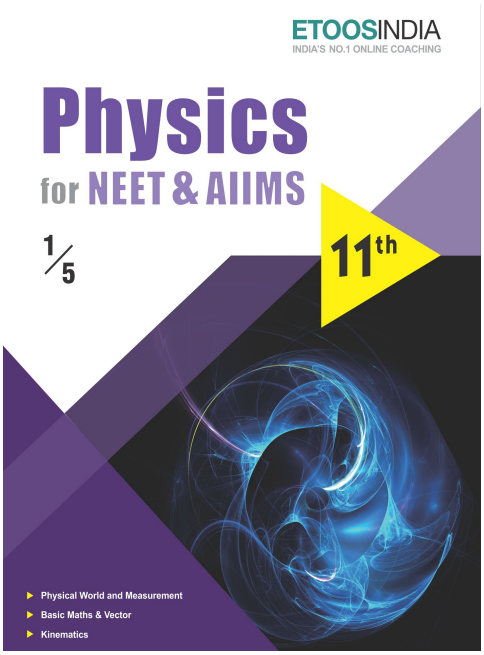
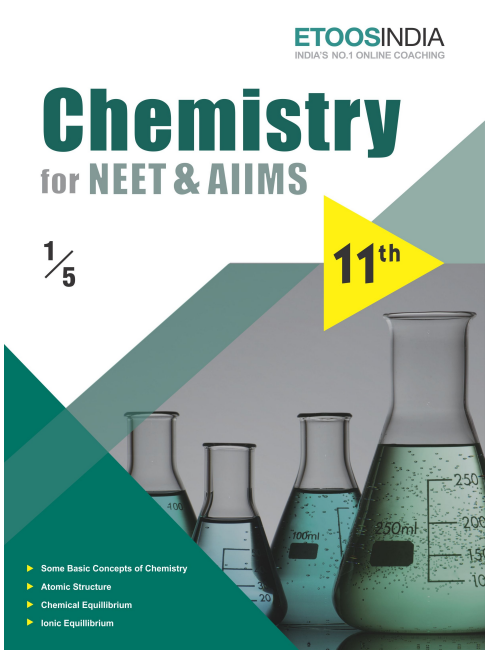
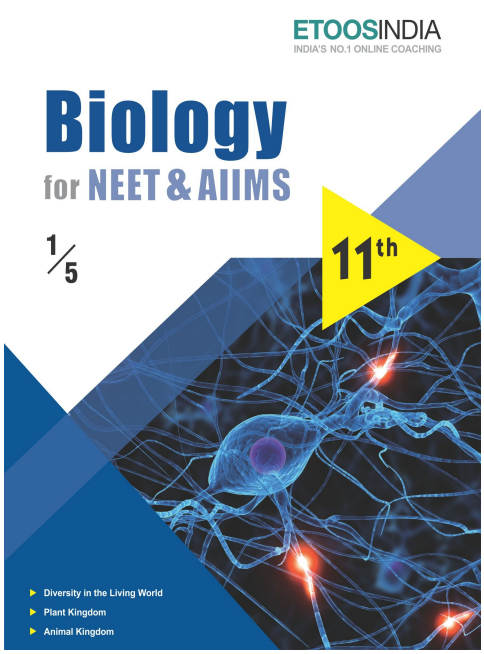
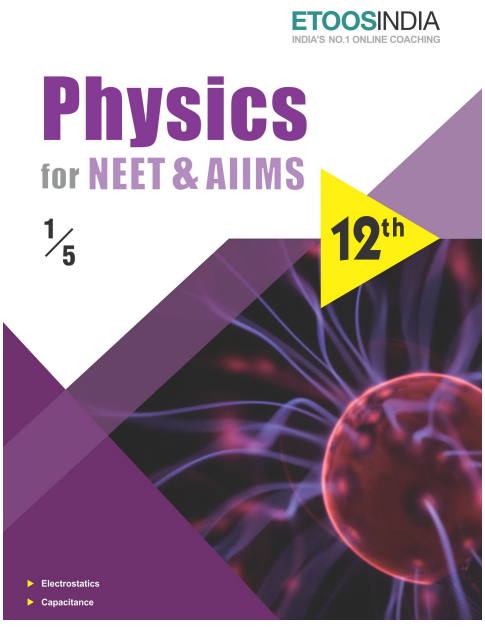
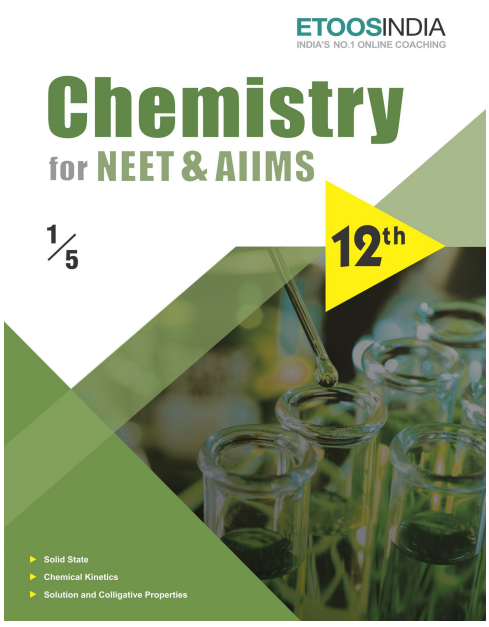
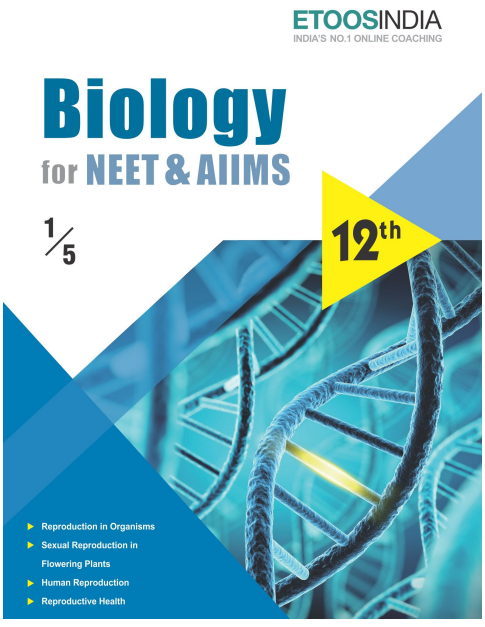












CHAPTER 07

P-BLOCK ELEMENTS

if all the elements are arranged in the order of atomic weights, a periodic repitition is obtained. This is expressed by the law of periodicity.

" DMITRI MENDELEEV"

INTRODUCTION

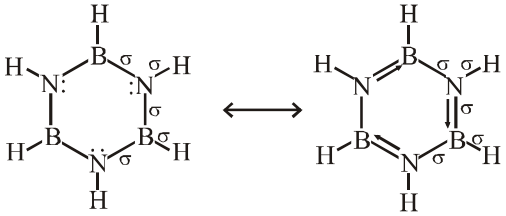
The elements is which last electron enters into p-subshell are called as p-block elements. The number of p-orbitals are three and, therefore, the maximum number of electrons that can be accommodated in a set of p-orbitals is six, hence p-block contains six groups. The general electronic configuration of these elements is ns^2np^{1-6} **(except for He)**.

p-block elements can be either metals, metalloids or non-metals. Maximum oxidation state shown by p-block elements is equal to the sum of valence electrons (i.e., sum of s-and p-electrons) or the group number minus 10 known as group oxidation state.

Absence of d-orbitals in the elements of second period and presence of d- and f-orbitals in rest of elements have significant effects on the properties as a result lower oxidation state will be more stable. This effect is known as **inert pair effect**.

(c) **Hybridisation :** If a lone pair participates in back bonding then it is not considered in hybridisation.
Ex. : $B_3N_3H_6$ (inorganic benzene or borazene or borazole)

- Hybridisation of B as well as N = sp^2



- Inorganic benzene is more reactive than organic benzene as in it the bonds are polar, although over all molecule is non polar.

(d) If back bonding is present then tendency to form dimer or polymer decreases.
Ex. : BF_3, BeF_2

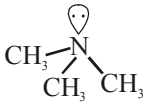
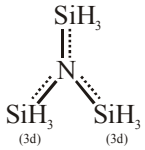
(2) pπ-dπ back bonding :

$$\underset{\substack{\text{2nd period}\\\text{with lp}}}{p} \longrightarrow \underset{\substack{\text{3rd period}\\\text{empty}}}{d}$$

it is used to explain following observations :

(a) Hybridisation

Ex.

Trimethyl amine $(CH_3)_3N$	**Trisilyl amine** $(SiH_3)_3N$
	
• sp^3 hybrid (N)	• sp^2 hybrid (N)
• trigonal pyramidal	• trigonal planar
• Lewis base (due to presence of lp)	• Not Lewis base
	• Bond angle increases

(b) Acidic strength

$CH_3-\ddot{O}-H$ Methyl alcohol	$SiH_3-\ddot{O}-H$ Silyl alcohol
• No back bonding	• Back bonding present in conjugate base
• Less acidic	• More acidic

(II) Dimerisation / Polymerisation

Types of Dimerisation

3C—2e	3C—4e
B_2H_6	$(BeCl_2)_2$
$(BeH_2)_2$	$(BeCl_2)_n$
$(BeH_2)_n$	$(AlCl_3)_2$
$Al_2(CH_3)_6$	$(ICl_3)_2$
$Ga_2(CH_3)_6$	

ETOOS KEY POINTS

Reactivity towards halogen :

Element in pure state	Type of bonding	Meling Point
C	Covalenet	4100°C
Si	Covalent	1420°C
Ge	Covalnet	945°C
Sn	Metallic	232°C
Pb	Metallic	327°C

On moving down the group from carbon to lead stability of +4 oxidation state decreases while stability of +2 oxidation state increases andd hence decreases oxidising power decreases down the group due to inert pair effect.

These elements form two types of hallides – MX_2 and MX_4. Most of the MX_4 are covalent. SnF_4 and PbF_4 are ionic in nature.

Thermal stability decreases with increasing atomic size of molecular mass of tetrahalide or due to decreasing polarity.

$CX_4 > SiX_4 > GeX_4 > SnX_4 > PbX_4$ and

$CF_4 > CCl_4 > CBr_4 > Cl_4$

In these compounds :

Hybridisation → sp^3

Geometry → Regular tetrahedral

Polarity → NON-POLAR

Bond angle → 109° 28′

PbI_4 is not stable as I^- is strong reducing agent which reduces Pb^{+4} to Pb^{+2} and also stability of +4 oxidation state of Pb is lesser than +2 state.

Sodium Zeolite $[Na_2Al_2Si_2O_8]$ / $[Na_2O.Al_2O_3.2SiO_2]$

(i) It is a 3-D silicate

(ii) It is used in

(a) For softening of hard water

(b) For cracking of hydrocarbon & isomerisation

Ex. ZSM-5 (Zeolite) is used to convert ethyl alcohol into petrol.

Etoos Tips & Formulas

BORON FAMILY

(1) Amorphous boron of low purity (called moissan boron) is obtained by reducing B_2O_3 with Mg or Na at a high temperature. It is 95–98% pure (being contaminated with metal borides), and is black in colour.

$$Na_2[B_4O_5(OH)_4].8H_2O \xrightarrow{acid} H_3BO_3 \xrightarrow{heat} B_2O_3 \xrightarrow{Mg\ or\ Na} 2B + 3\,MgO$$

(2) **BORANES**

Boranes are boron hydrogen compounds with general molecular formula B_nH_{n+4} or $B_n\,H_{n+6}$.They are electron deficient compounds.

(3) **ALUM**

Alums are double sulphates with their general formula $R_2SO_4.M_2(SO_4)_3.24H_2O$ where R = monovalent radical like Na^+, K^+, NH_4^+ and M = Trivalent radical like Al^{+3}, Cr^{+3}. Fe^{+3}.

CARBON FAMILY

(1) Carbon is found in nature in various allotropic forms which are:

(i) Crystalline Form : Diamond, Graphite, Fullerenes

(ii) Amorphous Form : Coal

(2) **SILICON (Si)**

Silicon is the second most abundant (27.2%) element after oxygen (45.5%) in the earth's crust. It does not occur free in nature but in the combined state, it occurs widely in form of silica and silicates. All mineral rocks, clays and soils are built of silicates of magnesium, aluminium, potassium or iron. Aluminium silicate is however the most common constituent of rocks and clays.

Silica is found in the free state in sand, flint and quartz and in the combined state as silicates like

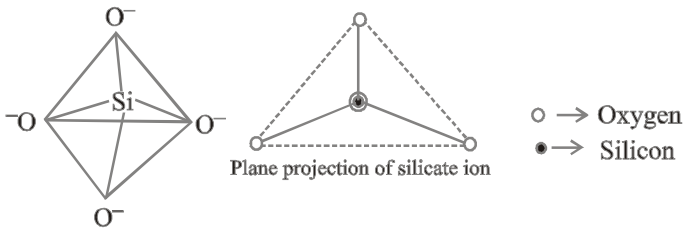
(a) Feldspar – $K_2O.Al_2O_3.6SiO_2$

(b) Kaolinite – $Al_2O_3.\,2\,SiO_2.\,2H_2O$

(c) Asbestos – $CaO.\,3MgO.4SiO_2$

Silicates are also important :

Silicates have basic unit of SiO_4^{4-}, each silicon atom is bonded with four oxide ions tetrahedrally.



SOLVED EXAMPLE

Ex. 1 By adding gypsum to cement

(A) Setting time of cement becomes less

(B) Setting time of cement increases

(C) Colour of cement becomes light

(D) Shining surface is obtained

Ans. **(B)** Raw materials for cement-limestone, clay, gypsum, Cement is a dirty greyish heavy powder containing calcium aluminates and silicated.

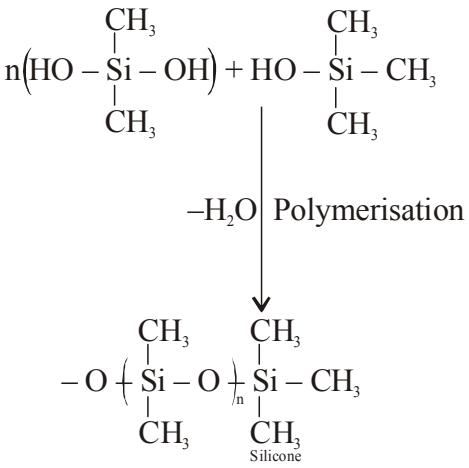
Gypsum ($CaSO_4.5H_2O$) is added to the components to increases the setting time of cement to that it gets sufficiently hardened. Setting of cement is an exothermic process and involves hydration of calcium aluminated and silicates.

Ex. 2 Silcon has a strong tendency to form polymers like silicones. The chain length of silicon polymer can be controlled by adding

(A) $MeSiCl_3$ **(B)** Me_2SiCl_2

(C) Me_3SiCl **(D)** Me_4Si

Ans. **(C)** Silicon has a strong tendency to form polymers like silicones. The chain length of silicon polymer can be controlled by adding Me_3SiCl which block the ends as shown below



Ex. 3 Quartz is extensively used as a piezoelectric material. it contains.....

(A) Pb **(B)** Si

(C) Ti **(D)** Sn

Ans. **(B)** Quartz, cristobalite and tridymite are some of the crystalline forms of silica and they are intercovertable at suitable temperature. Quartz is edxtensively used as a piezoelectric material.

Ex. 4 The most commonly used reducing agent is

(A) $AlCl_3$ **(B)** $PbCl_2$

(C) $SnCl_4$ **(D)** $SnCl_2$

Ans. **(D)** Reducing agents are those substance which resduced other subastance and it self oxidises

In $SnCl_2$, Sn exists in +2 oxidation state, thus, acts as a strong reducing agent i.e.,

$$SnCl_2 + 2FeCl_3 \longrightarrow 2FeCl_2 + SnCl_4$$

$$SnCl_2 + 2CuCl_2 \longrightarrow 2CuCl + SnCl_4$$

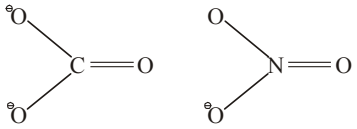
Ex. 5 Which of the following piars of ions are isolectonic and isostructural

(A) CO_3^{2-}, NO_3^- **(B)** ClO_3^-, CO_3^{2-}

(C) SO_3^{2-}, NO_3^- **(D)** ClO_3^-, SO_3^{2-}

Ans. **(A)** Compounds having same value of total number of electrons are known as isolectronic.

For CO_3^{2-}	For NO_3^-
Total number of electons	Total number of electrons
$=6+8\times3+2$	$=7+8\times3+1$
$=6+24+2$	$=7+25$
$=32$	$=32$



Hence, CO_3^{2-} and NO_3^- are isolectronic. These two ions have similar structure so they are isostructural. Both have triangular planar structure as in both the species carbon and nitrogen are sp^2 hybridised.

Exercise # 1 SINGLE OBJECTIVE NEET LEVEL

1. The most acidic of the following compounds is
(A) P_2O_3 (B) Sb_2O_3
(C) B_2O_3 (D) As_2O_3

2. Identify the statement that is not correct as far as structure of diborane is concerned
(A) There are two bridging hydrogen atoms in diborane
(B) Each boron atom forms four bonds in diborane
(C) The hydrogen atoms are not in the same plane in diborane
(D) All B - H bonds in diborane are similar

3. Soft heavy metal melts at and is used in making heat sensitive thermometers the metal is
(A) Galium (B) Sodium
(C) Potassium (D) Caesium

4. Which of the following is formed when aluminium oxide and carbon is strongly heated in dry chlorine gas
(A) Aluminium chloride
(B) Hydrate aluminium chloride
(C) Anhydrous aluminium chloride
(D) None of these

5. Which metal burn in air at high temperature with the evolution of much heat
(A) Cu (B) Hg
(C) Pb (D) Al

6. Aluminium hydroxide is soluble in excess of sodium hydroxide forming the ion
(A) AlO_2^{+3} (B) AlO_2^{-3}
(C) AlO_2^- (D) AlO_3^-

7. Boron form covalent compound due to
(A) Higher ionization energy
(B) Lower ionization energy
(C) Small size
(D) Both (A) and (C)

8. In diborane, the two H–B–H angles are nearly
(A) 60°, 120° (B) 95°, 120°
(C) 95°, 150° (D) 120°, 180°

9. Which of the following is a non-metal
(A) Gallium (B) Indium
(C) Boron (D) Aluminium

10. Which of the following is most acidic
(A) Na_2O (B) MgO
(C) Al_2O_3 (D) CaO

11. When orthoboric acid (H_3BO_3) is heated, the residue left is
(A) Metaboric acid (B) Boron
(C) Boric anhydride (D) Borax

12. Silicon dioxide is formed by the reaction of
(A) $SiCl_4 + 2H_2O$ (B) $SiO_2 + 4HF$
(C) $SiO_2 + NaOH$ (D) $SiCl_4 + NaOH$

13. Which alkali metal carbonate decomposes on heating to liberate CO_2 gas
(A) Li_2CO_3 (B) $CaCO_3$
(C) Na_2CO_3 (D) Al_2CO_3

14. Which of the following gives propyne on hydrolysis
(A) Al_4C_3 (B) Mg_2C_3 (C) B_4C (D) La_4C_3

15. Which one of the following statements is not correct
(A) Zinc dissolves in sodium hydroxide solution
(B) Carbon monoxide reduces iron (III) oxide to iron
(C) Mercury (II) iodide dissolves in excess of potassium iodide solution
(D) Tin (IV) chloride is made by dissolving tin solution in concentrated hydrochloric acid

16. In laboratory silicon can be prepared by the reaction
(A) By heating carbon in electric furnace
(B) By heating potassium with potassium dichromate
(C) Silica with magnesium
(D) None of these

17. Which of the following is the correct statement for red lead
(A) It is an active form of lead
(B) Its molecular formula is Pb_2O_3
(C) It decomposes into Pb andm CO_2
(D) It decomposes into PbO and O_2

Exercise # 2 SINGLE OBJECTIVE AIIMS LEVEL

1. Boric acid polymerizes due to –
(A) The presence of hydrogen bonds
(B) Its acidic nature
(C) Its geometry
(D) Its monobasic nautre

2. Aluminium is obtained by–
(A) Reduction of Al_2O_3 with coke
(B) Electrolysis of Al_2O_3 dissolved in Na_3AlF_6
(C) Reduction of Al_2O_3 with chromium
(D) Heating cryolite and alumina

3. In thermite welding, aluminium acts as –
(A) A solder (B) A flux
(C) An oxidising agent (D) A reducing agent

4. The final product obtained when boric acid is heated to red heat is –
(A) Metaboric acid (B) Tetraboric acid
(C) Boron oxide (D) Pyroboric acid

5. Which of the following can be detected by the borax-bead test ?
(A) Ni^{2+} (B) Co^{2+}
(C) Pb^{+2} (D) Both (A) & (B)

6. The hydrides of boron are called
(A) Boron hydrogen compounds
(B) Hydrogen borides
(C) Boranes
(D) Hydroboric acids

7. Which one of the following mixed sulphates is not an alum ?
(A) $K_2SO_4.Al_2(SO_4)_3.24H_2O$
(B) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$
(C) $Na_2SO_4.Fe(SO_4)_3.24H_2O$
(D) $CuSO_4.Al_2(SO_4)_3.24H_2O$

8. Higher percentage of carbon is found in –
(A) Anthracite (B) Lignite
(C) Bituminous (D) Peat

9. From B_2H_6, all the following can be prepared except –
(A) B_2O_3 (B) H_3BO_3
(C) $B_2(CH_3)_6$ (D) $NaBH_4$

10. The product formed in the reaction,
$BCl_3 + H_2O \longrightarrow$ Product is –
(A) $H_3BO_3 + HCl$ (B) $B_2O_3 + HOCl$
(C) $B_2H_6 + HCl$ (D) No reaction

11. Silicones have the general formula –
(A) SiO_4^{4-} (B) $Si_2O_7^{6-}$
(C) $(R_2SiO)_n$ (D) $(SiO_3)_n^{2-}$

12. In which of the following there exists a $p\pi - d\pi$ bonding –
(A) Diamond (B) Graphite
(C) Dimethylamine (D) Trisilylamines

13. Glass or silica soluble in –
(A) $HClO_4$ (B) HF
(C) Aqua-regia (D) H_2SO_4

14. The species present in solution when CO_2 is dissolved in water are –
(A) $CO_2, H_2CO_3, HCO_3^-, CO_3^{2-}$
(B) H_2CO_3, CO_3^{2-}
(C) CO_3^{2-}, HCO_3^-
(D) CO_2, H_2CO_3

15. P_2O_5 is used extensively as a –
(A) Dehydrating agent (B) Catalytic agent
(C) Reducing agent (D) Preservative

16. The number of molecules of water needed to convert one molecules of P_2O_5 into orthophosphoric acid is –
(A) 2 (B) 3
(C) 4 (D) 5

17. Producer gas is a mixture of –
(A) CO and N_2 (B) CO_2 and H_2
(C) CO and H_2 (D) CO_2 and N_2

18. Which variety of glass is used for manufacture of optical glasses ?
(A) Sodium glass (B) Flint glass
(C) Ground glass (D) Quartz

19. The colour imparted by Co(II) compounds to glass is –
(A) Green (B) Deep–Blue
(C) Yellow (D) Red

20. In warfare smoke screens are prepared from –
(A) PH_3 (B) CaC_2
(C) P_2O_5 (D) $COCl_2$

21. In Haber's process for the manufacture of ammonia, the catalyst used is –
(A) Finely divided nickel
(B) Finely divided molybdenum
(C) Finely divided iron
(D) Finely divided platinum

Exercise # 3 PART - 1 MATRIX MATCH COLUMN

1. Match the reactions listed in column-I with characteristic(s) / type of reactions listed in column-II.

Column-I	Column-II
(A) $BBr_3 + H_2 \longrightarrow B$	(p) Borax bead test
(B) $Na_2B_4O_7.10H_2O + CuSO_4 \rightarrow Cu(BO_2)_2$	(q) Reduction
(C) $AlCl_3 + H_2O \longrightarrow HCl$	(r) White fumes
(D) $Cr_2O_3 + Al \longrightarrow Cr$	(s) Hydrolysis

2. Match the reactions listed in column-I with characteristic(s) / type of reactions listed in column-II.

Column-I	Column-II
(A) $Al_2(C_2)_3 + H_2O \longrightarrow$	(p) One of the products contains both σ and π bonds
(B) $CH_2(COOH)_2 + P_4O_{10} \longrightarrow$	(q) Hydrolysis
(C) $CH_3SiCl_3 + H_2O \longrightarrow$	(r) Dehydration
(D) $SnCl_2.2H_2O \xrightarrow[\text{standing}]{\text{on}}$	(s) complex crosslinked polymer

3. Match the reactions listed in column-**I** with the product(s) listed in column-**II**.

Column–I	Column–II
(A) $B_2O_3 + H_2O$	(p) H_3BO_3
(B) $B_2H_6 + H_2O$	(q) H_2
(C) $B_3N_3H_6 + H_2O$	(r) HCl
(D) $BCl_3 + H_2O$	(s) NH_3
	(t) N_2

4. Match the type of silicates listed in column-I with characteristic(s) listed in column-II.

Column–I	Column–II
(A) Cyclic silicates	(p) Tetrahedral hybridisation.
(B) Single chain silicates	(q) Si–O bonds are 50% ionic and 50% covalent.
(C) Pyro silicates	(r) General formula is $(SiO_3)_n^{2n-}$
(D) Sheet silicates (two dimensional)	(s) Two oxygen atoms per tetrahedron are shared.

5. Match the materials listed in column-I with type of silicates listed in column-II.

Column–I	Column–II
(A) Spondumene	(p) Two dimensional sheet silicates
(B) Thorteveitite	(q) Pyrosilicates
(C) Kaolin	(r) Chain silicates
(D) Quartz	(s) Three dimensional sheet silicates.

Exercise # 4

PART - 1 | PREVIOUS YEAR (NEET/AIPMT)

1. Which one of the following arrangements does not truly represent the property indicated against it? [CBSE AIPMT 2000]
(A) $Br_2 < Cl_2 < F_2$ Oxidising power
(B) $Br_2 < Cl_2 < F_2$ Electronegativity
(C) $Br_2 < F_2 < Cl_2$ Electron affinity
(D) $Br_2 < Cl_2 < F_2$ Bond energy

2. Among the following the electron deficient compound is [CBSE AIPMT 2000]
(A) BCl_3 (B) CCl_4
(C) PCl_5 (D) $BeCl_2$

3. Nitogen forms N_2 , but phosphorus when form P_2 readily converted into P_4 reason is [CBSE AIPMT 2001]
(A) triple bond present between phosphorus atom
(B) $p\pi$ -$p\pi$ bonding is weak
(C) $p\pi$ – bonding is strong
(D) multiple bond form easily

4. Which reaction is not feasible ? [CBSE AIPMT 2002]
(A) $2KI + Br_2 \longrightarrow 3KBr + I_2$
(B) $2KBr + I_2 \longrightarrow 2KCl + Br_2$
(C) $2KBr + Cl_2 \longrightarrow 2KCl + Br_2$
(D) $2H_2O + 2F_2 \longrightarrow 4HF + O_2$

5. Which of the following statements is true ? [CBSE AIPMT 2002]
(A) Silicon exhibits 4 coordination number in its compounds
(B) Bond energy of F_2 is less than Cl_2
(C) Mn(III) oxidation state is more stable than Mn(II) in aqueous state
(D) Elements of 15^{th} group shows only +3 and +5 oxidation states

6. In borax bead test which compound is formed? [CBSE AIPMT 2002]
(A) Ortho borate (B) Meta borate
(C) Double oxide (D) Tetra Borate

7. Zn gives H_2 gas with H_2SO_4 and HCl but not with HNO_3 because [CBSE AIPMT 2002]
(A) Zn act as oxidising agent when react with HNO_3
(B) HNO_3 is weaker acid than H_2SO_4 and HCl
(C) In electrochemical series Zn is placed above hydrogen
(D) NO_3^- is reduced in preference to hydronium ion

8. The oxidation states of sulphur in the anious SO_3^{2-}, $S_2O_6^{2-}$ and $S_2O_6^{2-}$ follows the order [CBSE AIPMT 2003]
(A) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$
(B) $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$
(C) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$
(D) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

9. Which one of the following compounds is not a protonic acid [CBSE AIPMT 2003]
(A) HOCl is a stronger acid than HOBr
(B) HF is a stronger acid than HCl
(C) Among hailde ions. iodide is the most powerful reducing agent
(D) Fluorine is the only halogen that does not show a variable oxidation state

10. Which one of the following compounds is not a protonic acid? [CBSE AIPMT 2003]
(A) $SO(OH)_2$ (B) $SO_2(OH)_2$
(C) $B(OH)_3$ (D) $PO(OH)_3$

11. Which one of the following statements about the zeolites is false ? [CBSE AIPMT 2004]
(A) They are used as cation exchangers
(B) They have open structure which enables them to take up small molecules
(C) Zeolites are aluminosilcates having three dimensional network
(D) Some of the SiO_4^{4-} units are replaced by AlO_4^{5-} and AlO_6^{9-} ions in zeolites

12. Which is the best description of behaviour of bromine in the reaction given below?
$H_2O + Br_2 \longrightarrow HBr + HoBr$ [CBSE AIPMT 2004]
(A) Only oxidised
(B) Only reduced
(C) Both oxidised and reduced
(D) Only proton accepted

MOCK TEST

STRAIGHT OBJECTIVE TYPE

1. Ozone with KI solution produces
(A) Cl_2 (B) I_2 (C) HI (D) IO_3

2. The gases respectively absorbed by alkaline pyrogallol and oil of cinnamon is
(A) O_3, CH_4 (B) O_2, O_3 (C) SO_2, CH_4 (D) N_2O, O_3

3. Ozone turns trimethyl paper
(A) Green (B) Violet (C) Red (D) Black

4. Ozone is obtained from oxygen
(A) By oxidation at high temperature
(B) By oxidation using a catalyst
(C) By silent electric discharge
(D) By conversion at high pressure

5. Which of the following statement is true about ozone layer
(A) It is harmful because ozone is dangerous to living organism
(B) It is beneficial because oxidation reaction can proceed faster in the presence of ozone
(C) It is beneficial because ozone cuts out the ultraviolet radiation of the sun
(D) It is harmful because ozone cuts out the important radiation of the sun which are vital for photosynthesis

6. The correct order of the thermal stability of hydrogen halides (H -X) is
(A) HI > HBr > HCl > HF
(B) HF > HCl > HBr > HI
(C) HCl < HF < HBr < HI
(D) HI > HCl < HF < HBr

7. Phosgene is the common name of
(A) Carbonyl chloride
(B) Phosphine
(C) Phosphorus oxychloride
(D) Phosphorus trichloride

8. The solubility of iodine in water increases in the presence of
(A) Alcohol (B) Chloroform (C) Sodium hydroxide (D) Potassium iodide

9. When thiosulphate ion is oxidised by iodine, which one of the following ion is produced
(A) SO_3^{2-} (B) SO_4^{2-} (C) $S_4O_6^{2-}$ (Tetrathionate) (D) $S_2O_6^{2-}$

10. Which one of the following noble gases is the least polarizable
(A) Xe (B) Ar (C) Ne (D) He

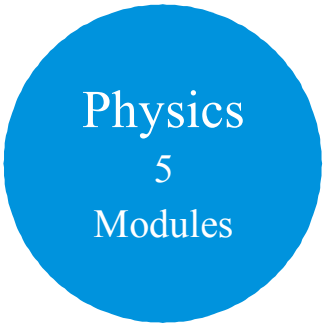
11. Which one of the following noble gases is not found in the atmosphere
(A) Rn (B) Kr (C) Ne (D) Ar

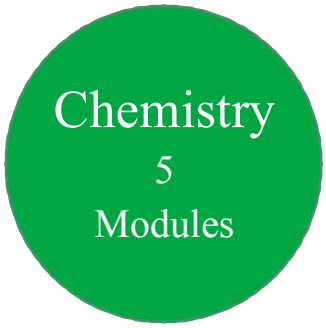
12. Helium is added to the oxygen supply used by deep sea divers because
(A) It is less soluble in blood than nitrogen at high pressure
(B) It is lighter than nitrogen
(C) It is readily miscible with oxygen
(D) It is less poisonous than nitrogen

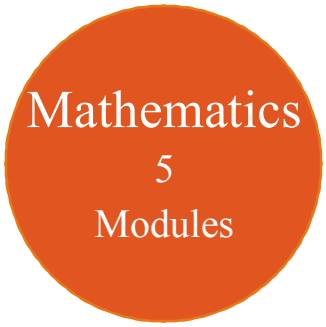
13. Which of the following statements is not correct for a noble gas
(A) Ar is used in electric bulbs
(B) Kr is obtained during radioactive disintegration
(C) Half life of Rn is only 3.8 days
(D) He is used in producing very low temperature

14. Aqueous solution of orthoboric acid can be titrated against sodium hydroxide using phenolphthalein indicator only in the presence of :
(A) trans-glycerol (B) catechol (C) cis-glycerol (D) both (B) and (C)

11th Class Modules Chapter Details

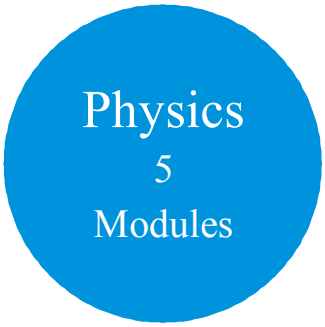


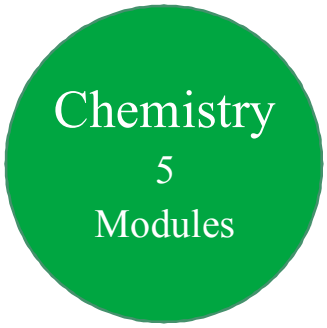


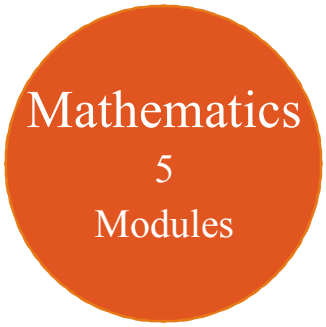


PHYSICS	CHEMISTRY	BIOLOGY
Module-1 1. Physical World & Measurements 2. Basic Maths & Vector 3. Kinematics **Module-2** 1. Law of Motion & Friction 2. Work, Energy & Power **Module-3** 1. Motion of system of particles & Rigid Body 2. Gravitation **Module-4** 1. Mechanical Properties of Matter 2. Thermal Properties of Matter **Module-5** 1. Oscillations 2. Waves	**Module-1(PC)** 1. Some Basic Conceps of Chemistry 2. Atomic Structure 3. Chemical Equilibrium 4. Ionic Equilibrium **Module-2(PC)** 1. Thermodynamics & Thermochemistry 2. Redox Reaction 3. States Of Matter (Gaseous & Liquid) **Module-3(IC)** 1. Periodic Table 2. Chemical Bonding 3. Hydrogen & Its Compounds 4. S-Block **Module-4(OC)** 1. Nomenclature of Organic Compounds 2. Isomerism 3. General Organic Chemistry **Module-5(OC)** 1. Reaction Mechanism 2. Hydrocarbon 3. Aromatic Hydrocarbon 4. Environmental Chemistry & Analysis Of Organic Compounds	**Module-1** 1. Diversity in the Living World 2. Plant Kingdom 3. Animal Kingdom **Module-2** 1. Morphology in Flowering Plants 2. Anatomy of Flowering Plants 3. Structural Organization in Animals **Module-3** 1. Cell: The Unit of Life 2. Biomolecules 3. Cell Cycle & Cell Division 4. Transport in Plants 5. Mineral Nutrition **Module-4** 1. Photosynthesis in Higher Plants 2. Respiration in Plants 3. Plant Growth and Development 4. Digestion & Absorption 5. Breathing & Exchange of Gases **Module-5** 1. Body Fluids & Its Circulation 2. Excretory Products & Their Elimination 3. Locomotion & Its Movement 4. Neural Control & Coordination 5. Chemical Coordination and Integration

12th Class Modules Chapter Details







PHYSICS

Module-1

1. Electrostatics
2. Capacitance

Module-2

1. Current Electricity
2. Magnetic Effect of Current and Magnetism

Module-3

1. Electromagnetic Induction
2. Alternating Current

Module-4

1. Geometrical Optics
2. Wave Optics

Module-5

1. Modern Physics
2. Nuclear Physics
3. Solids & Semiconductor Devices
4. Electromagnetic Waves

CHEMISTRY

Module-1(PC)

1. Solid State
2. Chemical Kinetics
3. Solutions and Colligative Properties

Module-2(PC)

1. Electrochemistry
2. Surface Chemistry

Module-3(IC)

1. P-Block Elements
2. Transition Elements (d & f block)
3. Co-ordination Compound
4. Metallurgy

Module-4(OC)

1. HaloAlkanes & HaloArenes
2. Alcohol, Phenol & Ether
3. Aldehyde, Ketone & Carboxylic Acid

Module-5(OC)

1. Nitrogen & Its Derivatives
2. Biomolecules & Polymers
3. Chemistry in Everyday Life

BIOLOGY

Module-1

1. Reproduction in Organisms
2. Sexual Reproduction in Flowering Plants
3. Human Reproduction
4. Reproductive Health

Module-2

1. Principles of Inheritance and Variation
2. Molecular Basis of Inheritance
3. Evolution

Module-3

1. Human Health and Disease
2. Strategies for Enhancement in Food Production
3. Microbes in Human Welfare

Module-4

1. Biotechnology: Principles and Processes
2. Biotechnology and Its Applications
3. Organisms and Populations

Module-5

1. Ecosystem
2. Biodiversity and Conservation
3. Environmental Issues