

Matter and its classification

- When two or more elements combine chemically with one another is formed ?
(A) Element (B) Mixture (C) Fluid (D) Compound
- Which one of the following statements is correct ?
(A) Two or more than two atoms of the element combine and form compound.
(B) The atoms retain their own property when form a compound.
(C) Each substance of a mixture loses its original property.
(D) Each substance of a mixture can be separated by physical or chemical methods.
- Which one of the following is heterogeneous mixture ?
(A) Air (B) Brass (C) $\text{NaCl} + \text{Fe}$ (D) Salt solution
- Which one of the following pairs have both are present a compound and mixture
(A) NH_3 and salt solution (B) Lemon juice and Liquidum
(C) Ice cream and NaCl (D) Gun powder and plaster of paris.
- Which one of the following is not an example of homogeneous mixture ?
(A) Sugar solution (B) $\text{O}_2 + \text{N}_2$ gases (C) Salt + Sand (D) $\text{Zn} + \text{Cu}$ alloy
- Co stands for _____ while CO stands for _____.
(A) The atoms of the element cobalt; the atoms of the compound carbon monoxide
(B) The atoms of the element carbon monoxide
(C) The atom of the element cobalt; the molecules of the compound carbon monoxide
(D) The molecules and atoms of element carbon
- Classify each of the following as an element, a compound, or a mixture.
(a) water (b) iron (c) ice-cream (d) sugar
(e) toothpaste (f) silicon dioxide (g) sulfur (h) cement
(i) air (j) magnesium oxide

Formula of ionic compounds

- Which of the following is the formula of the compound nickel bisulphate?
(A) Ni HSO_4 (B) Ni_2HSO_4 (C) Ni_2SO_4 (D) $\text{Ni}(\text{HSO}_4)_2$
- What is the chemical name of the substance whose formulae is $\text{Na}(\text{NH}_4)\text{HPO}_4$?
(A) Sodium hydrogen phosphate (B) Ammonium hydrogen phosphate
(C) Sodium ammonium hydrogen phosphate (D) None of these
- Which of the following is the formula of the compound stannic phosphate?
(A) $\text{Sn}_3(\text{PO}_4)_4$ (B) $\text{Sn}_2(\text{PO}_3)_2$ (C) $\text{Sn}_3(\text{PO}_3)_2$ (D) $\text{Sn}_2(\text{PO}_3)_4$
- Which of the following is the formula of the compound magnesium phosphite?
(A) Mg_2PO_3 (B) $\text{Mg}_2(\text{PO}_3)_4$ (C) $\text{Mg}_3(\text{PO}_3)_2$ (D) None of these
- Which of the following is the chemical name of $\text{Ba}(\text{ClO}_3)_2$?
(A) Barium chloride (B) Barium chlorate (C) Barium chlorite (D) Barium hypochlorite

13. Which of the following is the formula of barium peroxide ?

- (A) Ba_2O (B) Ba_2O_2 (C) BaO_2 (D) BaO_3

Matrix-Match Type

14. Match the column

- | | |
|-------------------------------|--|
| (A) Barium nitrate | (P) Cation is bivalent |
| (B) Silver chromate | (Q) Anion is bivalent |
| (C) Sodium Hydrogen phosphate | (R) no. of cations > no. of anions in one formula unit |
| (D) Magnesium phosphate | (S) no. of cations = no. of anions in one formula unit |
| | (T) Total no. of ions per formula unit is 3 |

Paragraph Type

We know that ionic compounds formed by combination of cation and anion.

By using NH_4^+ , CrO_4^{2-} , HCO_3^- , Ca^{2+} , SO_4^{2-}

Answer the following:

15. Name the compound having least number of ions per formula unit.

- (A) Ammonium chromate (B) Calcium bicarbonate
(C) Calcium chromate (D) Ammonium sulphate

16. Name the compound having least number of ions and minimum positive charge per formula unit.

- (A) Ammonium chromate (B) Calcium chromate
(C) Ammonium bicarbonate (D) Calcium sulphate

17. The chloride of a metal has the formula MCl_3 . The formula of its phosphate will be-

- (A) M_2PO_4 (B) MPO_4 (C) M_3PO_4 (D) $\text{M}(\text{PO}_4)_2$

ATOMIC MASS UNIT AND AVERAGE ATOMIC AND MOLECULAR MASS

18. Atomic weight of Ne is 20.2. Ne is mixture of Ne^{20} and Ne^{22} , Relative abundance of heavier isotope is

- (A) 90 (B) 20 (C) 40 (D) 10

19. Mass of one atom of the element A is 3.9854×10^{-23} g. How many atoms are contained in 1 g of the element A?

- (A) 2.509×10^{23} (B) 6.022×10^{23} (C) 12.044×10^{23} (D) None

20. The average atomic mass of a mixture containing 79 mole % of ^{24}Mg and remaining 21 mole % of ^{25}Mg and ^{26}Mg , is 24.31. then % mole of ^{26}Mg is

- (A) 5 (B) 20 (C) 10 (D) 15

21. The actual weight of a molecule of water is

- (A) 18 g (B) 2.99×10^{-23} g
(C) both (A) & (B) are correct (D) none of these

22. Number of oxygen molecules having weight equal to weight of 20 molecules of SO_3 is equal to

- (A) 100 (B) 50 (C) 15 (D) 8

RACE # 2

MOLE CONCEPT

CHEMISTRY

Protons , Neutrons and Electrons calculations

- Number of protons, neutrons & electrons in the element ${}_{89}\text{X}^{231}$ is
(A) 89, 231, 89 (B) 89, 89, 242 (C) 89, 142, 89 (D) 89, 71, 89
- The charge on the atom containing 17 protons, 18 neutrons and 18 electrons is
(A) +1 (B) -2 (C) -1 (D) Zero
- In an atom ${}_{13}\text{Al}^{27}$, number of protons is (a) electron is (b) and neutron is (c). Hence ratio will be [in order c : b : a]
(A) 13 : 14 : 13 (B) 13 : 13 : 14 (C) 14 : 13 : 13 (D) 14 : 13 : 14
- A and B are two elements which have same atomic weight and are having atomic number 27 and 30 respectively. If the atomic weight of A is 57 then number of neutron in B is
(A) 27 (B) 33 (C) 30 (D) 40
- The atomic mass 25 had 13 neutron's in its nucleus. What its ion can be
(A) Mn^{+2} (B) Cr^{+3} (C) Al^{+3} (D) Mg^{+2}
- The sum of number of neutrons and protons in all of the isotopes of hydrogen is
(A) 3 (B) 4 (C) 5 (D) 6
- Choose the false statement about deuterium
(A) It is an isotope of hydrogen (B) It contains $[(1\text{ e}^-) + (1\text{ P}^+) + (1\text{ n})]$
(C) It contains only $[(1\text{ P}^+) + (1\text{ n})]$ (D) D_2O is called the heavy water
- Complete the following table :

	Symbol	No. of protons in nucleus	No. of neutrons in nucleus	No. of electrons	Netcharge
1	Y_{39}^{89}				
2	-	20	20		+2
3	-	23	28	20	
4	-	15	16		-3

Symbol	No. of protons in nucleus	No. of neutrons in nucleus	No. of electrons	Netcharge
1 Y_{39}^{89}	39	50	39	0
2 X^{+2}	20	20	18	+2
3 Z^{+3}	23	28	20	+3
4 A^{-3}	15	16	18	-3

Mole calculations

- No. of atoms in 4.25 g of NH_3 is approx
(A) 1×10^{23} (B) 1.5×10^{23} (C) 2×10^{23} (D) 6×10^{23}
- The volume occupied by 4.4 g of CO_2 at 273 K and (P = 1 atm) is
(A) 22.4 L (B) 2.24 L (C) 0.224 L (D) 0.1 L

11. The number of neutrons present in 9 mg of O^{18} is
 (A) 10 (B) $5N_A$ (C) $0.005 N_A$ (D) $0.0005 N_A$
12. Rearrange the following (I to IV) in the order of increasing masses.
 (I) 0.5 mole of O_3 (II) 0.5 gm molecule of Nitrogen
 (III) 3.011×10^{23} molecule of O_2 (IV) 11.35 L of CO_2 at STP
 (A) $IV < III < II < I$ (B) $II < III < IV < I$ (C) $III < II < I < IV$ (D) $I < II < III < IV$
13. Total number of protons, neutrons and electrons present in 14 mg of ${}_6C^{14}$ is (Take $N_A = 6 \times 10^{23}$)
 (A) 1.2×10^{22} (B) 1.2×10^{25} (C) 7.2×10^{21} (D) 1.08×10^{22}
14. Complete the following table : ($N_A = 6 \times 10^{23}$)

	Mass of sample	Moles of sample	Molecules in sample	Total atoms in sample
1	3.9g C_6H_6			
2		0.2 mole H_2O		
3			2.4×10^{22} molecules CO_2	
4				3.6×10^{22} Total atoms in CH_3OH sample

Mass of sample	Moles of sample	Molecules in sample	Total atoms in sample
1 3.9g C_6H_6	0.05	$0.05N_A$	$0.6 N_A$
2 3.6 g	0.2 mole H_2O	$0.2 N_A$	$0.6 N_A$
3 1.76 g	0.04	2.4×10^{22} molecules CO_2	7.2×10^{22}
4 0.032g	0.001	6×10^{21}	3.6×10^{22} Total atoms in CH_3OH sample

15. Number of electrons in 36mg of ${}_8O^{-2}$ ions are (Take $N_A = 6 \times 10^{23}$)
 (A) 1.2×10^{21} (B) 9.6×10^{21} (C) 1.2×10^{22} (D) 1.9×10^{22}
16. Molar mass of electron is nearly ($N_A = 6 \times 10^{23}$)
 (A) $9.1 \times 10^{-31} \text{ kg mol}^{-1}$ (B) $9.1 \times 10^{-31} \text{ gm mol}^{-1}$
 (C) $54.6 \times 10^{-8} \text{ gm mol}^{-1}$ (D) $54.6 \times 10^{-8} \text{ kg mol}^{-1}$
17. Which of the following contain highest number of molecules
 (A) 2.8 g of CO (B) 3.2 g of CH_4 (C) 1.7 g of NH_3 (D) 3.2 g of SO_2
18. 5.6 L of oxygen at 273 K and 1 atm is equivalent to
 (A) 1 mole (B) 1/2 mole (C) 1/4 mole (D) 1/8 mole
19. Which has maximum number of molecules of O_2
 (A) 32 gm of O_2 (B) 1 mole of O_2
 (C) 1 gram molecule of O_2 (D) All have same
20. 1 gm - atom of nitrogen does not represents
 (A) $6.02 \times 10^{23} N_2$ molecules (B) 22.4 lit. of N_2 at N.T.P.
 (C) 11.2 lit. of N_2 at N.T.P. (D) 28 g of nitrogen
21. **Column-I** **Column-II**
 (A) 6.023×10^{23} molecules of CO_2 (P) 1 mol
 (B) 6.023×10^{23} molecules of water (Q) 22.4 L
 (C) 96 g of O_2 gas (R) 2 mol
 (D) 88 g of CO_2 gas (S) 3 mol

HOME WORK (NCERT : 1.10, 1.28, 1.30)

Mass percentage

- The haemoglobin of most mammals contains approximately 0.33% of iron by mass. The molecular mass of haemoglobin is 67200. The number of iron atoms in each molecule of haemoglobin is
(A) 3 (B) 4 (C) 2 (D) 6
- Percentage of Se in peroxidase anhydrous enzyme is 0.5% by weight (at.wt. = 78.4) then min.mol. wt. of peroxidase anhydrous enzymes is :-
(A) 1.568×10^4 (B) 1.568×10^3 (C) 15.68 (D) 2.136×10^4

Empirical formula

- A compound contains 38.8% C, 16.0% H and 45.2% N. The empirical formula of the compound would be –
(A) CH_3NH_2 (B) CH_3CN (C) $\text{C}_2\text{H}_5\text{CN}$ (D) $\text{CH}_2(\text{NH})_2$
- A compound of X and Y has equal mass of them. If their atomic weights are 30 and 20 respectively. Molecular formula of that compound (its mol. wt. is 120) could be -
(A) X_2Y_2 (B) X_3Y_3 (C) X_2Y_3 (D) X_3Y_2
- A hydrocarbon contains 80% of carbon, and its V.D. = 15 then the hydrocarbon is -
(A) CH_4 (B) C_2H_4 (C) C_2H_6 (D) C_2H_2
- A carbon compound containing carbon and oxygen has molar mass equal to 288. On analysis it is found to contain 50% by mass of each element. Therefore molecular formula of the compound is
(A) C_{12}O_9 (B) C_4O_3 (C) C_3O_4 (D) C_9O_{12}
- Two oxides of a metal contain 50% and 40% metal M respectively. If the formula of the first oxide is MO_2 , the formula of the second oxide will be
(A) MO_2 (B) MO_3 (C) M_2O (D) M_2O_5
- In a hydrocarbon, there is 3gm of carbon per gm of hydrogen present in the molecule. Therefore, molecular formula of the hydrocarbon is
(A) CH_4 (B) C_2H_6 (C) C_3H_8 (D) C_4H_{10}
- On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254 gm of iodine (at. mass 127) and 80 gm oxygen (at. mass 16). What is the formula of the compound
(A) IO (B) I_2O (C) I_5O_3 (D) I_2O_5
- The number of atoms of Cr and O are 4.8×10^{10} and 9.6×10^{10} respectively. Its empirical formula is -
(A) Cr_2O_3 (B) CrO_2 (C) Cr_2O_4 (D) none
- A given sample of pure compound contains 9.81 gm of Zn, 1.8×10^{23} atoms of chromium, and 0.60 mol of oxygen atoms. What is the simplest formula -
(A) ZnCr_2O_7 (B) ZnCr_2O_4 (C) ZnCrO_4 (D) ZnCrO_6

Laws of chemical combinations

- When 100 gm of C_2H_4 is polymerised to produce polyethylene according to the equation $n\text{C}_2\text{H}_4 \rightarrow (\text{C}_2\text{H}_4)_n$. Then, how many gm polyethylene $(\text{C}_2\text{H}_4)_n$ would be produced ?

At. wt : C-12 ; H - 1

- (A) 100 gm (B) 100n gm (C) $\frac{100n}{2}$ gm (D) $\frac{100}{28} \times n$ gm.

13. 8.4 g MgCO_3 on heating leaves behind a residue weighing 4.0 g, then carbon dioxide released into the atmosphere at S.T.P. will be
(A) 2.24 L (B) 4.48 L (C) 1.12 L (D) 0.56 L
14. When 10 ml of propane (gas) is combusted completely, volume of $\text{CO}_2(\text{g})$ obtained in similar condition is
(A) 10 ml (B) 20 ml (C) 30 ml (D) 40 ml
15. 2.76 g of silver carbonate on being strongly heated yields a residue weighing
(A) 2.16 g (B) 2.48 g (C) 2.32 g (D) 2.64 g
16. 0.54 gm of metal "M" yields 1.02 gm of its oxide M_2O_3 . The at. wt. of metal "M" is
(A) 9 (B) 18 (C) 27 (D) 54
17. Suppose two elements X and Y combine to form two compounds XY_2 and X_2Y_3 when 0.05 mole of XY_2 weight 5 g while 3.011×10^{23} molecules of X_2Y_3 weighs 85 g. The atomic masses of X and Y are respectively
(A) 20, 30 (B) 30, 40 (C) 40, 30 (D) 80, 60
18. Chlorine is prepared in the laboratory by treating manganese dioxide (MnO_2) with aqueous hydrochloric acid according to the reaction
- $$4\text{HCl}(\text{aq}) + \text{MnO}_2(\text{s}) \rightarrow 2\text{H}_2\text{O}(\ell) + \text{MnCl}_2(\text{aq}) + \text{Cl}_2(\text{g})$$
- How many gram of HCl react with 5.0 g of manganese dioxide ? (At. wt. of Mn = 55)
(A) 2.12 gm (B) 44.24 gm (C) 8.4 gm (D) 3.65 gm
19. One of the following combinations illustrate law of reciprocal proportions
(A) N_2O_3 , N_2O_4 , N_2O_5 (B) NaCl, NaBr, NaI (C) CS_2 , CO_2 , SO_2 (D) PH_3 , P_2O_3 , P_2O_5
20. The law of multiple proportions is illustrated by
(A) Carbon monoxide and carbon dioxide (B) Potassium bromide and potassium chloride
(C) Water and heavy water (D) Calcium hydroxide and barium hydroxide.
21. If law of conservation of mass was to hold true, then 20.8 gm of BaCl_2 on reaction with 9.8 gm of H_2SO_4 will produce 7.3 gm of HCl and BaSO_4 equal to
(A) 11.65 gm (B) 23.3 gm (C) 25.5 gm (D) 30.6 gm
22. 12 g carbon combines with 64 g sulphur to form CS_2 . 12 g carbon also combines with 32 g oxygen to form CO_2 . 10 g sulphur combines with 10 g oxygen to form SO_2 . These data illustrate the
(A) Law of multiple proportions (B) Law of definite proportions
(C) Law of reciprocal proportions (D) Law of gaseous volumes.

HOME WORK NCERT 1.21, 1.23, 1.24, 1.8, 1.9

Quantum numbers

- Principal, azimuthal and magnetic quantum numbers are respectively related to
(A) size, shape and orientation (B) shape, size and orientation
(C) size, orientation and shape (D) none of these
- Which of the following sets of quantum numbers can be correct for an electron in 4f-orbital :
(A) $n = 4, \ell = 3, m = -2, s = 0$ (B) $n = 4, \ell = 3, m = +4, s = -\frac{1}{2}$
(C) $n = 4, \ell = 3, m = +1, s = +\frac{1}{2}$ (D) $n = 4, \ell = 2, m = -1, s = +\frac{1}{2}$
- S_1 : According to Bohr model, the angular momentum of revolving electron is directly proportional to the atomic number of H-like species bearing the electron.
 S_2 : An orbital cannot accommodate more than 2 electrons.
 S_3 : All orbitals have directional character.
(A) FTF (B) TFF (C) FFT (D) TTF
- If an electron has spin quantum number of $+1/2$ and magnetic quantum number of -1 it cannot be present in :
(A) f-orbital (B) d-orbital (C) p-orbital (D) s-orbital
- When the quantum number n, ℓ, m, s are represented by $3, 3, 2, +1/2$, the symbolism for the electron is -
(A) 3s (B) 3d (C) 3f (D) Impossible set of quantum number
- For a 6s electron the values of n, ℓ, m, s respectively could be:
(A) 6, 4, 4, $+1/2$ (B) 1, 0, 0, $+1/2$ (C) 6, 1, 0, $+1/2$ (D) 6, 0, 0, $+1/2$
- Any p-orbital can accommodate up to
(A) four electrons (B) Two electrons in parallel spin
(C) Six electrons (D) Two electrons with opposite spin
- Which one of the following sets of quantum numbers (n, ℓ, m, s) represents an impossible arrangement?
(A) 3, 2, -2, $+1/2$ (B) 4, 0, 0, $+1/2$ (C) 3, 2, -3, $+1/2$ (D) 5, 3, 0, $-1/2$
- What type of orbital is designated $n = 2, \ell = 3, m_\ell = -2$?
(A) 4p (B) 4d (C) 4f (D) Impossible set of quantum number
- The maximum number of electrons that can be accommodated in s, p and d-subshells respectively are :
(A) 2 in each (B) 1, 3 and 5 (C) 2, 6 and 10 (D) 2, 6 and 14
- Which of the following quantum numbers has not been derived from Schrodinger wave equation:
(A) Principal quantum number (n) (B) Subsidiary quantum number (ℓ)
(C) Magnetic quantum number (m) (D) Spin quantum number (s)
- The orbital angular momentum corresponding to $n = 4$ and $m = -3$ is :
(A) 0 (B) $\frac{h}{\sqrt{2}\pi}$ (C) $\frac{\sqrt{6}h}{2\pi}$ (D) $\frac{\sqrt{3}h}{\pi}$
- Orbital angular momentum of an electron is $\sqrt{3} \frac{h}{\pi}$. Then, the number of orientations of this orbital in space are:
(A) 3 (B) 5 (C) 7 (D) 9

Electronic configurations

- What is the maximum possible number of electrons in an atom with $(n + 1 = 7)$:
(A) 18 (B) 50 (C) 32 (D) 8

15. Consider the ground state of Cr ($Z = 24$). The numbers of electrons with the azimuthal quantum numbers $l = 1$ and 2 respectively are
(A) 16 and 4 (B) 12 and 5 (C) 12 and 4 (D) 16 and 5
16. Degenerate atomic orbitals have
(A) Equal energy (B) Nearly equal energy (C) Different energy (D) None of the above
17. What is a possible set of quantum numbers for the unpaired electron in the orbital box diagram below ?
[Ar] $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow}$
3d 4s 4p
- (A) $n = 1, \ell = 1, m_\ell = -1, m_s = +1/2$ (B) $n = 4, \ell = 1, m_\ell = -1, m_s = +1/2$
(C) $n = 4, \ell = 2, m_\ell = -2, m_s = +1/2$ (D) $n = 4, \ell = 0, m_\ell = 0, m_s = +1/2$
18. Which element has the following ground state electron configuration ?
[Ar] $\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}\boxed{\uparrow}\boxed{\uparrow}$
3d 4s 4p
- (A) Se (B) As (C) S (D) Ge
19. Hund's rule states that the most stable arrangement of electrons (for a ground state electron configuration)
(A) Has three electrons per orbital, each with identical spins
(B) Has m_ℓ values greater than or equal to +1
(C) Has the maximum number of unpaired electrons, all with the same spin in degenerate orbital
(D) Has two electrons per orbital, each with opposing spins
20. How many maximum electrons can be described by the quantum numbers $n = 5, \ell = 2$ in a particular atom?
(A) 2 (B) 6 (C) 10 (D) 14
21. The total number of electrons in Cr atom for which $m = 0$
(A) 1 (B) 8 (C) 12 (D) 16
22. The Pauli exclusion principle states that
(A) no two electrons in an atom can have the same set of four quantum numbers
(B) electrons can have either $\pm 1/2$ spins
(C) electrons with opposing spins are attracted to each other
(D) no two electrons in an orbital can have the same spin
23. Which of the following statements regarding subshell filling order for a neutral atom is/are correct ?
(I) Electrons are assigned to the 4s subshell before they are assigned to the 3d subshell
(II) Electrons are assigned to the 4f subshell before they are assigned to the 6s subshell
(III) Electrons are assigned to the 4d subshell before they are assigned to the 5p subshell
(A) I only (B) II only (C) I and III (D) I, II and III

Home Work NCERT EXERCISE 2.23, 24, 27, 28, 29, 30, 311.

RACE # 5

MOLE CONCEPT

CHEMISTRY

1. Column-I

Column-II

- (A) No. of electrons in Na(11) having $m = 0$ (P) 7
 (B) No. of electrons in S(16) having $(n + \ell) = 3$ (Q) 15
 (C) No. of maximum possible electrons having $s = +1/2$ spin in Cr(24) (R) 8
 (S) 12
2. Imagine a universe in which the four quantum no. can have the same possible values as in our universe except that angular quantum no. (ℓ) can have integral values from 0, 1, 2 $n + 1$. Find the no. of electron $n = 1$ & 2 shell.
3. The total number of subshells in n^{th} main energy level are :
 (A) n^2 (B) $2n^2$ (C) $2n + 1$ (D) n .
4. Which of the following orbital does not make sense :
 (A) 4d (B) 3f (C) 5p (D) 7s
5. The correct order of the maximum spin of $[_{25}\text{Mn}^{4+}, _{24}\text{Cr}^{3+}, _{26}\text{Fe}^{3+}]$ is :
 (A) $\text{Fe}^{3+} > \text{Cr}^{3+} = \text{Mn}^{4+}$ (B) $\text{Fe}^{3+} = \text{Cr}^{3+} > \text{Mn}^{4+}$ (C) $\text{Cr}^{3+} = \text{Mn}^{4+} > \text{Fe}^{3+}$ (D) $\text{Fe}^{3+} > \text{Mn}^{4+} > \text{Cr}^{3+}$
6. A neutral atom of an element has 2K, 8L, 9M and 2N electrons. Which of the following is/are correctly matched :
 (A) Total number of s electrons - 8 (B) Total number of p electrons - 12
 (C) Total number of d electrons - 1 (D) Number of unpaired electrons in element - 3
7. Spin only magnetic moment of $_{25}\text{Mn}^{x+}$ ion is $\sqrt{15}$ B.M. Then, What is the value of x .
8. (a) If the value of Azimuthal Quantum Number ℓ for an electron in a particular subshell is 3, then the minimum value of shell number associated with this electron can be x

- (b) Orbital angular momentum of an electron is $\sqrt{3} \frac{h}{\pi}$. Then, the number of orientations of this orbital in space is y :

Give the value of $(y-x)$

MATCH THE COLUMN

9. Column-I

Column-II

- (A) N_2 (P) 40% carbon by mass
 (B) CO (Q) Empirical formula CH_2O
 (C) $\text{C}_6\text{H}_{12}\text{O}_6$ (R) Vapour density = 14
 (D) CH_3COOH (S) $14N_A$ ($N_A = 6.023 \times 10^{23}$) electrons in a mole

10. Column-I

Column-II

- (A) Vapour density (P) Unitless
 (B) 1 mol (Q) 6.023×10^{23} electrons
 (C) 12 g carbon (R) 6.023×10^{23} atoms
 (D) 96500 C (S) $\frac{1}{2} \times \text{Molecular mass}$

11. Column-I

Column-II

- (A) N^{3-} (1 mol) (P) 10 mol electrons
 (B) O^{2-} (1 mol) (Q) 8 mol protons
 (C) CH_4 (1 mol) (R) 6.023×10^{24} electrons
 (D) H_2O (1 mol) (S) 10 mol protons

12. Column-I

- (A) 0.5 mol SO_2 (g)
- (B) 1 g of H_2 (g)
- (C) 0.5 mol O_2 (g)
- (D) One gram mole of O_2 (g)

Column-II

- (P) Occupy 11.2 L at NTP
- (Q) Weighs 16 g
- (R) Number of atoms = $2 \times 6.023 \times 10^{23}$
- (S) Weighs 32 g

13. An unknown compound contains 8% sulphur by mass. Calculate

- (a) Least molecular weight of the compound and
- (b) Molecular weight if one molecule contains 4 atoms of "S"

- (A) 200, 400 (B) 300, 400 (C) 400, 1600 (D) 400, 1200

Home Work NCERT EXERCISE 2.62, 63, 64, 65, 66, 67

Periodic classification

- Which element's atomic weight had been corrected by Mendeleev :-
(A) Be (B) B (C) Br (D) Ba
- Which element is a bridge element Acc. to Mendeleev :-
(A) Na (B) Li (C) K (D) Cu
- Recently, a new element of Atomic No. 120 have been discovered. It will be placed in :-
(A) Inert gases (B) Alkali metal (C) Alkaline earth metal (D) Chalcogens
- Which of the following is inner transition element :-
(A) Ca (B) Cu (C) Cm (D) Cd
- What is the outermost electronic configuration of Pt :-
(A) $4d^{10}5s^0$ (B) $4d^95s^1$ (C) $5d^{10}6s^0$ (D) $5d^96s^1$
- The long form of periodic table has
(A) Eight horizontal rows and seven vertical columns
(B) Seven horizontal rows and eighteen vertical columns
(C) Seven horizontal rows and seven vertical columns
(D) Eight horizontal rows and eight vertical columns
- What is General electronic configuration of f-block element :-
(A) $(n-2)f^{0 \text{ to } 14} (n-1)d^{0 \text{ to } 4} ns^2$ (B) $(n-2)f^{0 \text{ to } 14} (n-1)d^{0 \text{ to } 1} ns^{0 \text{ to } 2}$
(C) $(n-2)f^{0 \text{ to } 14} (n-1)d^{0 \text{ to } 1} ns^0$ (D) $(n-2)f^{0 \text{ to } 14} (n-1)d^{0 \text{ to } 1} ns^2$
- Which block element show allotropy :-
(A) s-block (B) p-block (C) d-block (D) f-block
- Which group metal are non transition element
(A) 2nd group (B) 12th group (C) 16th group (D) 18th group
- Which block contain gaseous element :-
(A) s-block (B) p-block (C) d-block (D) f-block
- Rare earth metal are placed in :-
(A) s-block (B) p-block (C) Lanthanoides (D) Actinoids
- Which contain radioactive element :-
(A) s-block (B) p-block (C) d-block (D) Actinoids
- Which elements are called trans-uranium :-
(A) Element after uranium (B) Element after Lithium
(C) Element after Berrilium (D) Element after Boron
- If an atom has electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$, it will be placed in
(A) II A group (B) III A group (C) V B group (D) VI A group
- 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
(A) 33 (B) 34 (C) 31 (D) 49

16. Which one of the following belongs to representative group of elements in the periodic table
(A) Iron (B) Argon (C) Chromium (D) Aluminium
17. Which of the following pairs has both members from the same period of the periodic table
(A) Na, Ca (B) Na, Cl (C) Ca, Cl (D) Cl, Br
18. The elements having atomic number 72 belongs to
(A) s-block (B) p-block (C) d-block (D) f-block
19. An element has electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^4$. Predict their period, group and block
(A) Period = 3rd, block = p, group = 16 (B) Period = 5th, block = s, group = 1
(C) Period = 3rd, block = p, group = 10 (D) Period = 4th, block = d, group = 12
20. Two friends Rohit and John, students of chemistry once discussing on periodic table, reach to a conclusion that because of Aufbau rule and other principles their thoughts are restricted for further discussion on electronic arrangements of atoms. They decided not to obey Aufbau rule and capacity of each orbital is increased to three electrons i.e. instead of two each orbital can take maximum of three electrons. Now on the basis of new arrangement, what is the number of elements in third period and fifth period respectively ? (Assume that total number of elements are 112)
(A) 12, 27 (B) 27, 22 (C) 12, 22 (D) 22, 27
21. Which atomic number represents a noble gas
(A) 56 (B) 59 (C) 86 (D) 72
22. The element with atomic number 35 will be placed in
(A) Noble gas family (B) Alkali family
(C) Alkaline earth family (D) Halogen family
23. Effective nuclear charge experienced by a valence electron in an atom, will be less than actual nuclear charge, due to :-
(A) Shielding effect (B) Diagonal relationship
(C) Inert pair effect (D) Anomalous property
24. In a given shell the order of screening effect is :
(A) $s > p > f > d$ (B) $s > d > p > f$ (C) $s > p > d > f$ (D) $p > s > d > f$

Atomic radius

25. Which of the following atom has smallest size
(A) He (B) F (C) H (D) None of these
26. Which of the alkali metals is smallest in size ?
(A) Rb (B) K (C) Na (D) Li
27. Which of the following has largest radius ?
(A) Mg^{2+} (B) Na^+ (C) O^{2-} (D) F^-
28. The radius of Au atom is known as
(A) covalent radius (B) molecular radius (C) metallic radius (D) ionic radius

Home Work NCERT EXERCISE 3.1, 2, 3, 4, 5, 6, 7, 8, 34, 35

RACE # 7

PERIODIC TABLE

CHEMISTRY

- The descending order in size of Al, Al^{3+} , Mg and Mg^{2+} would be
 (A) $Mg > Mg^{2+} > Al^{3+} > Al$ (B) $Mg > Al > Al^{3+} > Mg^{2+}$
 (C) $Mg > Mg^{2+} > Al > Al^{3+}$ (D) $Mg > Al > Mg^{2+} > Al^{3+}$
- Ionic radii of
 (A) $Ti^{4+} < Mn^{7+}$ (B) ${}_{35}Cl^{-1} < {}_{37}Cl^{-1}$ (C) $K^{+} > Cl^{-1}$ (D) $P^{3+} > P^{5+}$
- The atomic radius of each of the following element is given Which one has incorrect value of it's ionic radius
 $Mg(1.6A^{\circ})$, $Si(1.17 A^{\circ})$, $P(1.1 A^{\circ})$, $S(1.02^{\circ})$
 (A) $Mg^{2+}(0.65 A^{\circ})$ (B) $Si^{4+}(0.41 A^{\circ})$ (C) $P^{3-}(2.12^{\circ})$ (D) $S^{2-}(1.0 A^{\circ})$
- Which radius order is correct :-
 (A) V.W. radius > Covalent > Metallic (B) V.W. radius > Metallic > Covalent
 (C) Metallic > V.W. radius > Covalent (D) Metallic > Covalent > V.W. radius
- Size in lanthanoid element decreases from left to right due to :-
 (A) Inert pair effect (B) Lanthanoid contraction
 (C) Diagonal relationship (D) Absence of vacant orbital
- The calculated atomic radius of Cl and Cu are 99 Pm and 128 Pm. These are :-
 (A) Metallic and covalent respectively (B) Both metallic radius
 (C) Covalent and metallic respectively (D) Both covalent radius
- Which d-block metal has almost equal size :-
 (A) Sc, Ti (B) Ti, V (C) Sc, Fe (D) Co, Ni
- Which of the following has the maximum number of unpaired electrons -
 (A) Mg^{2+} (B) Ti^{3+} (C) V^{3+} (D) Fe^{2+}
- Which statement is correct
 (A) For potassium, the atomic radius < ionic radius ; but for bromine, the atomic radius > ionic radius
 (B) For potassium and bromine both, the atomic radii > ionic radii
 (C) For potassium and bromine both, the atomic radii < ionic radii
 (D) For potassium, the atomic radius > ionic radius but for bromine, the atomic radius < ionic radius
- Al^{3+} has a lower ionic radius than Mg^{2+} because
 (A) Mg atom has less number of neutrons than Al (B) Al^{3+} has higher nuclear charge than Mg^{2+}
 (C) Their electronegativities are different (D) Al has a lower ionisation potential than Mg atom
- In the isoelectronic species, the ionic radii (\AA) of N^{3-} , O^{2-} 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
- The correct order of second ionization potential of carbon, nitrogen, oxygen and fluorine is :
 (A) $C > N > O > F$ (B) $O > N > F > C$ (C) $O > F > N > C$ (D) $F > O > N > C$
- Which of the following is correct order of ionic radius.
 (A) $Al^{+3} > Mg^{+2} > Na^{+}$ (B) $Na^{+} > Mg^{+2} > Al^{+3}$ (C) $Mg^{+2} > Na^{+} > Al^{+3}$ (D) $Mg^{+2} > Al^{+3} > Na^{+}$

14. Which of the following atom has largest size
(A) Ba (B) Cs (C) K (D) Sr
15. From the given set of species, point out the species from each set having least atomic radius:-
(a) O^{2-} , F^- , Na^+ (b) Ni, Cu, Zn (c) Li, Be, Mg (d) He, Li^+ , H^-
Correct answer is
(A) O^{2-} , Cu, Li, H^- (B) Na^+ , Ni, Be, Li^+ (C) F^- , Zn, Mg, He (D) Na^+ , Cu, Be, He
16. In the ions P^{3-} , S^{2-} and Cl^- the increasing order of size is:-
(A) $Cl^- < S^{2-} < P^{3-}$ (B) $P^{3-} < S^{2-} < Cl^-$ (C) $S^{2-} < Cl^- < P^{3-}$ (D) $S^{2-} < P^{3-} < Cl^-$
17. Which of the following order of atomic/ionic radius is not correct :-
(A) $I^- > I > I^+$ (B) $Mg^{+2} > Na^+ > F^-$ (C) $P^{+5} < P^{+3}$ (D) $Li > Be > B$
18. Select correct order of size of A^{3+} , B^{3+} , C^{3+} :
(If atomic number of A = 58, B = 69 and C = 63)
(A) $A^{3+} > B^{3+} > C^{3+}$ (B) $C^{3+} > B^{3+} > A^{3+}$ (C) $A^{3+} > C^{3+} > B^{3+}$ (D) $B^{3+} > C^{3+} > A^{3+}$
19. 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) $x < y < z$
20. Match list I with list II and select the correct answer using the codes given below

List I

Ion

- (A) Li^+
(B) Na^+
(C) Br^-
(D) I^-

List II

Radius (in pm)

- (a) 216
(b) 195
(c) 60
(d) 95

Codes :

- | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|---|
| (A) | (B) | (C) | (D) | (A) | (B) | (C) | (D) | |
| (A) | a | b | d | c | (B) | b | c | a |
| (C) | c | d | b | a | (D) | d | c | b |

Subjectives

21. Mg^{2+} , O^{2-} , Na^+ , F^- , N^{3-} (Arrange in decreasing order of ionic size)
22. Why Ca^{2+} has a smaller ionic radius than K^+ .
23. Arrange in decreasing order of atomic size : Na, Cs, Mg, Si, Cl.
24. If internuclear distance between Cl atoms in Cl_2 is 10 \AA & between H atoms in H_2 is 2 \AA , then calculate internuclear distance between H & Cl (Electronegativity of H = 2.1 & Cl = 3.0).

Home Work

NCERT EXERCISE 3.12, 13, 16, 19, 20, 25, 38

Ionisation energy

- The first four ionisation energy values of an element are 191, 578, 872 and 5962 kcal. The number of valence electrons in the element is
(A) 1 (B) 2 (C) 3 (D) 4
- The correct order of ionisation energy of C, N, O, F is
(A) $F < N < C < O$ (B) $C < N < O < F$ (C) $C < O < N < F$ (D) $F < O < N < C$
- The ionisation energy of nitrogen is more than that of oxygen because
(A) Nitrogen has half filled p-orbitals
(B) Nitrogen is left to the oxygen in the same period of the periodic table
(C) Nitrogen contains less number of electrons
(D) Nitrogen is less electronegative
- Select correct about first ionization energy :
(A) $Be > B$ (B) $Be^+ > B^+$ (C) $B^+ < C^+$ (D) $B > C$
- Select correct about first ionization energy :
(A) $Zn > Cu$ (B) $Cu > Zn$ (C) $Zn > Ga$ (D) $Ga > Zn$
- Correct orders of 1st I.P. are :-
(a) $Li < B < Be < C$ (b) $O < N < F$ (c) $Be < N < Ne$
(A) a, b (B) b, c (C) a, c (D) a, b, c
- IP_1 and IP_2 of Mg are 178 and 348 K. cal mol⁻¹. The enthalpy required for the reaction $Mg \rightarrow Mg^{2+} + 2e^-$ is :-
(A) + 170 K.cal (B) + 526 K.cal (C) - 170 K.cal (D) - 526 K.cal
- The IP_1 , IP_2 , IP_3 , IP_4 and IP_5 of an element are 7.1, 14.3, 34.5, 46.8, 162.2 eV respectively. The element is likely to be
(A) Na (B) Si (C) F (D) Ca
- Which of the following has 2nd IP < 1st IP
(A) Mg (B) Ne (C) C (D) None of these
- The first (IE_1) and second (IE_2) ionization energies (kJ/mol) of a few elements designated by Roman numerals are given below. Which of these would be an alkali metal ?

	IE_1	IE_2		IE_1	IE_2
(A) I	2372	5251	(B) II	520	7300
(C) III	900	1760	(D) IV	1680	3380
- Which of the following reaction correctly represent second ionization energy of atom magnesium :
(A) $Mg_{(s)} \longrightarrow Mg_{(g)}^{+2} + 2e^-$ (B) $Mg_{(g)} \longrightarrow Mg_{(g)}^{+2} + 2e^-$
(C) $Mg_{(g)}^+ \longrightarrow Mg_{(g)}^{+2} + e^-$ (D) $Mg_{(g)}^{+2} \longrightarrow Mg_{(g)}^{+3} + e^-$
- The ionisation energy of B and Al as compared to Be and Mg are
(A) Lower (B) Higher (C) Equal (D) None of these

13. Element X, Y and Z have atomic numbers 19, 37 and 55 respectively. Which of the following statements is true:-
 (A) Their ionisation potential would increase with the increasing atomic number
 (B) 'Y' would have an ionisation potential in between those of 'X' and 'Z'
 (C) 'Z' would have the highest ionisation potential
 (D) 'Y' would have the highest ionisation potential
14. Which of the following information is not specific for one element in periodic table :
 (A) Atom in which one electron is present in outer most shell and helium gas configuration in penultimate shell.
 (B) Atom which have maximum ionization energy (IE_1).
 (C) Atom which have full filled 2^{nd} principal energy level but other higher energy levels are vacant.
 (D) Atom which have higher value of IE_2 as compared to IE_1 .
15. Consider the following changes :



The second ionization energy of M could be calculated from the energy values associated with :

- (A) $1 + 3 + 4$ (B) $2 - 1 + 3$ (C) $1 + 5$ (D) $5 - 3$
16. Incorrect order of ionisation energy is :-
 (A) $Pb (I.E.) > Sn (I.E.)$ (B) $Na^+ (I.E.) > Mg^+ (I.E.)$
 (C) $Li^+ (I.E.) < O^+ (I.E.)$ (D) $Be^+ (I.E.) < C^+ (I.E.)$
17. The electronic configuration of some neutral atoms are given below :-
 (A) $1s^2 2s^1$ (B) $1s^2 2s^2 2p^3$ (C) $1s^2 2s^2 2p^5$ (D) $1s^2 2s^2 2p^6 3s^1$
- In which of these electronic configuration would you expect to have highest :-
 (i) IE_1 (ii) IE_2
 (A) C, A (B) B, A (C) C, B (D) B, D

Subjectives

18. The IE do not follow a regular trend in II & III periods with increasing atomic number. Why?
19. The IE values of $Al(g) \rightarrow Al^+(g) + e^-$ is $577.5 \text{ kJ mol}^{-1}$ and ΔH for $Al(g) \rightarrow Al^{3+}(g) + 3e^-$ is 5140 kJ mol^{-1} . If second and third IE values are in the ratio 2 : 3. Calculate IE_2 and IE_3 .

SIMILAR QUESTIONS BELONGS TO NCERT TEXT BOOK

Problem - 3.5, 3.6

Exercise - 3.12, 3.17, 3.19, 3.16, 3.31

Electron affinity and Electronegativity

- A compound AB whose electronegativity difference is 1.9. Atomic radius of A and B are 4 and 2 Å. The distance between A & B mean d_{A-B} is –
(A) 6.2Å (B) 5.82Å (C) 6.9Å (D) 7.5Å
- Which of the following element has the lowest value of electron affinity –
(A) Carbon (B) Oxygen (C) Fluorine (D) Neon
- In which case the energy released is minimum:-
(A) $Cl \rightarrow Cl^-$ (B) $P \rightarrow P^-$ (C) $N \rightarrow N^-$ (D) $C \rightarrow C^-$
- Electron addition would be easier in :-
(A) O (B) O^+ (C) O^- (D) O^{+2}
- Process in which maximum energy is released:-
(A) $O \rightarrow O^{-2}$ (B) $Mg^+ \rightarrow Mg^{+2}$ (C) $Cl \rightarrow Cl^-$ (D) $F \rightarrow F^-$
- Select correct order of IE_3 :
(A) $O > C > N > B$ (B) $B > C > N > O$ (C) $O > N > C > B$ (D) $O > C > B > N$
- In the formation of a chloride ion, from an isolated gaseous chlorine atom, 3.8 eV energy is released, which would be equal to :-
(A) Electron affinity of Cl^- (B) Ionisation potential of Cl
(C) Electronegativity of Cl (D) Ionisation potential of Cl^-
- The electron gain enthalpies of halogens are as given below.
 $F = -332, Cl = -349, Br = -324, I = -295 \text{ kJ mol}^{-1}$.
The less negative value for F as compared to that of Cl is due to :
(A) Strong electron-electron repulsions in the compact 2p sub shell of F.
(B) Weak electron-electron repulsions in the bigger 3p sub shell of Cl
(C) Smaller electronegativity value of F than Cl
(D) (A) & (B) both
- Which of the following represent(s) the correct order of electron affinities ?
(A) $F > Cl > Br > I$ (B) $C < N < O < F$ (C) $N < C < O < F$ (D) $C < Si > P > N$
- The process(es) requiring the absorption of energy is/are :
(A) $Cl \rightarrow Cl^-$ (B) $S \rightarrow S^{2-}$ (C) $H \rightarrow H^-$ (D) $Ar \rightarrow Ar^-$
- An element which have configuration ns^2np^5 of its outermost shell has highest electron affinity in its group of periodic table, what is the value of principle quantum number (n) of its penultimate shell :
(A) One (B) Two (C) Three (D) Four
- Select correct order of electron affinity
(A) $F > Cl > O > S$ (B) $Cl > F > O > S$ (C) $Cl > F > S > O$ (D) $Cl > S > F > O$
- Highest electron affinity is shown by
(A) F^- (B) Cl^- (C) Li^+ (D) Na^+
- Electron addition would be easier in
(A) S (B) S^+ (C) S^- (D) S^{+2}

15. Alkaline earth metals always form dipositive ions due to
(A) $IE_2 - IE_1 > 10 \text{ eV}$ (B) $IE_2 - IE_1 = 17 \text{ eV}$ (C) $IE_2 - IE_1 < 10 \text{ eV}$ (D) None of these
16. The element with least electronegative nature is –
(A) Cu (B) Cs (C) Cr (D) Ba
17. An element X have electronegativity on Paulings scale is 2.5, select correct about polarity of bond in :
(A) $\overset{\delta-}{\text{H}}-\overset{\delta+}{\text{X}}$ (B) $\overset{\delta+}{\text{N}}-\overset{\delta-}{\text{X}}$ (C) $\overset{\delta+}{\text{Br}}-\overset{\delta-}{\text{X}}$ (D) $\overset{\delta+}{\text{B}}-\overset{\delta-}{\text{X}}$
18. The nomenclature of ICl is iodine monochloride because of
(A) Size of I < Size of Cl (B) Atomic number of I > Atomic number of Cl
(C) E.N. of I < E.N. of Cl (D) E. A. of I < E. A. of Cl
19. The amount of energy released for the process $X_{(g)} + e^- \rightarrow X_{(g)}^-$ is minimum and maximum respectively for :–
(a) F (b) Cl (c) O (d) P
Correct answer is :–
(A) c & a (B) d & b (C) a & b (D) c & b
20. The ionization energy and electron affinity of an element are 17.42 and 3.42 eV respectively. Then the electronegativity of the element on Pauling scale is –
(A) 10.435 (B) 3.721 (C) 1.86 (D) 2.88
21. The correct order of electron affinity of B, C, N, O is :–
(A) $O > C > N > B$ (B) $B > N > C > O$ (C) $O > C > B > N$ (D) $O > B > C > N$
22. Elements P, Q, R and S belong to the same group. The oxide of P is acidic, oxide of Q and R are amphoteric while the oxide of S is basic. Which of the following elements is the most electropositive?
(A) P (B) Q (C) R (D) S
23. For an element 'A', the first ionisation energy will be numerically equal to :
(A) EA of A^+ (B) EA of A^{2+} (C) IE of A^{2+} (D) None of these
24. Which is the correct order of electronegativity –
(A) $\text{Cl} > \text{S} > \text{P} > \text{Si}$ (B) $\text{Si} > \text{Al} > \text{Mg} > \text{Na}$ (C) $\text{F} > \text{Cl} > \text{Br} > \text{I}$ (D) All
25. Electronegativity decreases in the order –
(A) $\text{F} > \text{O} > \text{N} > \text{Br}$ (B) $\text{F} > \text{Br} > \text{N} > \text{O}$ (C) $\text{F} > \text{O} > \text{Br} > \text{N}$ (D) $\text{F} > \text{Br} > \text{O} > \text{N}$

Subjectives

26. Explain why a few elements such as Be, N & He have positive electron gain enthalpies while majority of elements do have negative values.

SIMILAR QUESTIONS BELONGS TO NCERT TEXT BOOK

Exercise - 3.20, 3.22

Application of Electronegativity

- Arrange in the order of increasing acidic nature (NO_2 , K_2O , ZnO) :-
(A) $\text{NO}_2 < \text{ZnO} < \text{K}_2\text{O}$ (B) $\text{K}_2\text{O} < \text{ZnO} < \text{NO}_2$ (C) $\text{NO}_2 < \text{K}_2\text{O} < \text{ZnO}$ (D) $\text{K}_2\text{O} < \text{NO}_2 < \text{ZnO}$
- The basic character of MgO , SrO , K_2O and NiO increases in the order :-
(A) $\text{K}_2\text{O} < \text{SrO} < \text{MgO} < \text{NiO}$ (B) $\text{NiO} < \text{MgO} < \text{SrO} < \text{K}_2\text{O}$
(C) $\text{MgO} < \text{NiO} < \text{SrO} < \text{K}_2\text{O}$ (D) $\text{K}_2\text{O} < \text{MgO} < \text{NiO} < \text{SrO}$
- The order in which the following oxides are arranged according to decreasing basic nature is :-
(A) $\text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3 > \text{SiO}_2$ (B) $\text{SiO}_2 > \text{Al}_2\text{O}_3 > \text{MgO} > \text{Na}_2\text{O}$
(C) $\text{Al}_2\text{O}_3 > \text{SiO}_2 > \text{MgO} > \text{Na}_2\text{O}$ (D) $\text{SiO}_2 > \text{MgO} > \text{Na}_2\text{O} > \text{Al}_2\text{O}_3$
- The correct order of acidic strength is
(A) $\text{Cl}_2\text{O}_7 > \text{SO}_3 > \text{P}_4\text{O}_{10}$ (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) $\text{K}_2\text{O} > \text{CaO} > \text{MgO}$
- Which of the following is an amphoteric oxide ?
(A) MgO (B) Al_2O_3 (C) SiO_2 (D) P_2O_5
- Least basic oxide is :-
(A) Fe_2O_3 (B) FeO (C) BaO (D) Na_2O
- Identify the correct order of acidic strengths :-
(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) $\text{H}_2\text{O} < \text{CO}_2 < \text{CaO} < \text{CuO}$
- Which of the following does not represent the correct order of the property indicated
(A) $\text{Sc}^{3+} > \text{Cr}^{3+} > \text{Fe}^{3+} > \text{Mn}^{3+}$ ionic radii (B) $\text{Sc}^{3+} < \text{Y}^{3+} < \text{La}^{3+}$ Ionic radii
(C) $\text{FeO} < \text{CaO} > \text{MnO} > \text{CuO}$ Basic nature (D) All
- Which of the following is the most basic oxide?
(A) SeO_2 (B) Al_2O_3 (C) Sb_2O_3 (D) Bi_2O_3
- Calculate individual and average Oxidation number (if required) of the marked element
(1) $\text{H}\underline{\text{N}}\text{O}_3$ (2) $\underline{\text{O}}\text{S}\text{O}_4$ (3) $\text{P}\underline{\text{H}}_3$ (4) $\underline{\text{C}}\text{r}\text{O}_4^{2-}$
(5) $\underline{\text{C}}\text{r}_2\text{O}_7^{2-}$ (6) $\underline{\text{C}}\text{r}\text{O}_2\text{Cl}_2$ (7) $\text{Na}_2\text{H}\underline{\text{P}}\text{O}_4$ (8) $\underline{\text{F}}\text{e}\text{S}_2$
(9) $\underline{\text{C}}_6\text{H}_{12}\text{O}_6$ (10) $\underline{\text{X}}\text{e}\text{O}_2\text{F}_2$ (11) $\text{Li}\underline{\text{A}}\text{l}\text{H}_4$ (12) $\text{Na}_3\underline{\text{A}}\text{l}\text{F}_6$
(13) $\underline{\text{P}}_4$ (14) $\underline{\text{O}}_3$ (15) $\text{I}(\underline{\text{I}}\text{O}_3)_3$ (16) $\underline{\text{F}}\text{e}_3\text{O}_4$
(17) $\text{Cs}\underline{\text{I}}_3$ (18) $\underline{\text{K}}\text{O}_3$ (19) $\underline{\text{O}}_2\text{F}_2$ (20) $\text{H}_2\underline{\text{S}}\text{i}\text{F}_6$
(21) $\underline{\text{P}}(\text{OH})_3$ (22) $\underline{\text{P}}\text{OCl}_3$ (23) $\underline{\text{S}}\text{i}(\text{OH})_4$ (24) $\text{Mg}_2\underline{\text{C}}_3$
(25) $\text{Ca}\underline{\text{C}}_2$ (26) $\text{Be}_2\underline{\text{C}}$ (27) $\text{Na}\underline{\text{B}}\text{H}_4$ (28) $\underline{\text{F}}\text{e}_{0.96}\text{O}$

11. Calculate the O.N. of all atoms in following compounds

- | | | | |
|--|---------------------------------------|---------------------------------------|--|
| (1) Fe_3O_4 | (2) FeO | (3) $\text{Na}_2\text{S}_4\text{O}_6$ | (4) $\text{C}_2\text{H}_5\text{OH}$ |
| (5) $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ | (6) CO_2 | (7) FeS_2 | |
| (8) PbS | (9) CS_2 | (10) CrO_5 | (11) $(\text{N}_2\text{H}_5)_2\text{SO}_4$ |
| (12) N_2O_5 | (13) HCN | (14) HNC | (15) $\text{Ba}[\text{H}_2\text{PO}_2]_2$ |
| (16) OsO_4 | (17) $\text{H}_2\text{S}_2\text{O}_3$ | (18) $\text{CH}_3\text{SO}_3\text{H}$ | 6 |

Miscellaneous questions

12. Which are correct match :-

- | | |
|--|---|
| (a) $\text{O} < \text{C} < \text{S} < \text{Se}$ — Atomic size | (b) $\text{Na} < \text{Al} < \text{Mg} < \text{Si}$ — 1 st I.P |
| (c) $\text{MgO} < \text{SrO} < \text{Cs}_2\text{O} < \text{K}_2\text{O}$ — Basic character | |
| (A) a, b | (B) b, c |
| (C) a, c | (D) a, b, c |

13. For the processes $\text{K}^+(\text{g}) \xrightarrow{\text{I}} \text{K}(\text{g}) \xrightarrow{\text{II}} \text{K}(\text{s})$:-

- | | |
|--|--|
| (A) Energy is released in (I) and absorbed in (II) | (B) Energy is absorbed in (I) and released in (II) |
| (C) Energy is absorbed in both the processes | (D) Energy is released in both the processes |

14. Which of the following option is/are correct :-

- | | |
|---|---|
| (A) IE_1 of $\text{Be} > \text{IE}_1$ of Be^- | (B) IE_1 of $\text{Be}^- > \text{IE}_1$ of Be |
| (C) $ \text{IE}_1 \text{ of } \text{Be}^- = \text{EA of Be} $ | (D) IE_1 of $\text{Be} > \text{IE}_1$ of B |

15. Match the column :

Column-I

Column-II

- | | |
|--------|--|
| (A) F | (P) highest ionization energy |
| (B) Cl | (Q) highest electronegativity |
| (C) Br | (R) highest electron affinity |
| (D) I | (S) highest size |
| | (T) atom in which penultimate shell is full filled |

Subjectives

16. From among the elements, choose the following: Cl, Br, F, Al, C, Li, Cs & Xe.

- | | |
|--|--|
| (i) The element with highest electron gain enthalpy | (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. | |

17. Which oxide is more basic, MgO or BaO ? Why?

18. 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) $\text{Se}(\text{OH})_2$ | (e) FrOH | (f) BrOH |
|-------------------|------------------|------------------------------|------------------------------|-------------------|-------------------|

19. Compare the following giving reasons

Acidic nature of oxides : CaO , CO , CO_2 , N_2O_5 , SO_3

ANSWER KEY

RACE-01

1. (D) 2. (D) 3. (C) 4. (A) 5. (C) 6. (C)
7. (a) C (b) E (c) M (d) C (e) M (f) C (g) E (h) M (i) M (j) C 8. (D) 9. (C)
10. (A) 11. (C) 12. (B) 13. (B) 14. (A)→P,T; (B)→QRT; (C)→QRT; (D)→P,R
15. (C) 16. (C) 17. (B) 18. (D) 19. (D) 20. (C) 21. (B)
22. (B)

RACE-02

1. (C) 2. (C) 3. (C) 4. (A) 5. (D) 6. (D) 7. (C)
8. 9. (D) 10. (B) 11. (C) 12. (B) 13. (A) 14.
15. (C) 16. (D) 17. (B) 18. (C) 19. (D) 20. (ABD)
21. (A)→P,Q; (B)→P; (C)→S; (D)→R

RACE-03

1. (B) 2. (A) 3. (A) 4. (C) 5. (C) 6. (A) 7. (B)
8. (A) 9. (D) 10. (B) 11. (B) 12. (A) 13. (A) 14. (C)
15. (A) 16. (C) 17. (C) 18. (C) 19. (C) 20. (A) 21. (B)
22. (C)

RACE-04

1. (A) 2. (C) 3. (A) 4. (D) 5. (D) 6. (D) 7. (D)
8. (C) 9. (D) 10. (C) 11. (D) 12. (D) 13. (C) 14. (C)
15. (B) 16. (A) 17. (B) 18. (A) 19. (C) 20. (C) 21. (C)
22. (A) 23. (C)

RACE-05

1. (A-P, B-R, C-Q) 2. (18,32) 3. (D) 4. (B) 5. (A) 6. (ABC)
7. 4 8. 3 9. (A-R,S), (B-R,S), (C-P,Q), (D-P,Q) 10. (A-PS); (B-R); (C-R); (D-Q)
11. (A-P,R), (B-P,Q,R), (C-P,R,S), (D-P,R,S) 12. (A-P,S), (B-P), (C-Q), (D-R)
13. (C)

RACE-06

1. (A) 2. (A) 3. (C) 4. (C) 5. (D) 6. (B) 7. (D)
8. (B) 9. (B) 10. (B) 11. (C) 12. (D) 13. (A) 14. (C)
15. (A) 16. (D) 17. (B) 18. (C) 19. (A) 20. (B) 21. (C)
22. (D) 23. (A) 24. (C) 25. (A) 26. (D) 27. (C) 28. (C)

RACE -07

1. (D) 2. (D) 3. (D) 4. (B) 5. (B) 6. (C) 7. (D)
8. (D) 9. (D) 10. (B) 11. (C) 12. (C) 13. (B) 14. (B)
15. (B) 16. (A) 17. (B) 18. (C) 19. (B) 20. (C)
21. $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+}$ 23. $Cl < Si < Mg < Na < Cs$ 24. $r_{HCl} = 5.919 \text{ Å}$

RACE -08

1. (C) 2. (C) 3. (A) 4. (A) 5. (AC) 6. (D) 7. (B)
8. (B) 9. (D) 10. (B) 11. (C) 12. (A) 13. (B)
14. (D) 15. (D) 16. (C) 17. (A)
19. $IE_2 = 1825 \text{ kJ/mol}$, $IE_3 = 2737.5 \text{ kJ/mol}$

RACE -09

1. (B) 2. (D) 3. (C) 4. (D) 5. (C) 6. (A) 7. (D)
8. (D) 9. (C) 10. (B) 11. (B) 12. (C) 13. (C) 14. (D)
15. (C) 16. (B) 17. (D) 18. (C) 19. (B) 20. (B) 21. (C)
22. (D) 23. (A) 24. (D) 25. (A)

RACE -10

1. (B) 2. (B) 3. (A) 4. (A) 5. (B) 6. (A)
7. (A) 8. (A) 9. (D)
10.
1. (+5) 2. (+8) 3. (-3) 4. (+6) 5. (+6) 6. (+6) 7. (+5)
8. (+2) 9. (0) 10. (+6) 11. (+3) 12. (+3) 13. (0) 14. (0)
15. (+5) 16. (8/3) 17. (-1/3) 18. (-1/3) 19. (+1) 20. (+4) 21. (+3)
22. (+5) 23. (+4) 24. (-4/3) 25. (-1) 26. (-4) 27. (+3) 28. (2.08)
11.
1. (8/3, -2) 2. (+2, -2) 3. (+1, 2.5, -2) 4. (-2, +1, -2, +1)
5. (+2, +6, -2, -3, +1, +6, -2, +1, -2) 6. (+4, -2) 7. (+2, -1) 8. (+2, -2)
9. (+4, -2) 10. (+6, -1, -2) 11. (-2, +1, +6, -2) 12. (+5, -2)
13. (+1, +2, -3) 14. (+1, -3, +2) 15. (+2, +1, +1, -2) 16. (+8, -2)
17. (+1, -2, +6, -2) 18. (-2, +1, +4, -2, +1)
12. (A) 13. (D) 14. (ACD) 15. (A-P, Q, T); (B R, T); (C-T); (D-S)
16. (i) Cl (ii) Cs (iii) Al (iv) F (v) Xe
17. BaO
18. (a) Basic (b) Acidic (c) Basic (d) Acidic (e) Basic (f) Acidic
19. $CaO < CO < CO_2 < N_2O_5 < SO_3$