative [4] They have seven electrons in outermost orbit
- Q.7** On decreasing a group electropositive character of elements ?
 [1] Increases [2] Decreases [3] Remains same [4] None
- Q.8** The element with the highest first ionisation potential is :
 [1] Boron [2] Carbon [3] Nitrogen [4] Oxygen
- Q.9** The ion with highest radius is ?
 [1] Na^+ [2] N^{3-} [3] F^- [4] Al^{3+}
- Q.10** Which pair of elements is chemically most similar ?
 [1] Na, Al [2] Cu, S [3] Ti, Zr [4] Zr, Hf
- Q.11** In the series C, N, O and F, the electronegativity ?
 [1] Decreases from C to F [2] Increases from C to F
 [3] Remains constant [4] Decreases from C to O and then increases
- Q.12** In the long form of periodic table, the elements having lowest ionisation potential are present in ?
 [1] I group [2] IV group [3] VII group [4] Zero group
- Q.13** The first ionisation energy is smallest for the atom with electronic configuration ?
 [1] ns^2np^3 [2] ns^2np^4 [3] ns^2np^5 [4] ns^2np^6
- Q.14** The law of octaves applies to the following set of elements ?
 [1] B, N, C [2] Be, Mg, Ca [3] Ar, K, Ca [4] Se, Te, As
- Q.15** In a period, the alkali metals have ?
 [1] Highest ionisation energy [2] Largest atomic radii
 [3] Highest density [4] Highest electronegativity

- Q.16** An atom with high electronegativity generally has ?
[1] Tendency to form +ve ions [2] High ionisation potential
[3] Large atomic size [4] Low electron affinity
- Q.17** Elements of I A group give colour in Bunsen burner due to :
[1] Low I.P [2] Low M.P
[3] Softness [4] One electron in outermost shell
- Q.18** The correct order of atomic size is ?
[1] $Be > C > F > Ne$ [2] $Be < C < F < Ne$ [3] $Be > C > F < Ne$ [4] $F < Ne < Be < C$
- Q.19** The first ionisation energy of Na, Mg, Al and Si is in the order ?
[1] $Na < Mg > Al < Si$ [2] $Na > Mg > Al > Si$ [3] $Na < Mg < Al > Si$ [4] $Na > Mg > Al > Si$
- Q.20** The electronegativity of the following elements increases in the order ?
[1] C, N, Si, P [2] N, Si, C, P [3] Si, P, C, N [4] P, Si, N, C
- Q.21** Which of the following elements have strong tendency to form anions ?
[1] P, S, Cl [2] As, Sb, Bi [3] Fe, Co, Ni [4] Li, Be, B
- Q.22** The first element of each period in the periodic table has ?
[1] Two electrons in the first shell [2] One electron in the first shell
[3] One s-electron in the outermost shell [4] 8 electrons in the outermost shell
- Q.23** In the periodic table, with the increase in atomic number, the metallic character of an element ?
[1] Decreases in a period and increases in a group
[2] Increases in a period and decreases in a group
[3] Increases both in a period and the group
[4] Decreases in a period and the group
- Q.24** A newly discovered element X is placed in group IA of the periodic table because it forms ?
[1] An oxide which is acid [2] A volatile chloride having formula XCl
[3] An ionic chloride having formula XCl [4] An insoluble XCO_4
- Q.25** In the periodic table the trend of electropositive character from Na to Ar ?
[1] Increases [2] Decreases
[3] Constant [4] First increases and then decreases
- Q.26** In the periodic table of elements, the elements are arranged in the order of ?
[1] Increasing volume [2] Increasing atomic number
[3] Increasing mass number [4] Increasing density
- Q.27** Elements of the same group in the periodic table are characterised by the same ?
[1] Ionisation potential [2] Electronegativity
[3] Electron affinity [4] Number of valence electrons

- Q.28** Which of the following pairs has elements containing same number of electrons in outermost orbit ?
 [1] N, O [2] Na, Cl [3] As, Bi [4] Pb, Sb
- Q.29** The elements of II short period are called ?
 [1] Typical elements [2] Transition elements [3] Normal elements [4] Inert elements
- Q.30** Among the following group of elements, the one whose elements can have positive as well as negative oxidation states are ?
 [1] H, F, O [2] Na, Mg, Al [3] He, Li, Be [4] H, Cl, Br
- Q.31** The correct order of relative stability of half filled and completely filled shells is ?
 [1] $p^3 < d^5 < d^{10} < p^6$ [2] $d^5 > p^3 > d^{10} > p^6$ [3] $d^5 < p^3 < d^{10} < p^6$ [4] $p^3 < d^{10} < d^5 < p^6$
- Q.32** Which has the highest boiling point ?
 [1] CH_4 [2] He [3] H_2 [4] Xe
- Q.33** The decreasing order of second ionisation potential of K, Ca and Ba ($Z : K = 19, Ca = 20, Ba = 56$)
 [1] $K > Ca > Ba$ [2] $Ca > Ba > K$ [3] $Ba > K > Ca$ [4] $K > Ba > Ca$
- Q.34** In the long form of periodic table all the non-metals are placed in ?
 [1] s-block [2] p-block [3] d-block [4] f-block
- Q.35** Among the following elements, the one having the highest ionisation energy ?
 [1] $[Ne] 3s^2 3p^1$ [2] $[Ne] 3s^2 3p^3$ [3] $[Ne] 3s^2 3p^2$ [4] $[Ar] 3d^{10} 4s^2 4p^3$
- Q.36** Which of the following is formed easily ?
 [1] Ca^{2+} [2] Zn^{2+} [3] Cl^{2+} [4] O^{2+}
- Q.37** Which of the following has least density ?
 [1] Na [2] Li [3] Mg [4] K
- Q.38** The process requiring the absorption of energy is ?
 [1] $F \rightarrow F^-$ [2] $H \rightarrow H^-$ [3] $Cl \rightarrow Cl^-$ [4] $O \rightarrow O^{2-}$
- Q.39** Which of the following is Dobereiner triad ?
 [1] Cl, Br, I [2] Zn, Cr, Na [3] Ne, Ar, K [4] B, C, Si
- Q.40** Which of the following compounds is more stable ?
 [1] Na_3N [2] Li_3N [3] K_3N [4] Rb_3N
- Q.41** In Pauling electronegativity scale, element next to fluorine is ?
 [1] Cl [2] N [3] O [4] I
- Q.42** Which of the following ions forms highly soluble hydroxide in water ?
 [1] K^+ [2] Zn^{2+} [3] Al^{3+} [4] Ca^{2+}
- Q.43** On the basis of valencies of elements in a group, the formula of compound formed by tin with fluorine is ?
 [1] SnF [2] SnF_3 [3] SnF_6 [4] SnF_4
- Q.44** In II period most acidic oxide is formed by ?
 [1] F [2] N [3] O [4] Li

- Q.45** Which of the following atoms possesses the smallest volume ?
 [1] S [2] Si [3] P [4] He
- Q.46** Decreasing order of atomic weight is correct of the elements given below ?
 [1] Fe > Co > Ni [2] Ni > Co > Fe [3] Co > Ni > Fe [4] Co > Fe > Ni
- Q.47** Chloride of an element A gives neutral solution in water. The element in the periodic table belongs to
 [1] 1st group [2] III group [3] V group [4] 1st transition series
- Q.48** Group number and valency has no relation in ?
 [1] Zero group [2] First group [3] IIIrd group [4] VII group
- Q.49** Lanthanide contraction can explain ?
 [1] Atomic number of the series [2] Number of extra nuclear electrons
 [3] Density of the series [4] Ionic radius of series
- Q.50** Pd has exceptional electronic configuration $4d^{10} 5s^0$. It belongs to
 [1] 4th group [2] 6th group [3] 10th group [4] None of these

Answer Key - 1

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	1	2	3	2	3	4	1	3	2	4	2	1	2	2	2	2	1	3	1	3
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	1	3	1	3	2	2	4	3	1	4	3	4	1	2	2	1	2	4	1	2
Que.	41	42	43	44	45	46	47	48	49	50										
Ans.	3	1	4	2	4	3	1	1	4	3										

Exercise # 2

- Q.1** The first ionisation potential of Na, Mg, Al and Si follow the order
 [1] Na > Mg > Al > Si [2] Na < Mg > Al < Si [3] Na < Mg < Al < Si [4] Na = Mg = Al > Si
- Q.2** For the processes $K^+(g) \xrightarrow{I} K(g) \xrightarrow{II} K(s)$
 [1] Energy is released in (I) and absorbed in (II) [2] Energy is absorbed in (I) and released in (II)
 [3] Energy is absorbed in both the processes [4] Energy is released in both the processes
- Q.3** $\Delta = X_A - X_B = 2.0$ what is percent ionic character for a covalent molecule A-B
 [1] 46 [2] 50 [3] 20 (4) 30
- Q.4** Consider the $M(OH)_3$ formed by all the group 13 elements. The correct sequence of acidic strength of hydroxides $[M(OH)_3]$ is
 [1] $B(OH)_3 < Al(OH)_3 > Ga(OH)_3 > In(OH)_3 > Tl(OH)_3$
 [2] $B(OH)_3 > Tl(OH)_3 > Al(OH)_3 > In(OH)_3 > Ga(OH)_3$
 [3] $Al(OH)_3 > Ga(OH)_3 > B(OH)_3 > In(OH)_3 > Tl(OH)_3$
 [4] $B(OH)_3 > Al(OH)_3 > Ga(OH)_3 > In(OH)_3 > Tl(OH)_3$
- Q.5** According to Allred and Rochow scale, the electronegativity is given by the expression
 [1] First ionisation energy + First electron affinity
 [2] First ionisation energy – First electron affinity
 [3] $0.359 Zr^{-2} + 0.744$ (where Z is effective nuclear charge and r is the mean radius of the orbital)
 [4] None of the above
- Q.6** 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 and 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
 [1] Greater degree of covalency in compounds of Hf^{4+}
 [2] Lanthanide contraction
 [3] Difference in the coordination number of Zn^{4+} and Hf^{4+} in their compounds
 [4] Actinide contraction
- Q.7** Pick out the isoelectronic series from the following
 I. CH_3^+ II. NH_3 III. CH_3^- IV. H_3O^+
 Correct answer is :
 [1] III & IV [2] I & III [3] II, III & IV [4] III & IV
- Q.8** Which of the following oxyacids act as reducing agent
 [1] $H_4P_2O_7$ [2] $H_4P_2O_6$ [3] H_3PO_4 [4] H_3PO_3

Q.9 Adding electron to neutral gaseous atom usually leads to

- (a) Liberation of energy (b) Formation of ion
(c) Proton/electron ratio decreases (d) Stabilizing the species

Code is

- [1] a, d [2] b, c, d [3] a, b, d [4] a, b, c

Q.10 Match list - I with list - II and choose the correct answer from the code given below

List - I

- (A) Strongest reductant
(B) Half filled d-orbital
(C) Coinage metal
(D) Lanthanide

List- II

- a. aurum
b. cerium
c. chromium
d. iodide ion

Code is -

- | (A) | (B) | (C) | (D) |
|-------|-----|-----|-----|
| [1] d | c | a | b |
| [2] a | b | c | d |
| [3] d | a | c | b |
| [4] b | c | a | b |

Q.11 Triad - I [N^{3-} , O^- , Na^+]

Triad - II [N^+ , C^+ , O^+]

Choose the species of lowest IP from triad-I and the species of highest IP from triad - II respectively

- [1] N^{3-} , O^+ [2] Na^+ , C^+ [3] N^{3-} , N^- [4] O^- , C^+

Q.12 False statement for periodic classification of elements is

- [1] The properties of the elements are periodic function of their atomic numbers
[2] No. of nonmetallic elements is less than the no. of metallic elements
[3] First ionization energy of elements does not change continuously with increasing of atomic no. in a period.
[4] d-subshell is filled by directional electron with increasing atomic no. of transition elements.

Q.13 Element Hg has two oxidation states Hg^{+1} & Hg^{+2} . The right order of radii of these ions

- [1] $Hg^{+1} > Hg^{+2}$ [2] $Hg^{+2} > Hg^{+1}$ [3] $Hg^{+1} = Hg^{+2}$ [4] $Hg^{+2} \geq Hg^{+1}$

Q.14 Match list I with list II & then select the correct answer from the codes given below

List - I

- (A) Increasing atomic size
(B) Decreasing atomic radius
(C) Increasing electronegativity
(D) Decreasing effective nuclear charge

List - II

- (a) $Cl < O < F$
(b) $B > Be > Li$
(c) $Si < Al < Mg$
(d) $N > O > F$

Codes

- | | A | B | C | D | | A | B | C | D |
|-----|---|---|---|---|-----|---|---|---|---|
| [1] | c | d | a | b | [2] | d | b | c | a |
| [3] | a | c | b | d | [4] | b | a | d | c |

- Q.15** Element A,B,C,D belong to the same group. The basic character of their oxides will be in which order if the atomic numbers of A,B,C,D are $(Z-x)$, $(Z+2x+2)$, Z , $(Z+x)$ respectively
 [1] $A < B > C < D$ [2] $A > B > C > D$ [3] $B > D > C > A$ [4] $B > C > D > A$
- Q.16** First, second third and fourth I.P. values in e.v. of M are 5.1, 17.9, 23.9, 120 respectively. The ion which would be formed is
 [1] M^{+3} [2] M^{+2} [3] M^{+4} [4] M^{+1} and M^{+2}
- Q.17** The electronic configuration of four elements L,P,Q and R are given below
 $L = 1s^2, 2s^2 2p^4$ $Q = 1s^2, 2s^2 2p^6, 3s^2 3p^5$
 $P = 1s^2, 2s^2 2p^6, 3s^1$ $R = 1s^2, 2s^2 2p^6, 3s^2$
 The formula of the ionic compounds that can be formed between these elements are
 [1] L_2P, RL, PQ, R_2Q [2] LP, L, PQ, RQ [3] P_2L, RL, PQ, RQ_2 [4] LP, R_2L, P_2Q, RQ
- Q.18** X–X bond length is 1.00 Å and C–C bond length is 1.54 Å. If electronegativities of X and C are 3.0 and 2.0 respectively the C–X bond length is likely to be
 [1] 1.27 [2] 1.28 [3] 1.18 [4] 1.08
- Q.19** If $a = NO_2$, $b = K_2O$, $c = ZnO$
 Arrange the above compounds in the decreasing order of basicity
 [1] a, b, c [2] b, c, a [3] c, b, a [4] a, c, b
- Q.20** All elements in the same group of the periodic table have the same
 [1] Number of electrons [2] Number of valence electrons
 [3] Atomic weight [4] Atomic number
- Q.21** Which of the following pair have equal number of electrons in the outermost orbit
 [1] N–O [2] Na–Ca [3] As –Bi [4] Pb – Sb
- Q.22** The elements increasing order of I.P are
 [1] P, S, Cl, Ar [2] Ar, Cl, S, P [3] S, P, Cl, Ar [4] Ar, P, S, Cl
- Q.23** With respect to chlorine, hydrogen will be
 [1] electropositive [2] Electronegative
 [3] Neutral [4] None of these
- Q.24** Which of the following transition metal cation has maximum unpaired electrons
 (!) Mn^{2+} [2] Fe^{2+} [3] Co^{2+} [4] Ni^{2+}
- Q.25** In the process $Cl_{(g)} + e \xrightarrow{\Delta H} Cl_{(g)}^-$; ΔH is
 [1] Positive [2] Negative [3] Zero [4] Unpredictable
- Q.26** General electronic configuration of the transition elements is given by
 [1] $ns^2 nd^{1-10}$ [2] ns^2, np^6, nd^{1-10} [3] $(n-1) d^{1-10} np^6$ [4] $(n-1) d^{1-10}, ns^2$
- Q.27** Element with electronic configuration $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^6, 4d^{10}, 5s^2, 5p^3$ belongs to begroup of the periodic table
 [1] IIIA [2] V A [3] V B [4] III B

- Q.28** In which of the following process energy liberated
- [1] $\text{Cl} \rightarrow \text{Cl}^+ + e$ [2] $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$
 [3] $\text{Cl} + e \rightarrow \text{Cl}^-$ [4] $\text{O}^- + e \rightarrow \text{O}^{2-}$
- Q.29** The element with $(n-1) s^2 p^6 d^{10}, ns^2 p^5$ outer configuration is likely to be
- [1] Alkali metal [2] Chalcogen
 [3] Transition metal [4] Halogen
- Q.30** $Z = 21, 89, 49, 5, 39, 79$ in this group separate the elements belonging to the same group of the periodic table
- [1] 89, 21, 39 [2] 5, 49, 79 [3] 5, 21, 39 [4] None of them
- Q.31** I.P. of oxygen and nitrogen respectively would be (in eV)
- [1] 13.6, 14.6 [2] 13.6, 13.6 [3] 14.6, 13.6 [4] 14.6, 14.6
- Q.32** Electron affinity of carbon is greater than nitrogen because
- [1] Carbon shows catenation property
 [2] Entering electron occupies 2p orbital of carbon
 [3] Carbon accept one electron and assumes $(\text{He}) 2s^2 2p_x^1 2p_y^1 2p_z^1$ structure
 [4] All the above are correct
- Q.33** Which of the following statement about transuranic elements is incorrect
- [1] These are all synthetic elements
 [2] These are elements of atomic number 93 and beyond
 [3] elements from 90 to lawrencium are called actinones
 [4] These are part of third transition series

Answer Key - 2

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	2	4	1	4	3	2	3	4	4	1	1	3	1	1	3	1	3	3	2	2
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33							
Ans.	3	3	1	1	2	4	2	3	4	1	1	3	4							

Exercise # 3

- Q.1** The energy required to remove an electron of a gaseous atom from its ground state is called [CPMT 1989, 94]
 [1] Potential energy [2] Ionization energy [3] Electrode potential [4] Activation energy
- Q.2** Which of the following statement concerning lanthanides elements is false - [CBSE 1994]
 [1] Lanthanides are separated from one another by ion exchange method
 [2] Ionic radii of trivalent lanthanides steadily increases with increase in the atomic number
 [3] All lanthanides are highly dense metals
 [4] More characteristic oxidation state of lanthanide element is +3
- Q.3** The electron affinity of - [CPMT 1994]
 [1] Carbon is greater than oxygen [2] Sulphur is less than oxygen
 [3] Iodine is greater than bromine [4] Bromine is less than chlorine
- Q.4** Which one of the following represents the electronic configuration of the most electropositive element [AIIMS 1982, CPMT 1994]
 [1] [He] $2s^1$ [2] [Xe] $6s^1$ [3] [He] $2s^2$ [4] [Xe] $6s^2$
- Q.5** In which of the following pairs the difference between the covalent radii of the two metals is maximum [MP PET 1994]
 [1] K, Ca [2] Mn, Fe [3] Co, Ni [4] Cr, Mn
- Q.6** On pauling scale which of the following does not have electronegativity ≥ 3.0 - [MP PET 1994]
 [1] Oxygen [2] Nitrogen [3] Chlorine [4] Bromine
- Q.7** Radius of the isoelectronic species [MP PET 1994]
 [1] Increases with the increase of nuclear charge
 [2] Decreases with the increase of nuclear charge
 [3] Is the same for all
 [4] First increases and then decreases
- Q.8** The electronic configuration of an element is $1s^2, 2s^2, 2p^6, 3s^2, 3p^3$. What is the atomic number of the element which is just below the above element in the periodic table [CBSE 1995]
 [1] 33 [2] 34 [3] 31 [4] 49
- Q.9** To which block is related an element having electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$ in the periodic table - [MP PMT 1995]
 [1] s-block [2] p-block [3] d-block [4] f-block
- Q.10** Alkali metals in each period have [MP PMT 1995]
 [1] smallest size [2] Lowest ionization potential
 [3] Highest ionization potential [4] Highest electronegativity

- Q.11** Which one of the elements has the maximum electron affinity **[MP PET 1995]**
 [1] F [2] Cl [3] Br [4] I
- Q.12** The property of attracting electrons by the halogen atom in a molecule is called **[CPMT 1996]**
 [1] Ionisation potential [2] Electron affinity
 [3] Electronegativity [4] Electronic attraction
- Q.13** The amount of energy which is released due to addition of extra electron to the outermost orbit of gaseous atom is called **[BHU 1996]**
 [1] Electron capacity [2] Electron affinity
 [3] Ionisation potential [4] Electronegativity
- Q.14** Lithium shows diagonal relationship with **[MP PET 95, 1996]**
 [1] Al [2] Mg [3] Be [4] B
- Q.15** All the elements in a group in the periodic table have the same **[MP PET 1996, MP PMT 1996]**
 [1] Atomic number [2] Electronic configuration
 [3] Atomic weight
 [4] Number of electrons in the outermost shell or number of electrons for bonding
- Q.16** The first ionisation energies of alkaline earth metals are higher than those of the alkali metals. This is because **[MP PET 1996]**
 [1] There is increase in the nuclear charge of the alkaline earth metals
 [2] There is a decrease in the nuclear charge of the alkaline earth metals
 [3] There is no change in the nuclear charge
 [4] None of the above
- Q.17** The electron affinities of halogens are F = 322, Cl = 349, Br = 324, I = 295 kJ mol⁻¹. The higher value for Cl as compared to that of F is due to **[MP PET 1997]**
 [1] Weaker electron-electron repulsion in Cl [2] Higher atomic radius of F
 [2] Smaller electronegativity of F [4] More vacant p-subshell in Cl
- Q.18** The outermost electronic configuration of the most electronegative elements is **[MP PET 1996, Raj. PMT 1997]**
 [1] ns² np³ [2] ns² np⁴ [3] ns² np⁵ [4] ns² np⁶
- Q.19** The incorrect statement among the following is **[IIT 1997]**
 [1] The first ionisation potential of Al is less than the first ionisation potential of Mg
 [2] The second ionisation potential of Mg is greater than the second ionisation potential of Na
 [3] The first ionisation potential of Na is less than the first ionisation potential of Mg
 [4] The third ionisation potential of Mg is greater than the third ionisation potential of Al

- Q.20** Which of the properties remains unchanged on descending a group in the periodic table [MP PET 1997]
 [1] Atomic size [2] Density [3] Valence electrons [4] Metallic character
- Q.21** Which is smallest in size [RPMT 1997]
 [1] O^{2-} [2] C^{4-} [3] F^- [4] N^{3-}
- Q.22** The elements indicating following atomic numbers belong to same group [RPMT 1997]
 [1] 11 and 37 [2] 19 and 15 [3] 39 and 88 [4] None of these
- Q.23** Dobereiner triads is [RPMT 1997]
 [1] Na, K, Rb [2] Mg, S, As [3] Cl, Br, I [4] P, S, As
- Q.24** Which shows variable valency
 [1] s-block elements [2] p-block elements [3] d-block elements [4] Radioactive elements
- Q.25** Which of the following gaseous atoms has highest value of IE - [JIPMER 97, CPMT 1997]
 [1] P [2] Si [3] Mg [4] Al
- Q.26** Fluorine has low electron affinity than chlorine because of [CPMT 1997]
 [1] Smaller radius of fluorine, high density [2] Smaller radius of chlorine, high density
 [3] Bigger radius of fluorine, less density [4] Smaller radius of chlorine, less density
- Q.27** Strongest reducing agent is [RPMT 1997]
 [1] Cl_2 [2] Cl^- [3] Br [4] I^-
- Q.28** Arrange the following in increasing order of their atomic radius : Na, K, Mg, Rb [AFMC 95, 1997]
 [1] $Mg < K < Na < Rb$ [2] $Mg < Na < K < Rb$
 [3] $Mg < Na < Rb < K$ [4] $Na < K < Rb < Mg$
- Q.29** Which of the following elements are analogous to the lanthanides [AIIMS 1998]
 [1] Actinides [2] Borides [3] Carbides [4] Hydrides
- Q.30** As per the modern periodic law, the physical and chemical properties of elements are periodic functions of their [C.B.S.E. 1998]
 [1] Atomic volume [2] Electronic configuration
 [3] Atomic weight [4] Atomic size
- Q.31** The first ionization potentials (eV) of Be and B respectively are [C.B.S.E. 1998]
 [1] 8.29 eV, 9.32 eV [2] 9.32 eV, 9.32 eV [3] 8.29 eV, 8.29 eV [4] 9.32 eV, 8.29 eV
- Q.32** In the following, the element with the highest electropositivity is [MP PET/PMT 1998]
 [1] Copper [2] Caesium [3] Barium [4] Chromium
- Q.33** Elements with outer electron configuration $ns^2 np^6$ are [MP PET/PMT 1998]
 [1] Alkaline earth metals [2] Transition elements
 [3] Chalcogens [4] Noble gases
- Q.34** In the periodic table, the element with atomic number 16 will be placed in the group [MP PET/PMT 1998]
 [1] Third [2] Fourth [3] Fifth [4] Sixth

- Q.35** A sudden large jump between the values of second and third ionisation energies of an element would be associated with the electronic configuration **[CBSE 1992, AFMC 1998]**
 [1] $1s^2, 2s^2p^6, 3s^1$ [2] $1s^2, 2s^2p^6, 3s^2p^1$ [3] $1s^2, 2s^2p^6, 3s^2p^2$ [4] $1s^2, 2s^2p^6, 3s^2$
- Q.36** Which of the following statement is true about the elements of IA and IIA group elements **[RPMT 1998]**
 [1] The I.P. of alkali metals are higher than that of alkaline earth metal
 [2] The size of alkali metals are larger than that of alkaline earth metals
 [3] The reactivity of alkaline earth metals is more than that of alkali metals
 [4] All the above
- Q.37** Which pair show less similarity in their properties than the other three **[RPMT 1998]**
 [1] Li–Mg [2] Be–Al [3] Na–Ca [4] B–Si
- Q.38** Number of s-block element are **[RPMT 1998]**
 [1] More than that of p-block elements [2] Equal to that of p-block elements
 [3] More than that of d-block elements [4] None of the above
- Q.39** Which of the following is most electronegative **[CPMT 1998]**
 [1] Carbon [2] Silicon [3] Lead [4] Tin
- Q.40** Ionic radii of **[MP PMT 1999]**
 [1] $Ti^{4+} < Mn^{7+}$ [2] $^{35}Cl^- < ^{37}Cl^-$ [3] $K^+ > Cl^-$ [4] $P^{3+} > P^{5+}$
- Q.41** In the modern periodic table, the place of the element with atomic number 31 is in **[MP PMT 1999]**
 [1] s-block [2] d-block [3] p-block [4] f-block
- Q.42** Which one of the following is an s-block element **[MP PMT 1999]**
 [1] Aluminium [2] Chromium [3] Niobium [4] Potassium
- Q.43** Which of the following metals exhibits more than one oxidation state **[MP PET 1999]**
 [1] Na [2] Mg [3] Fe [4] Al
- Q.44** Which has the smallest size **[MP PET 1999]**
 [1] Na^+ [2] Mg^{2+} [3] Al^{3+} [4] P^{5+}
- Q.45** The word alkali is used for alkali metals indicates **[RPMT 1999]**
 [1] Ash of the plants [2] Metallic nature [3] Silvery lustre [4] Active metal
- Q.46** Maximum covalent character is associated with the compound **[RPMT 1999]**
 [1] NaI [2] MgI_2 [3] $AlCl_3$ [4] AlI_3
- Q.47** Arrange F, Cl, O, N in the decreasing order of electronegativity **[PET 2000]**
 [1] $O > F > N > Cl$ [2] $F > N > Cl > O$ [3] $Cl > F > N > O$ [4] $F > O > N \approx Cl$
- Q.48** Which of the following metal does not show variable oxidation state **[PET 2000]**
 [1] Zn [2] Fe [3] Cu [4] Cr
- Q.49** In which of the following process highest energy is absorbed **[PET 2000]**
 [1] $Cu \rightarrow Cu^+$ [2] $Br \rightarrow Br^-$ [3] $I \rightarrow I^-$ [4] $Li \rightarrow Li^+$

- Q.50** The bond angle in PH_3 is **[RPMT 2000]**
 [1] Much less than NH_3 [2] Equal to that of NH_3
 [3] Much greater than NH_3 [4] Slightly greater than NH_3
- Q.51** Hydrogen can be put in halogen group because **[RPMT 2000]**
 [1] It has deuterium and tritium as isotopes [2] It forms hydrides like chlorides
 [3] It contains one electron only [4] It is light
- Q.52** Correct order of 1st IP among following elements Be, B, C, N, O is **[CPMT 2001]**
 [1] $\text{B} < \text{Be} < \text{C} < \text{O} < \text{N}$ [2] $\text{B} < \text{Be} < \text{C} < \text{N} < \text{O}$
 [3] $\text{Be} < \text{B} < \text{C} < \text{N} < \text{O}$ [4] $\text{Be} < \text{B} < \text{C} < \text{O} < \text{N}$
- Q.53** Diagonal relationship is shown by **[RPET 2001]**
 [1] Ca, Ba [2] Be, Mg [3] Na, K [4] Li, Mg
- Q.54** Correct sequence of bond length is **[RPET 2001]**
 [1] $\text{HC} \equiv \text{CH} > \text{H}_2\text{C} = \text{CH}_2 > \text{H}_3\text{C} - \text{CH}_3$ [2] $\text{H}_2\text{C} = \text{CH}_2 > \text{HC} \equiv \text{CH} > \text{H}_3\text{C} - \text{CH}_3$
 [3] $\text{H}_3\text{C} - \text{CH}_3 > \text{H}_2\text{C} = \text{CH}_2 > \text{HC} \equiv \text{CH}$ [4] $\text{H}_3\text{C} - \text{CH}_3 > \text{HC} \equiv \text{CH} > \text{H}_2\text{C} = \text{CH}_2$
- Q.55** Outer electronic configuration of an element is $4s^1 3d^{10}$. The element is expected to be **[RPMT 2001]**
 [1] A metal [2] A nonmetal [3] Element of 10th group [4] Liquid at 2981°C
- Q.56** Electron affinity of oxygen, sulphur and selenium follows the order **[RPMT 2001]**
 [1] $\text{O} > \text{S} > \text{Se}$ [2] $\text{S} > \text{O} > \text{Se}$ [3] $\text{Se} > \text{O} > \text{S}$ [4] $\text{Se} > \text{S} > \text{O}$
- Q.57** Element 'X' having electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^3$ forms compound with Ca. The compound is **[RPMT 2001]**
 [1] Ca_2X_3 [2] Ca_3X [3] Ca_3X_2 [4] CaX
- Q.58** Triad of transuranic element is **[RPMT 2001]**
 [1] Th, NP, Pu [2] Bk, Cf, Fm [3] Tm, Nd, Pm [4] Pa, Fm, Md
- Q.59** Most covalent halide of aluminium is **[RPMT 2001]**
 [1] AlI_3 [2] AlBr_3 [3] AlCl_3 [4] AlF_3
- Q.60** Which of the following order is wrong **[CBSE 2002]**
 [1] $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3$ – Acidic
 [2] $\text{Li} < \text{Be} < \text{B} < \text{C}$ – IE_1
 [3] $\text{Al}_2\text{O}_3 < \text{MgO} < \text{Na}_2\text{O} < \text{K}_2\text{O}$ – Basic
 [4] $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Cs}^+$ – Ionic radius
- Q.61** General electronic configuration of lanthanides is **[CBSE 2002]**
 [1] $(n-2) f^{1-14}, (n-1) s^2 p^6 d^{0-1}, ns^2$ [2] $(n-2) f^{0-14}, (n-1) d^{10-1}, ns^2$
 [3] $(n-2) f^{0-14}, (n-1) d^{10}, ns^2$ [4] $(n-2) d^{0-1}, (n-1) f^{1-14}, ns^2$
- Q.62** Which of the following orders is correct for the first ionisation potential of B, C and N **[MP-PMT 2002]**
 [1] $\text{B} > \text{C} > \text{N}$ [2] $\text{N} > \text{C} > \text{B}$ [3] $\text{N} > \text{C} < \text{B}$ [4] $\text{N} < \text{C} < \text{B}$

- Q.63** Chloride ion and potassium ion are isoelectronic, then **[KCET 2002]**
 [1] Their sizes are same [2] Cl^- ion is bigger than K^+ ion
 [3] K^+ ion is relatively bigger [4] Their sizes depend on their cation and anion
- Q.64** Which of the following does not have valence electron in 3d-subshell **[AIIMS 2002]**
 [1] Fe (III) [2] Cr (I) [3] Mn (II) [4] P (O)
- Q.65** Which of the following elements is most metallic **[MP-PMT 2002]**
 [1] P [2] As [3] Sb [4] Bi
- Q.66** What is the general electronic configuration for second row transition series **[Orissa JEE 2002]**
 [1] $[\text{Ne}] 3d^{1-10}, 4s^2$ [2] $[\text{Ar}] 3d^{1-10}, 4s^{1-2}$ [3] $[\text{Kr}] 4d^{1-10}, 5s^{1-2}$ [4] $[\text{Xe}] 5d^{1-10}, 6s^{1-2}$
- Q.67** The ions O^{2-} , F^- , Na^+ , Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show **[CBSE, PMT 2003]**
 [1] A significant decrease from O^{2-} to Al^{3+}
 [2] An increase from O^{2-} to F^- and then decrease from Na^+ to Al^{3+}
 [3] A decrease from O^{2-} to F^- and then increase from Na^+ to Al^{3+}
 [4] A significant increase from O^{2-} to Al^{3+}
- Q.68** According to the Periodic Law of elements, the variation in properties of elements is related to their **[AIEEE 2003]**
 [1] nuclear neutron-proton number ratios [2] atomic masses
 [3] nuclear masses [4] Atomic numbers
- Q.69** The atomic numbers of vanadium (V), Chromium (Cr), Manganese (Mn) and iron (Fe) are respectively 23, 24, 25 and 26. Which one of these may be expected to have the highest second ionization enthalpy **[AIEEE 2003]**
 [1] Fe [2] V [3] Cr [4] Mn
- Q.70** Which one of the following groupings represents a collection of isoelectronic species **[AIEEE 2003]**
 [1] Ca^{2+} , Cs^+ , Br [2] Na^+ , Ca^{2+} , Mg^{2+} [3] N^{3-} , F^- , Na^+ [4] Be, Al^{3+} , Cl^-
- Q.71** Which one of the following ions has the highest value of ionic radius **[AIEEE 2004]**
 [1] F^- [2] B^{3+} [3] O^{2-} [4] Li^+
- Q.72** Among Al_2O_3 , SiO_2 , P_2O_3 and SO_2 the correct order of acid strength is **[AIEEE 2004]**
 [1] $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_3 < \text{SO}_2$ [2] $\text{SiO}_2 < \text{SO}_2 < \text{Al}_2\text{O}_3 < \text{P}_2\text{O}_3$
 [3] $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{SO}_2 < \text{P}_2\text{O}_3$ [4] $\text{SO}_2 < \text{P}_2\text{O}_3 < \text{SiO}_2 < \text{Al}_2\text{O}_3$
- Q.73** The Correct sequence of increasing covalent character is represented by **[CBSE PMT 2005]**
 [1] $\text{LiCl} < \text{NaCl} < \text{KCl} < \text{BeCl}_2$ [2] $\text{BeCl}_2 < \text{NaCl} < \text{LiCl}$
 [3] $\text{NaCl} < \text{LiCl} < \text{BeCl}_2$ [4] $\text{BeCl}_2 < \text{LiCl} < \text{NaCl}$
- Q.74** Ionisation energy in group I-A varies in the decreasing order as - **[Orissa JEE 2005]**
 [1] $\text{Li} > \text{Na} > \text{K} > \text{Cs}$ [2] $\text{Na} > \text{Li} > \text{K} > \text{Cs}$ [3] $\text{Li} > \text{Cs} > \text{K} > \text{Na}$ [4] $\text{K} > \text{Cs} > \text{Na} > \text{Li}$
- Q.75** Order of first ionization potentials of elements Li, Be, B, Na is - **[Kerala CET 2005]**
 [1] $\text{Li} > \text{Be} > \text{B} > \text{Na}$ [2] $\text{Be} > \text{B} > \text{Li} > \text{Na}$ [3] $\text{Na} > \text{Li} > \text{B} > \text{Be}$ [4] $\text{Be} > \text{Li} > \text{B} > \text{Na}$

- Q.76** Ionic compounds are formed most easily with **[DPMT 2005]**
 [1] Low electron affinity, high ionisation energy [2] High electron affinity, low ionisation energy
 [3] Low electron affinity, low ionisation energy [4] High electron affinity, high ionisation energy
- Q.77** Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species. **[CBSE PMT 2005]**
 [1] $\text{Cl} < \text{F} < \text{S} < \text{O}$ [2] $\text{O} < \text{S} < \text{F} < \text{Cl}$ [3] $\text{S} < \text{O} < \text{Cl} < \text{F}$ [4] $\text{F} < \text{Cl} < \text{O} < \text{S}$
- Q.78** The pair of amphoteric hydroxides is - **[AIIMS 2005]**
 [1] $\text{Al}(\text{OH})_3, \text{LiOH}$ [2] $\text{Be}(\text{OH})_2, \text{Mg}(\text{OH})_2$ [3] $\text{B}(\text{OH})_3, \text{Be}(\text{OH})_2$ [4] $\text{Be}(\text{OH})_2, \text{Zn}(\text{OH})_2$
- Q.79** Which of the following oxides is amphoteric in character **[AIEEE 2005]**
 [1] CaO [2] CO_2 [3] SiO_2 [4] SnO_2
- Q.80** In which of the following arrangements the order is NOT according to the property indicated against it **[AIEEE 2005]**
 [1] $\text{Al}^{3+} < \text{Mg}^{2+} < \text{Na}^+ < \text{F}^-$; Increasing ionic size
 [2] $\text{B} < \text{C} < \text{N} < \text{O}$; Increasing first ionization enthalpy
 [3] $\text{I} < \text{Br} < \text{F} < \text{Cl}$; Increasing electron gain enthalpy (with negative sign)
 [4] $\text{Li} < \text{Na} < \text{K} < \text{Rb}$: Increasing metallic radius
- Q.81** Lanthanoid contraction is caused due to - **[AIEEE 2006]**
 [1] The appreciable shielding on outer electrons by 5d electrons from the nuclear charge
 [2] The same effective nuclear charge from Ce to Lu
 [3] The imperfect shielding on outer electrons by 4f electrons from the nuclear charge
 [4] The appreciable shielding on outer electrons by 4f electrons from the nuclear charge
- Q.82** The increasing order of the first ionization enthalpies of the elements B, P, S and F (lowest first) is **[AIEEE 2006]**
 [1] $\text{P} < \text{S} < \text{B} < \text{F}$ [2] $\text{B} < \text{P} < \text{S} < \text{F}$ [3] $\text{B} < \text{S} < \text{P} < \text{F}$ [4] $\text{F} < \text{S} < \text{P} < \text{B}$
- Q.83** The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence **[AIEEE 2007]**
 [1] $\text{SiX}_2 \ll \text{GeX}_2 \ll \text{SnX}_2 \ll \text{PbX}_2$ [2] $\text{PbX}_2 \ll \text{SnX}_2 \ll \text{GeX}_2 \ll \text{SiX}_2$
 [3] $\text{GeX}_2 \ll \text{SiX}_2 \ll \text{SnX}_2 \ll \text{PbX}_2$ [4] $\text{SiX}_2 \ll \text{GeX}_2 \ll \text{PbX}_2 \ll \text{SnX}_2$

Answer Key - 3

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	2	2	4	2	1	4	2	1	3	2	2	3	2	2	4	1	1	3	2	3
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	3	1	3	3	1	1	4	2	1	2	4	2	4	4	4	2	3	4	1	4
Que.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	3	4	3	4	1	4	4	1	4	1	2	1	4	3	1	2	3	2	1	2
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	1	2	2	4	4	3	2	4	1	3	3	1	3	1	2	2	2	4	3	2
Que.	81	82	83																	
Ans.	3	3	1																	