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# UNIT : 15 P - BLOCK ELEMENTS

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## Important Points

The elements (except He atom) having outermost valence shell electronic configuration  $ns^2 np^1$  to  $ns^2 np^6$  are called p-block elements. Since p-orbital can accommodate six maximum electrons, six groups 13 to 18 are there in p-block elements. We shall study group 13 and 14 i.e. Boron and carbon group elements in this unit. Generally in a row or period electronegativity, ionisation enthalpy and oxidising power are increasing as the atomic number increases while in group it decreases as the atomic number increases. Generally, in group covalent radius, van der Waals radius and metallic character increases as the atomic number increases. It is a characteristic of the p-block elements that metal, non-metal and metalloid are included in the same group.

The group 13 includes elements, Boron, Aluminium, Gallium, Indium and Thallium. Aluminium is the third most abundant element found in earth's crust. The important ores of aluminium are bauxite and cryolite. Variation in some properties of group 13 elements are like atomic radii and ionic radii, ionisation enthalpy, metallic character, electronegativity, melting point and boiling point, density, character as reducing and nature of compound are observed in elements of boron group i.e. Group 13 elements having electronic configuration  $ns^2 np^1$ . Hence, they possess +3 oxidation state and their stability goes on decreasing as the atomic number increases. These elements also possess +1 oxidation state and the stability goes on increasing as the atomic number increases.

The chemical reactivity of group 13 elements are as given below. Group 13 elements do not combine directly with hydrogen but they combine indirectly to form hydride compounds. Boron forms a number of hydrides having molecular formula  $B_n H_{n+4}$  and  $B_n H_{n+6}$  which are known as boranes. The other elements of this group form polymeric hydrides. Group 13 elements form  $MX_3$  type trihalides, where X = F, Cl, Br and I is unknown.  $AlCl_3$  exists in dimer form. The group 13 elements form oxides and hydroxides having formula  $M_2 O_3$  and  $M(OH)_3$  respectively. As the atomic number of elements goes on increasing, the acidic character of oxide and hydroxide goes on decreasing. Elements of these group form octahedral complexes. Aluminium sulphate reacts and forms double salts with sulphate of  $NH_4^+$  and alkali metal ions having formula  $M_2SO_4 \cdot A_2(SO_4)_3 \cdot 24H_2O$  or  $MAI(SO_4)_2 \cdot 12H_2O$  where  $M = Na^+, K^+, Rb^+$  and  $NH_4^+$ . The first element (Boron) of group 13 shows anomalous behaviour. Boron is chemically less reactive and almost inert with normal chemical reagents at normal temperature but reacts with strong oxidising agents and with some typical reagents like non-metal, acid alkali and metals. Some important compounds of boron are borax powder, boric acid and boron hydride. The properties and uses of aluminium are as given in the text. Aluminium reacts with acid and base so it is amphoteric in nature.

The group 14 includes elements carbon, silicon, germanium, tin and lead. The first element

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of this group is carbon, so it is also known as carbon group elements. Carbon shows catenation property due to its small size, high electronegativity and very high carbon-carbon bond energy. Due to typical characteristic of catenation it forms number of compounds which are studied in organic chemistry. It also forms compounds with metals and non-metals. Group 14 elements have variation in properties like atomic radii, ionisation enthalpy electropositive character, electronegativity, melting points and boiling points density, catenation and allotropy. The oxidation state of group 14 elements are +2 and +4. The trends in chemical reactivity are as given in the text. The carbon shows anomalous behaviour. The crystalline allotropes of carbon are diamond, graphite and fullerenes. The physical properties and chemical properties are as given in the text. Some important compounds of carbon are halides of carbon, carbon disulphide, carbide compounds, carbon monoxide and carbon dioxide, and the method of preparation and uses are as given in the text. The important compounds of silicon are silicon hydrides having general formula  $\text{Si}_n \text{H}_{2n+2}$ . The value of bond enthalpy for silicon-silicon is  $297 \text{ kJmol}^{-1}$  hence catenation character is observed in silicon and it forms limited hydride compounds, having formula  $\text{Si}_n \text{H}_{2n+2}$  where  $n = 1$  to 8, and these compounds are also known as silanes. The stability of silane compounds are less compared to hydrides of carbon and hence reducing power is more. Silicon also forms silicon dioxide known as silica and more than 22 allotropic structures are known in which some are crystalline and some are amorphous. Silica is acidic and hence it dissolves in liquid alkali or alkaline carbonate to form silicate compounds. Silicon reacts with only  $\text{F}_2$  and form  $\text{SiF}_4$  while reacts with  $\text{Cl}_2$  and form  $\text{SiCl}_4$ . The hydrolysis of  $\text{SiCl}_4$  gives silicic acid and the mechanism for hydrolysis are in two steps. The silicones are synthetic materials containing  $\text{Si} - \text{O} - \text{Si}$  bond linkage. These compounds are polymeric substances containing  $\text{R}_2\text{SiO}$  repeating unit. The general formula is  $(\text{R}_2 \text{SiO})_n$ , where R is methyl or phenyl group. The empirical formula is  $\text{R}_2\text{SiO}$  which is similar to that of organic compound, ketone, so it is called silicone. The preparation, properties and uses are as given in the text. Approximately 95% of earth's crust consists of silicates and silica compounds, containing independent  $\text{SiO}_4^{4-}$  having tetrahedral structure. The types of silicates depending upon the number of corners (0, 1, 2, 3 and 4) of the  $\text{SiO}_4^{4-}$  tetrahedron are shared with other tetrahedrons and based on that they are classified as given in the text. In a three dimensional structure of  $\text{SiO}_2$ , its  $\text{Si}^{4+}$  partially substituted by  $\text{Al}^{3+}$  gives aluminosilicate are called feldspar and zeolites. In zeolites the  $\text{SiO}_4^{4-}$  and  $\text{AlO}_4^{5-}$  tetrahedron joined together in simple way to form three dimensional network. The uses of silicates are as a molecular sieves and shape selectives catalyst. One important catalyst of silicate is ZSM-5 used in petrochemical industry which converts alcohol directly into gasoline.

The elements of groups 13 to 18 in the periodic table are known as p-block elements. The general electronic configuration of these elements is  $ns^2np^{1-6}$ . We have studied about the elements of groups 15, 16, 17 and 18 in this unit.

### General introduction of elements of groups 15, 16, 17, 18

Common name/ Identification	group 15	group 16	group 17	group 18
	Nitrogen group	Chalogens or Oxygen group	Halogen Group	Noble Gas Group
Electronic configuration of valence shell	$ns^2np^3$	$ns^2np^4$	$ns^2np^5$	$ns^2np^6$
Oxidation state	N -3, to +5	O -2, -1, +1, +2	F -1	Ne -
	P, As -3, +3, +5	S, Se, Te -2, +2, +4, +6	Cl, Br, I -1, +1, +3, +5, +7	Xe +2, +4, +6, +8
	Sb, Bi +3, +5	Po +2, +4	-	-

The periodicity in properties of elements of groups 15,16,17,18.

				18
	15	16	17	He
2p	N	O	F	Ne
3p	P	S	Cl	Ar
4p	As	Se	Br	Kr
5p	Sb	Te	I	Xe
6p	Bi	Po	At	Rn

The first element of group 15, differs in many aspects from the other elements in the group. The reason for which is its smaller size, the capacity of formation of  $p\pi-p\pi$  triple bond between, nitrogen atoms and the nonavailability of d-orbitals. As we go down from above in the group, variations are found in properties. Dinitrogen ( $N_2$ ) can be prepared in the laboratory as well as on commercial level. The oxides of nitrogen element are  $N_2O$ ,  $NO$ ,  $N_2O_3$ ,  $N_2O_4$  and  $N_2O_5$  which possess resonance forms. Ammonia and nitric acid are compounds of nitrogen. Phosphorus element exists as  $P_4$  molecule. It has many allotropes. It forms hydrides, halides and oxoacid compounds.

Polonium element of group 16 is radioactive. Oxygen forms metal oxides with metals. Ozone is a strong oxidising agent. Sulphur element possess different allotropes. Out of these  $\alpha$  and  $\beta$  allotropes are very important. Sulphur element combines with oxygen and forms oxide compounds like  $SO_2$  and  $SO_3$ . Out of the different oxoacids of sulphur, sulphuric acid is very important. It is called 'King of Chemicals.'

Astatine element of group 17 is radioactive. As these elements require one electron to have stable electronic configuration, they are very reactive. As a result of this, the elements of this group are not available in free state, but are available in the combined state as negative ions. The elements of this group form oxides, hydrogen halides, interhalogen compounds and oxoacid compounds.

Radon element of group 18 is radioactive. As the octet structure is complete in all the elements of this group they are chemically inert. Xenon element of this group, under specific reaction conditions combine with fluorine and oxygen elements and form fluoride and oxide compounds.

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### M.C.Q.

#### Boron Family

- (1) Boron form covalent Compound due to  
(a) Higher ionisation enthalpy (b) Lower ionisation enthalpy  
(c) Small size (d) Both (a) and (c)
- (2) In diborane the Two H-B-H angles are nearly  
(a)  $60^\circ, 120^\circ$  (b)  $95^\circ, 120^\circ$  (c)  $95^\circ, 150^\circ$  (d)  $120^\circ, 180^\circ$
- (3) The stability of +1 oxidation state increases in the sequence  
(a)  $\text{Al} < \text{Ga} < \text{In} < \text{Tl}$  (b)  $\text{Tl} < \text{In} < \text{Ga} < \text{Al}$  (c)  $\text{In} < \text{Tl} < \text{Ga} < \text{Al}$  (d)  $\text{Ga} < \text{In} < \text{Al} < \text{Tl}$
- (4) Which of the following is most acidic  
(a)  $\text{Na}_2\text{O}$  (b)  $\text{MgO}$  (c)  $\text{Al}_2\text{O}_3$  (d)  $\text{CaO}$
- (5) When Orthoboric acid ( $\text{H}_3\text{BO}_3$ ) is strongly heated, the residue is  
(a) Meta boric acid (b) Boron (c)  $\text{Al}_2\text{O}_3, 2\text{H}_2\text{O}$  (d) None of above
- (6) Bauxite has the composition  
(a)  $\text{Al}_2\text{O}_3$  (b)  $\text{Al}_2\text{O}_3, \text{H}_2\text{O}$  (c)  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$  (d) None of above
- (7) Which one of the following is correct statement  
(a) The hydroxide of aluminium is more acidic than that of boron  
(b) The hydroxide of boron is basic, while that of aluminium is amphoteric  
(c) The hydroxide of boron is acidic, while that of aluminium is amphoteric  
(d) The hydroxide of boron & aluminium are amphoteric
- (8)  $\text{AlCl}_3$  is  
(a) Anhydrous & covalent (b) Anhydrous & ionic  
(c) covalent & basic (d) coordinate & acidic
- (9) Aluminium (III) chloride forms a dimer because  
(a) Higher coordination number can be achieved by aluminium  
(b) Aluminium has high ionization energy  
(c) Aluminium belongs to III group  
(d) It cannot form a trimer
- (10) Aluminium has a great affinity for oxygen & its oxidation is an exothermic process. This fact is used in  
(a) Preparing thin foils of aluminium (b) Making utensils  
(c) Preparing duralumin alloy (d) Thermite welding
- (11) Which of the following is an amphoteric oxide.  
(a)  $\text{MgO}$  (b)  $\text{Al}_2\text{O}_3$  (c)  $\text{Cl}_2\text{O}_7$  (d)  $\text{Ti}_2\text{O}_2$
- (12) When Al is added to KOH solution  
(a) No action takes place (b) Oxygen is evolved  
(c) Water is produced (d) Hydrogen is evolved

- (13) Aluminium is more reactive than iron. But Aluminium is less easily corroded than iron because
- (a) Aluminium is noble metal (b) Oxygen forms a protective oxide layer  
 (c) Iron undergoes reaction easily with water (d) Iron forms mono and divalent ions
- (14) Aluminium vessels should not be washed with materials containing washing soda since
- (a) Washing soda is expensive  
 (b) Washing soda is easily decomposed  
 (c) Washing soda reacts with aluminium to form soluble aluminate  
 (d) Washing soda reacts with aluminium to form insoluble aluminium oxide
- (15) Which of the statements about anhydrous aluminium chloride is correct
- (a) It exists as  $\text{AlCl}_3$  molecule (b) It is not easily hydrolysed  
 (c) It sublimes at  $100^\circ\text{C}$  under vacuum (d) It is a strong Lewis base
- (16) Number of water molecules in Mohr's salt is
- (a) 7 (b) 6 (c) 5 (d) 8
- (17) The liquid metal expanding on solidification is
- (a) Ga (b) Al (c) Zn (d) Ca
- (18) Aluminium chloride exists as dimer,  $\text{Al}_2\text{Cl}_6$  in solid state as well as in solution of non-polar solvents such as benzene when dissolved in water gives
- (a)  $[\text{Al}(\text{OH})_6]^{3-} + 3\text{HCl}$  (b)  $[\text{Al}(\text{H}_2\text{O})_6]^{3+} + 3\text{Cl}^-$  (c)  $\text{Al}^{3+} + 3\text{Cl}^-$  (d)  $\text{Al}_2\text{O}_3 + 6\text{HCl}$
- (19) The hardest substance amongst the following is
- (a)  $\text{Be}_2\text{C}$  (b) Graphite (c) Titanium (d) SiC
- (20) Inorganic Benzene is
- (a)  $\text{B}_2\text{H}_6$  (b)  $\text{B}_3\text{N}_3\text{H}_6$  (c)  $\text{B}_3\text{O}_3\text{H}_6$  (d)  $(\text{BH}_3)_3$
- (21) Anhydrous  $\text{AlCl}_3$  cannot be obtained from which of the following reactions
- (a) Heating  $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$   
 (b) By passing dry HCl over hot aluminium powder  
 (c) By passing dry  $\text{Cl}_2$  over hot aluminium powder  
 (d) By passing dry  $\text{Cl}_2$  over a hot mixture of alumina and coke
- (22) Diborane combines with ammonia at  $120^\circ\text{C}$  to give
- (a)  $\text{B}_2\text{H}_6 \cdot \text{NH}_3$  (b)  $\text{B}_2\text{H}_6 \cdot 2\text{NH}_3$  (c)  $\text{B}_2\text{H}_6 \cdot 3\text{NH}_3$  (d)  $\text{B}_2\text{H}_6 \cdot 4\text{NH}_3$
- (23) Which metal burns in air at high temperature with the evolution of much heat.
- (a) Cu (b) Hg (c) Pb (d) Al
- (24) Aluminium hydroxide is soluble in excess of sodium hydroxide forming the ion
- (a)  $\text{AlO}_2^{3+}$  (b)  $\text{AlO}_2^{-3}$  (c)  $\text{AlO}_2^-$  (d)  $\text{AlO}_3^-$

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- (25) Moissan boron is \_\_\_\_\_
- (a) Amorphous boron of ultra purity (b) Crystalline boron of ultra purity  
(c) Amorphous boron of low purity (d) Crystalline boron of low purity
- (26) Which of the following is only acidic in nature
- (a)  $\text{Be}(\text{OH})_2$  (b)  $\text{Mg}(\text{OH})_2$  (c)  $\text{B}(\text{OH})_3$  (d)  $\text{Al}(\text{OH})_3$
- (27) Which of the following does not exist in free form
- (a)  $\text{BF}_3$  (b)  $\text{BCl}_3$  (c)  $\text{BBr}_3$  (d)  $\text{BH}_3$
- (28) Alumina is \_\_\_\_\_
- (a) Acidic (b) Basic (c) Amphoteric (d) None of these
- (29) Hydrogen gas will not produce
- (a) Heated cupric oxide (b) Heated ferric oxide  
(c) Heated stannic oxide (d) Heated aluminium oxide
- (30) Conc.  $\text{HNO}_3$  \_\_\_\_\_
- (a) Reacts with aluminium vigorously  
(b) Reacts with aluminium to form aluminium nitrate.  
(c) Doesn't react with aluminium  
(d) Reacts with platinum
- (31) Anhydrous  $\text{AlCl}_3$  is obtained from
- (a) Dilute  $\text{HCl}$  & aluminium metal (b) Aluminium & chlorine gas.  
(c) Hydrogen chloride gas & aluminium metal (d) None of the above
- (32) Which is true for an element & present in III group of the periodic table
- (a) It is gas at room temperature (b) It has oxidation state of +4  
(c) It forms  $\text{R}_2\text{O}_3$  (d) It forms  $\text{RX}_2$
- (33) An aqueous solution of borax is
- (a) neutral (b) acidic (c) basic (d) none
- (34) Crystalline metal can be transformed into metallic glass by
- (a) alloying (b) Pressing into thin plates  
(c) slow cooling of molten metal (d) Very rapid cooling of the molten metal
- (35) Which metal is protected by a layer of its own oxide
- (a) Al (b) Ag (c) Au (d) Fe
- (36)  $\text{B}(\text{OH})_3 + \text{NaOH} \rightleftharpoons \text{NaBO}_2 + \text{Na}[\text{B}(\text{OH})_4] + \text{H}_2\text{O}$  How can this reaction be made to proceed in forward direction.
- (a) Addition of cis Benzene - 1,2-diol (b) Addition of Borax  
(c) Addition of trans-Benzene 1,2-diol (d) Addition of  $\text{Na}_2\text{HPO}_4$

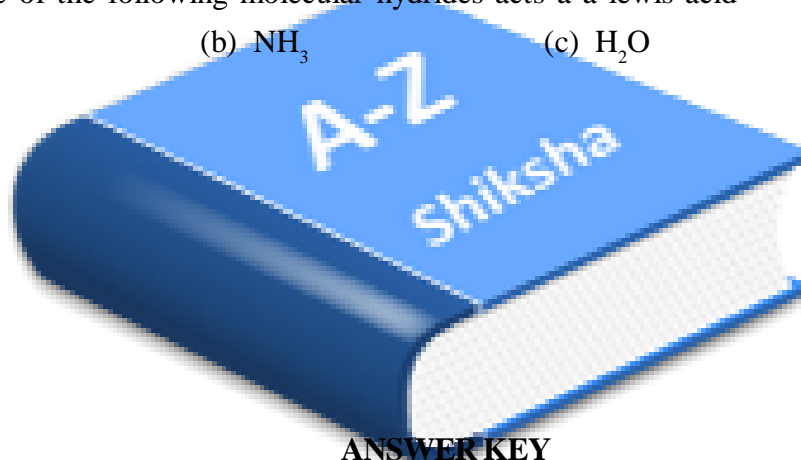


- (37) An element A dissolves both in acid and alkali. It is an example of  
 (a) Allotropic nature of A (b) Dimorphic nature of A  
 (c) Amorphous nature of A (d) Amphoteric nature of A
- (38) Which among the following is not a borane.  
 (a)  $B_2H_6$  (b)  $B_3H_6$  (c)  $B_4H_{10}$  (d) None of these
- (39) In Goldschmidt aluminothermic process, thermite contains  
 (a) 3 parts of  $Al_2O_3$  and 4 Parts of Al (b) 3 parts of  $Fe_2O_3$  and 2 parts of Al  
 (c) 3 Parts of  $Fe_2O_3$  and 1 part of Al (d) 1 Part of  $Fe_2O_3$  and 1 Part of Al
- (40) Aluminium oxide is not reduced by chemical reactions since  
 (a) Aluminium oxide is reative (b) Reducing agents contaminate  
 (c) Aluminium oxide is highly stable (d) The process pollutes the environment
- (41) Aluminium is not used  
 (a) In silvery paints (b) For making utensils  
 (c) As a reducing agent (d) As oxidizer in metalurgy
- (42) Bauxite containing impurities of iron oxide is purified by  
 (a) Hoop's Process (b) Serpeck's Process (c) Bayer's Process (d) Electrolytic process
- (43) In the purification of Bauxite by Hall's process  
 (a) Bauxite ore is heated with NaOH solution at  $50^\circ C$   
 (b) Bauxite ore is heated with  $NaHCO_3$   
 (c) Bauxite ore is fused with coke and heated at  $1800^\circ C$  in a current of nitrogen  
 (d) Bauxite ore is heated with  $NaHCO_3$
- (44) The molecular formula of feldspar is  
 (a)  $K_2O \cdot Al_2O_3 \cdot 6SiO_2$  (b)  $K_2O \cdot 3Al_2O_3 \cdot 6SiO_2$   
 (c)  $Na_3AlF_6$  (d)  $CaSO_4 \cdot 2H_2O$
- (45) Common alum is  
 (a)  $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$  (b)  $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$   
 (c)  $K_2SO_4 \cdot Fe_2(SO_4)_3 \cdot 24H_2O$  (d)  $(NH_4)_2SO_4 \cdot FeSO_4 \cdot 6H_2O$
- (46) Which of the following is not true about potash Alum  
 (a) It's empirical formula is  $KAl(SO_4)_2 \cdot 12H_2O$  (b) It's aqueous solution is basic  
 (c) It is Used in dyeing industries  
 (d) On heating it melts in it's water of crystallization
- (47) Which of the following statements about  $H_3BO_3$  is not correct.  
 (a) It is a strong tribasic acid  
 (b) It is prepared by acidifying an aqueous solution of Borax.  
 (c) It has a layer structure in which planar  $BO_3^{3-}$  Units are joined by hydrogen bonds.  
 (d) It doesn't act as proton donar but acts as a lewis acid by accepting hydroxyl ion.

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- (48) The type of hybridization of boron in diborane is.  
(a)  $Sp$ - hybridization (b)  $Sp^2$  - hybridization (c)  $Sp^3$  - hybridization (d)  $Sp^3d^2$  - hybridization
- (49) 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
- (50) Soft heavy metal melts at  $30^\circ C$  and is used in making heat sensitive thermometers, the metal is  
(a) Gallium (b) Sodium (c) Potassium (d) cesium
- (51) In the reaction  $B_2O_3 + C + Cl_2 \rightarrow A + CO$ . The A is  
(a)  $BCl_3$  (b)  $BCl_2$  (c)  $B_2Cl_2$  (d)  $CCl_2$
- (52) The most acidic of the following compound is  
(a)  $P_2O_3$  (b)  $Sb_2O_3$  (c)  $B_2O_3$  (d)  $As_2O_3$
- (53) Heating an aqueous solution of aluminium chloride to dryness will give  
(a)  $AlCl_3$  (b)  $Al_2Cl_6$  (c)  $Al_2O_3$  (d)  $Al(OH)Cl_2$
- (54) Which of the following is the electron deficient molecule  
(a)  $B_2H_6$  (b)  $C_2H_6$  (c)  $PH_3$  (d)  $SiH_4$
- (55) The structure of diborane Contains  
(a) four  $2c - 2e$  bonds and two  $3c - 2e$  bonds  
(b) Two  $2c - 2e$  bonds and Four  $3c - 2e$  bonds  
(c) Two  $2c - 2e$  bonds and two  $3c - 3e$  bonds  
(d) Four  $2c - 2e$  bonds and four  $3c - 2e$  bonds
- (56) In Hall Heroult's process, the main reagent is mixed with  
(a)  $B_2 H_6$  (b)  $C_2 H_6$  (c)  $Na_3AlF_6$  (d)  $SiH_4$
- (57) Which of the following statement is incorrect  
(a) Al react with excess NaOH to give  $Al(OH)_3$   
(b)  $NaHCO_3$  on heating gives  $Na_2CO_3$   
(c) Pure sodium metal dissolves in liquid ammonia to give blue solution  
(d) NaOH reacts with glass to give sodium silicate
- (58) Which of the following is nonmetal  
(a) Ga (b) In (c) Th (d) B
- (59) Which one of the following statements about diborane is not true  
(a) The B atoms in it are  $SP^3$  hybridised  
(b) It contains two 3-centre-2-electron bonds  
(c) All B-H bond lengths in it are equal due to resonance  
(d) The molecule contains 12 valence electrons



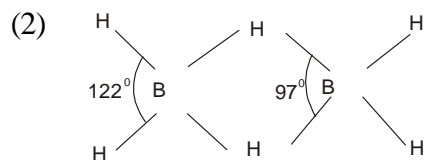
- (60) Boron shows single oxidation state due to absence of  
 (a) Inert pair effect      (b) Screening effect  
 (c) Isotope effect      (d) None
- (61) Which of the following is non - existent  
 (a)  $\text{AlF}_6^{3-}$       (b)  $\text{COF}_6^{3-}$       (c)  $\text{BF}_6^{2-}$       (d)  $\text{SiF}_6^{2-}$
- (62) Which of the processes is used in thermite welding  
 (a)  $\text{TiO}_2 + 4\text{Na} \rightarrow \text{Ti} + 2\text{Na}_2\text{O}$       (b)  $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$   
 (c)  $\text{SnO}_2 + 2\text{C} \rightarrow \text{Sn} + 2\text{CO}$       (d)  $\text{Cr}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Cr}$
- (63) In which of the following molecules is hydrogen bond absent  
 (a) Water      (b) Inorganic benzene      (c) Diborane      (d) Methanol
- (64) The tendency of  $\text{BF}_3$ ,  $\text{BCl}_3$  &  $\text{BBr}_3$  to behave as lewis acid decreases in the sequence  
 (a)  $\text{BF}_3 > \text{BCl}_3 > \text{BBr}_3$       (b)  $\text{BCl}_3 > \text{BF}_3 > \text{BBr}_3$   
 (c)  $\text{BBr}_3 > \text{BCl}_3 > \text{BF}_3$       (d)  $\text{BBr}_3 > \text{BF}_3 > \text{BCl}_3$
- (65) Which one of the following molecular hydrides acts a a lewis acid  
 (a)  $\text{CH}_4$       (b)  $\text{NH}_3$       (c)  $\text{H}_2\text{O}$       (d)  $\text{B}_2\text{H}_6$



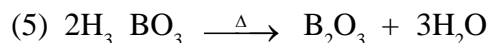
**ANSWER KEY**

1	d	16	b	31	c	46	d	61	c
2	b	17	a	32	c	47	a	62	b
3	a	18	b	33	c	48	c	63	c
4	c	19	c	34	d	49	d	64	c
5	a	20	b	35	a	50	a	65	d
6	c	21	a	36	a	51	a		
7	c	22	b	37	d	52	c		
8	a	23	d	38	b	53	c		
9	a	24	c	39	c	54	a		
10	d	25	c	40	c	55	a		
11	b	26	c	41	d	56	c		
12	d	27	d	42	c	57	a		
13	b	28	c	43	b	58	d		
14	c	29	d	44	a	59	c		
15	c	30	c	45	a	60	a		

## HINTS

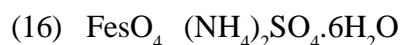
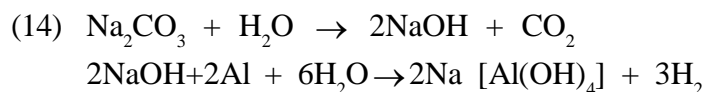
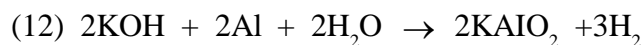


(3) The Order is due to inert pair effect

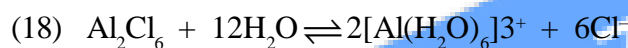


(7)  $\text{B}(\text{OH})_3 \rightarrow \text{H}_3\text{BO}_3$  (Boric acid),  $\text{Al}(\text{OH})_3 \rightarrow$  amphoteric

(11)  $\text{Al}_2\text{O}_3$  is an amphoteric Oxide



(17) Liquified Ga expand on solidification Ga is less electropositive in nature. It has the weak metallic bond. so it expand on solidification



(19)  $\text{B}_4\text{C}$  is the hardest substance along with diamond



Thus  $\text{AlCl}_3$  cannot be obtained by this method

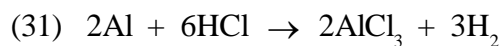


Thus  $\text{AlCl}_3$  cannot be obtained by this method.

(26) Except  $\text{B}(\text{OH})_3$  all other hydroxides are of metallic hydroxide having the basic nature  $\text{B}(\text{OH})_3$  are the hydroxides of non metal showing the acidic nature.

(27) Boro form different hydrides of general formula  $\text{B}_n\text{H}_{n+4}$  and  $\text{B}_n\text{H}_{n+6}$  but  $\text{BH}_3$  is unknown.

(28) Alumina is amphoteric oxide which reacts with acid as well as base



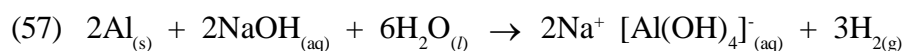
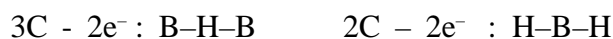
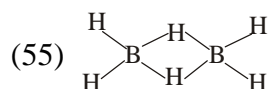
(32)  $\text{Al} \rightarrow$  III group  $\rightarrow$  form  $\text{Al}_2\text{O}_3$

(36) Due to formation of chelated complex, the reaction moves in forward direction.

(39) In aluminothermic process, Thermite contains 3 parts of  $\text{Fe}_2\text{O}_3$  and one part of Al.

(40) Aluminium oxide is highly stable therefore it is not reduced by chemical reactions

(49)  $\text{B}_2\text{H}_6$  has two types of B - H bonds.



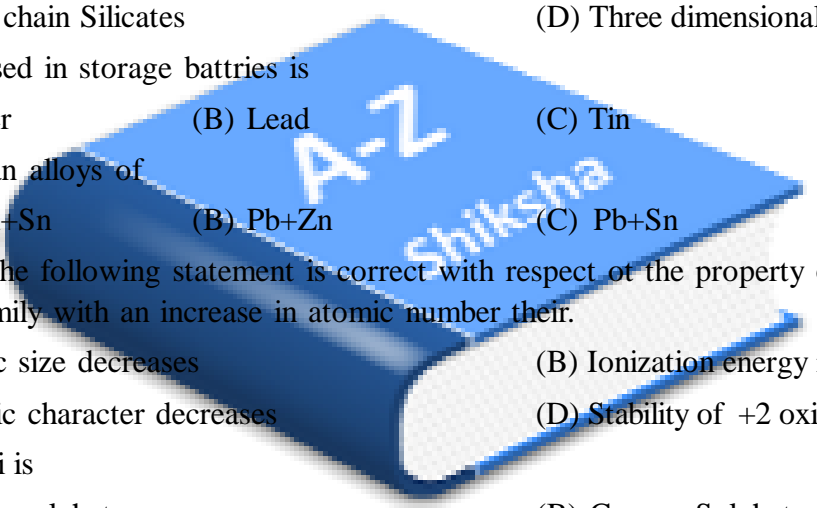
sodium tetra hydroxo aluminate (III)

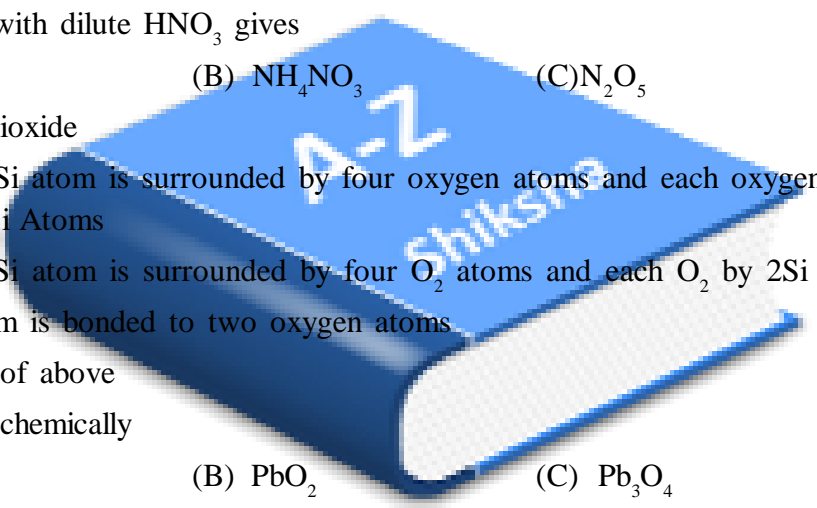
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## CARBON FAMILY

- (1) The compound which does not possess a peroxide linkage is  
(A)  $\text{Na}_2\text{O}_2$  (B)  $\text{CrO}_5$  (C)  $\text{H}_2\text{SO}_5$  (D)  $\text{PbO}_2$
- (2) Soldiers of Napoleon army while at Alps during freezing winter suffered a serious problem as regards To the tin buttons of their uniforms. white metallic tin buttons got converted to grey powder. This Transformation is related to  
(A) A change in the partial pressure of oxygen in the air  
(B) A change in the crystalline structure of tin  
(C) An interaction with nitrogen of air at very low to temperatures  
(D) An interaction with water vapour contained in the humid air.
- (3) Which one of the following statements about the zeolites is false  
(A) Zeolites are aluminosilicates having 3D network  
(B) Some of the  $\text{SiO}_4^{4-}$  units are replaced by  $\text{AlO}_4^{5-}$  and  $\text{AlO}_6^{9-}$  ions in zeolites  
(C) They are used as cation exchangers  
(D) They have open structure which enables them to take up small molecules.
- (4) Which of the following acts UV rays  
(A) Soda glass (B) Crook's glass (C) Pyrex (D) None
- (5) The Stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence  
(A)  $\text{GeX}_2 \leq \text{SiX}_2 \leq \text{SnX}_2 \leq \text{PbX}_2$  (B)  $\text{SiX}_2 \leq \text{GeX}_2 \leq \text{PbX}_2 \leq \text{SnX}_2$   
(C)  $\text{SiX}_2 \leq \text{GeX}_2 \leq \text{SnX}_2 \leq \text{PbX}_2$  (D)  $\text{PbX}_2 \leq \text{SnX}_2 \leq \text{GeX}_2 \leq \text{SiX}_2$
- (6) Sodium oxalate on heating with cone  $\text{H}_2\text{SO}_4$  gives  
(A) CO Only (B)  $\text{CO}_2$  Only (C) CO and  $\text{CO}_2$  (D)  $\text{SO}_2$  and  $\text{SO}_3$
- (7) Glass reacts with HF to produce  
(A)  $\text{SiF}_4$  (B)  $\text{H}_2\text{SiF}_6$  (C)  $\text{H}_2\text{SiO}_3$  (D)  $\text{Na}_3\text{AlF}_6$
- (8) Extraction of lead by reduction methods done by  
(A) adding more galena into reverberatory furnace  
(B) Adding more lead sulphate in reverberatory furnace  
(C) Adding more galena and coke into the reverberatory furnace  
(D) Self reduction of oxide form sulphide present in the furnace.
- (9) Which is used to produce smoke screen  
(A) Calcium phosphide (B) Zinc sulphide (C) Sodium carbonate (D) Zinc phosphide
- (10) When tin is treated with concentrated nitric acid  
(A) It is converted in to stannous nitrate (B) It is converted in to stannic nitrate  
(C) It is converted in to metastannic acid (D) It becomes passive

- (11) In III A group Tl (thallium) shows +1 Oxidation state while other members show +3 oxidation state. Why?
- (A) Presence of lone pair of electron in Tl. (B) Inert pair effect  
(C) Large Ionic radius of Tl ion (D) None
- (12) Carbon suboxide  $C_3O_2$  has
- (A) Linear structure (B) Bent structure  
(C) Trigonal planar structure (D) Distorted tetrahedral structure.
- (13) Which of the following is a mixed oxide
- (A)  $Fe_2O_3$  (B)  $PbO_2$  (C)  $Pb_3O_4$  (D)  $BaO_2$
- (14) Noble gases are absorbed in
- (A) Anhydrous  $CaCl_2$  (B) Charcoal (C) Conc,  $H_2SO_4$  (D) Coconut
- (15) Solid  $CO_2$  is known as dry ice because
- (A) it melts as  $0^\circ C$  (B) it evaporates at  $40^\circ C$   
(C) it evaporates at  $-78^\circ C$  without melting (D) its boiling point is more than  $199^\circ C$
- (16) Carborundum is
- (A) SiC (B)  $AlCl_3$  (C)  $Al_2(SO_4)_3$  (D)  $Al_2O_3 \cdot 9H_2O$
- (17)  $H_2O_2$  on reaction with PbS gives
- (A) PbO (B)  $PbSO_4$  (C)  $PbO_2$  (D)  $PbHSO_4$
- (18) Which of the following statements is incorrect
- (A) Silicon is extensively used as a semiconductor (B) Carborandum is SiC  
(C) Silicon occurs in free state in nature (D) Mica contains the element silicon
- (19)  $SiF_4$  gets hydrolysed gives
- (A)  $SiO_2$  (B)  $Si(OH)_2F_2$  (C)  $H_2SiF_6$  (D)  $Si(OH)_4$
- (20) Silicon is an important constituent of
- (A) Rocks (B) Amalgams (C) Chlorophyll (D) Haemoglobin
- (21) The number of unpaired electrons in carbon atom is
- (A) 1 (B) 2 (C) 3 (D) 4
- (22) Colour is imparted to glass by mixing
- (A) Synthetic gas (B) Metal oxide  
(C) Oxide of non - metal (D) Coloured Salt
- (23) Which of the following glass is used in making wind screen of automobiles.
- (A) Crook's Glass (B) Jena Glass (C) Safety Glass (D) Pyrex Glass
- (24) Which of the following is insoluble in water
- (A)  $Na_2CO_3$  (B)  $CaCO_3$  (C)  $ZnCO_3$  (D)  $Al_2(CO_3)_3$
- (25) In which of the following the inert pair effect is most prominent
- (A) C (B) Si (C) Ge (D) pb

- 
- (26) Plumbosolubility implies dissolution of lead in  
(A) Bases (B) Acids (C) Ordinary Water (D)  $\text{CuSO}_4$
- (27) Which of the following glass is used to make lenses and prisms  
(A) Flint (B) Jena (C) Pyrex (D) Quartz
- (28)  $\text{N}_2$  gas is absorbed by  
(A) Calcium hydroxide (B) Ferrous sulphate  
(C) Calcium Carbide (D) Aluminium Carbide
- (29) White lead is  
(A)  $\text{PbCO}_3$  (B)  $\text{PbCO}_3 \cdot \text{PbO}$  (C)  $2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$  (D)  $2\text{PbSO}_4 \cdot \text{PbO}$ .
- (30) Red lead is  
(A)  $\text{Pb}_3\text{O}_4$  (B)  $\text{PbO}$  (C)  $\text{PbO}_2$  (D)  $\text{Pb}_4\text{O}_3$
- (31) Name of the structure of silicates in which three oxygen atoms of  $[\text{SiO}_4]^{4-}$  are shared is  
(A) pyrosilicate (B) Sheet Silicate  
(C) Linear chain Silicates (D) Three dimensional Silicate
- (32) A metal used in storage batteries is  
(A) Copper (B) Lead (C) Tin (D) Nickel
- (33) Solder is an alloy of  
(A)  $\text{Pb}+\text{Zn}+\text{Sn}$  (B)  $\text{Pb}+\text{Zn}$  (C)  $\text{Pb}+\text{Sn}$  (D)  $\text{Sn}+\text{Zn}$
- (34) Which of the following statement is correct with respect to the property of elements in the carbon Family with an increase in atomic number their.  
(A) Atomic size decreases (B) Ionization energy increases  
(C) Metallic character decreases (D) Stability of +2 oxidation state increases
- (35) Lapis lazuli is  
(A) Ferrous sulphate (B) Copper Sulphate  
(C) Sodium Alumino Silicate (D) Zinc Sulphate
- (36) 'Lead pencil' contains  
(A)  $\text{PbS}$  (B) Graphite (C)  $\text{FeS}$  (D)  $\text{Pb}$
- (37) Which of the following gives propyne on hydrolysis  
(A)  $\text{Al}_4\text{C}_3$  (B)  $\text{Mg}_2\text{C}_3$  (C)  $\text{B}_4\text{C}$  (D)  $\text{La}_4\text{C}_3$
- (38) The ionic carbide is  
(A)  $\text{ZnC}$  (B)  $\text{TiC}$  (C)  $\text{SiC}$  (D)  $\text{CaC}_2$
- (39) Which of the following is not iso structural with  $\text{SiCl}_4$   
(A)  $\text{PO}_4^{3-}$  (B)  $\text{NH}_4^+$  (C)  $\text{SCl}_4$  (D)  $\text{SO}_4^{2-}$
- (40) For prevention of rusting of iron which is used in paints.  
(A)  $\text{PbO}$  (B)  $\text{PbO}_2$  (C)  $\text{Pb}_3\text{O}_4$  (D)  $\text{PbSO}_4$
- 

- 
- (41) Diamond is harder than graphite because  
(A) Graphite is planar (B) Diamond has free electron  
(C) Graphite is  $sp^3$  hybridized (D) None
- (42) Supercritical  $CO_2$  is used as  
(A) Dry ice (B) Fire fighting  
(C) A Solvent for extraction of organic compound from natural sources  
(D) A highly inert medium for carrying out various reactions.
- (43) Products formed on heating  $Pb(NO_3)_2$  are  
(A)  $PbO$ ,  $N_2$ ,  $O_2$  (B)  $Pb(NO_2)_2$ ,  $O_2$  (C)  $PbO$ ,  $NO_2$ ,  $O_2$  (D)  $Pb$ ,  $N_2$ ,  $O_2$
- (44) Which of the following lead oxide is 'Sindhur'  
(A)  $PbO$  (B)  $PbO_2$  (C)  $Pb_2O_3$  (D)  $Pb_3O_4$
- (45) Percentage of lead in lead pencil is  
(A) 0 (B) 20 (C) 80 (D) 70
- (46)  $Pb$  reacts with dilute  $HNO_3$  gives  
(A)  $NO$  (B)  $NH_4NO_3$  (C)  $N_2O_5$  (d)  $NO_2$
- (47) In silicon dioxide  
(A) Each Si atom is surrounded by four oxygen atoms and each oxygen atom is bonded to two Si Atoms  
(B) Each Si atom is surrounded by four  $O_2$  atoms and each  $O_2$  by 2Si atom  
(C) Si atom is bonded to two oxygen atoms  
(D) None of above
- (48) Litharge is chemically  
(A)  $PbO$  (B)  $PbO_2$  (C)  $Pb_3O_4$  (D)  $Pb(CH_3COO)_2$
- (49) Which of the following has most density  
(A) Fe (B) Ca (C) B (D) Pb
- (50) Red lead is an example of an \_\_\_\_\_ Oxide  
(A) Basic (B) Super (C) Mixed (D) Amphoteric
- (51) Element showing the phenomenon of allotropy is \_\_\_\_\_  
(A) Aluminium (B) Lead (C) Tin (D) Copper
- (52) Which of the following is a metalloid  
(A) Bi (B) Sn (C) Ge (D) C
- (53) Which gas is liberated when  $Al_4C_3$  is hydrolysed  
(A)  $CH_4$  (B)  $C_2H_2$  (C)  $C_2H_6$  (D)  $CO_2$
- (54) Which of the following attacks glass  
(A)  $HCl$  (B)  $HF$  (C)  $HI$  (D)  $HBr$
- 

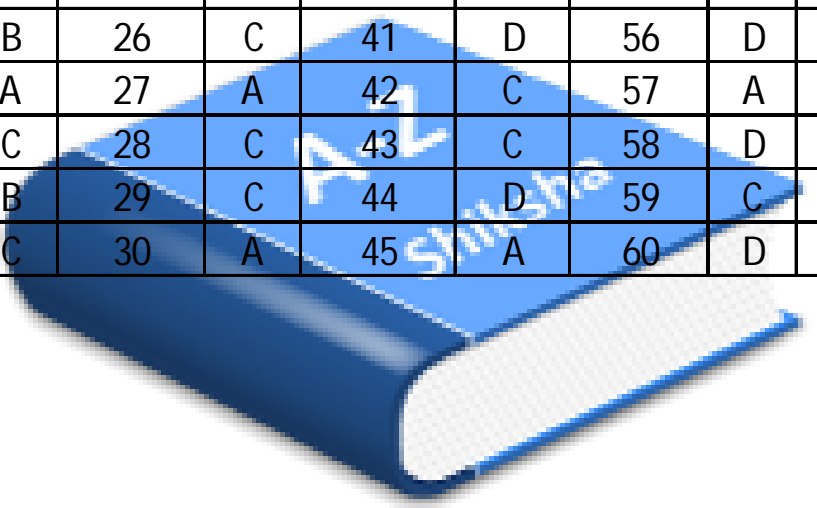


- (55) Dry ice is  
 (A) Solid  $\text{CO}_2$  (B) Solid  $\text{NO}_2$  (C) Solid  $\text{SO}_2$  (D) None
- (56)  $\text{SiCl}_4$  on hydrolysis forms 'X' & HCl Compound 'X' loses water at  $1000^\circ\text{C}$  & gives 'Y'. Compound 'X' & 'Y' are respectively.  
 (A)  $\text{H}_2\text{SiCl}_6$ ,  $\text{SiO}_2$  (B)  $\text{H}_2\text{SiO}_4$ , Si (C)  $\text{SiO}_2$ , Si (D)  $\text{H}_4\text{SiO}_4$ ,  $\text{SiO}_2$
- (57)  $\text{Pb} + \text{Conc. HNO}_3$  gives  
 (A)  $\text{Pb}(\text{NO}_3)_2 + \text{NO}_2$  (B)  $\text{PbNO}_3 + \text{NO}$  (C)  $\text{Pb}(\text{NO}_3)_4 + \text{NO}_3$  (D)  $\text{Pb}(\text{NO}_3)_3 + \text{N}_2\text{O}$
- (58) Which of the following has least tendency to undergo catenation  
 (A) C (B) Si (C) Ge (D) Sn
- (59) The products of the following reaction are  $\text{SiO}_2 + \text{C} \xrightarrow{\Delta}$   
 (A) SiC &  $\text{CO}_2$  (B) SiO & CO (C) SiC & CO (D) Si &  $\text{CO}_2$
- (60)  $\text{PbO}_2$  is  
 (A) Basic (B) Acidic (C) Neutral (D) Amphoteric
- (61) On controlled hydrolysis and condensation  $\text{R}_3\text{SiCl}$  yields  
 (A)  $\text{R}_3\text{Si-O-SiR}_3$  (B)  $\text{[R}_3\text{Si-O-SiR}_3\text{]}_n$  (C)  $\text{R}_3\text{SiOH}$  (D)  $\text{R}_3\text{Si}_4\text{O}_4$
- (62) Hydrolysis of which of the following does not occur?  
 (A)  $\text{VCl}_4$  (B)  $\text{TiCl}_4$  (C)  $\text{SiCl}_4$  (D)  $\text{CCl}_4$
- (63) Pure silicon doped with phosphorous is a  
 (A) Metallic conductor (B) Insulator  
 (C) n - type semiconductor (D) P - type semiconductor
- (64) Carbogen is a mixture of  
 (A)  $\text{CO} + \text{N}_2$  (B)  $\text{CO} + \text{O}_2$  (C)  $\text{CO}_2 + \text{O}_2$  (D)  $\text{C} + \text{H}_2 + \text{N}_2$
- (65) The element evolving two different gases on reaction with conc.  $\text{H}_2\text{SO}_4$  is \_\_\_\_\_.  
 (A) P (B) C (C) Hg (D) S
- (66) Carborundum is obtained when silica is heated at high temperature with  
 (A) C (B) CO (C)  $\text{CO}_2$  (D)  $\text{CaCO}_3$
- (67) Lead pipes are corroded quickly by  
 (A) Dil  $\text{H}_2\text{SO}_4$  (B) Conc.  $\text{H}_2\text{SO}_4$  (C) Acetic Acid (D) Water
- (68) Which is the correct oxidation state of lead  
 (A) +2, +4 (B) +1, +2 (C) +3, +4 (D) +4
- (69) Quartz is an example of  
 (A) Chain Silicate (B) Sheet Silicate  
 (C) Cyclic Silicate (D) 3D network Silicate

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**Answer Key**

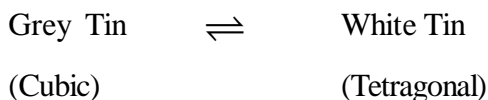
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3	B	18	C	33	C	48	A	63	C
4	B	19	D	34	D	49	D	64	C
5	C	20	A	35	C	50	C	65	B
6	C	21	B	36	B	51	C	66	A
7	B	22	B	37	B	52	C	67	C
8	A	23	c	38	D	53	A	68	A
9	A	24	D	39	C	54	B	69	D
10	C	25	D	40	C	55	A		
11	B	26	C	41	D	56	D		
12	A	27	A	42	C	57	A		
13	C	28	C	43	C	58	D		
14	B	29	C	44	D	59	C		
15	C	30	A	45	A	60	D		



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### HINTS

- (2) Grey tin is very brittle & easily crumbles down to a powder in very cold climates



The change of white tin to grey is accompanied by increase in volume. This is called disease or tin Plague.

- (3) Zeolite have  $\text{SiO}_4$  &  $\text{AlO}_4$  tetrahedrons linked together in a three dimensional open structure in which four or six member ring predominate. Due to open chain structure they have cavities & can take up water & other small molecules.

- (4) Crook's glass is a special type of glass containin cerium oxide. It does not allow the passage of ultraviolet rays & is used for making lense.

- (5) Due to inert pair effect, stability of +2 oxidation state increases as we move down this group  $\text{SiX}_2 \leq \text{GeX}_2 \leq \text{SnX}_2 \leq \text{PbX}_2$

- (6) Sodium oxalate react with conc.  $\text{H}_2\text{SO}_4$  to form CO &  $\text{CO}_2$  gas

- (10) tin is oxidized to meta stannic acid when it is treated with nitric acid



- (11) Inert pair effect become significant for 6th & 7th period of p- block element.

- (12) Carbon Suboxide has linear structure with C - C bond length equal to  $130 \text{ \AA}$  & C - O bond length equal to  $120 \text{ \AA}$   $\text{O} = \text{C} = \text{C} = \text{C} = \text{O} \leftrightarrow \text{O}^- - \text{C} \equiv \text{C} - \text{C} \equiv \text{O}^+$

- (13)  $\text{Pb}_3\text{O}_4$  is mixed oxide. It can be represented as  $2\text{PbO} - \text{PbO}_2$

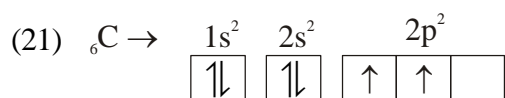
- (14) Noble gas are found in very minute amount in atmospheres. These are separated from each other by using coconut char coal. Which absorb different gas at different temperatures.

- (15) Solid  $\text{CO}_2$  is known as dry ice because it evaporate at  $-18^\circ\text{C}$  without changing in Liquid state.

- (17) When hydrogen peroxide reacts with PbS then they forms  $\text{PbSO}_4$

- (18) Silicon occurs in combined state in nature as silica,  $\text{SiO}_2$

- (19) It is hydrolysed with water to form a  $\text{Si(OH)}_4$



No of unpaired e- in p = 2.

- (22) Metal oxides or some salts are fused with glass to imparted colour of glass.

- (24)  $\text{Al}_2(\text{CO}_3)_3$  is less soluble in water than  $\text{Na}_2\text{CO}_3$ ,  $\text{ZnCO}_3$

- (25) inert pair effect is most prominent in Pb because from top to bottom due to increase in number of shells.

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(29) White lead  $\rightarrow 2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$ .

(30)  $\text{Pb}_3\text{O}_4 \Rightarrow$  Red Lead (Sindhur)

(31) Three dimensional sheet structure are formed when three oxygen atom of each  $[\text{SiO}_4]^{4-}$  Tetrahedrals are formed

(33)  $\text{Pb} + \text{Sn}$

(34) In carbon family stability +2 oxidation state increases on moving down the group in the periodic table with an increase in atomic number due to screening effect.

(37) Propyne can be prepared by hydrolysis of magnesium carbide.

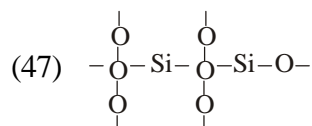


(41) In crystalline lattice of diamond, each carbon atom is linked to four other carbon atoms tetrahedrally by using  $\text{sp}^3$  - hybrid orbitals giving rise to a rigid three dimensional network of carbon atom for this reason, diamond is very hard. Graphite, has hexagonal layer structure in which each carbon atom is linked to three other carbon atoms by using  $\text{sp}^2$  hybrid orbitals. The hexagonal layer in graphite are held together by weak Van-der waal's forces. So graphite is soft.

(42) Supercritical  $\text{CO}_2$  is used as a solvent for the extraction of organic compound from their natural sources.

(43)  $2\text{Pb(NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$

(46) Pb reacts with dilute  $\text{HNO}_3$  to produce NO gas



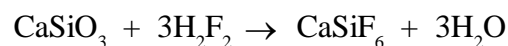
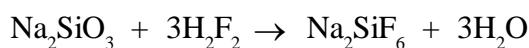
(49)  $\text{Pb} \Rightarrow 11.34$  g/ml heaviest.

(50)  $\text{Pb}_3\text{O}_4$  is a mixed oxide of  $2\text{PbO} + \text{PbO}_2$

(52) Boron (B), Si, Ge, As, Sb & At are metalloid elements. Bismuth (Bi) & tin (Sn) are metal while carbon (C) is non - metal.

(53)  $\text{Al}_4\text{C}_3 + 12\text{H}_2\text{O} \rightarrow 3\text{CH}_4 + 4 \text{Al(OH)}_3$

(54) Glass being a mixture of sodium & calcium silicates react with hydro fluoric acid forming sodium & calcium fluorsilicates respectively.

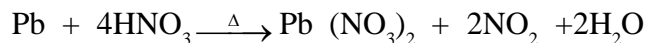


The etching of glass is based on these reactions

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(55) Solid  $\text{CO}_2$  is called dry ice because it changes to vapour state directly without changing to liquid state.

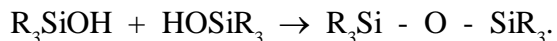
(57)  $\text{HNO}_3$  is best solvent for lead



(59)  $\text{SiO}_2 + 3\text{C} \rightarrow \text{SiC} + 2\text{CO}$

(60) It reacts with alkali as well as acid.

(61)  $\text{R}_3\text{SiCl}$  on hydrolysis form only a dimer



(62)  $\text{CCl}_4 + \text{H}_2\text{O} \rightarrow$  No reaction d - orbital absent in carbon atom

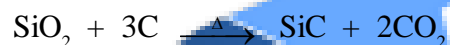
(63) excess of one valence electron in P atom over Si will form n type conductor.

(64) Calbogen is mixture of 90%  $\text{O}_2$  & 10%  $\text{CO}_2$

(65)  $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} + 2\text{SO}_2$

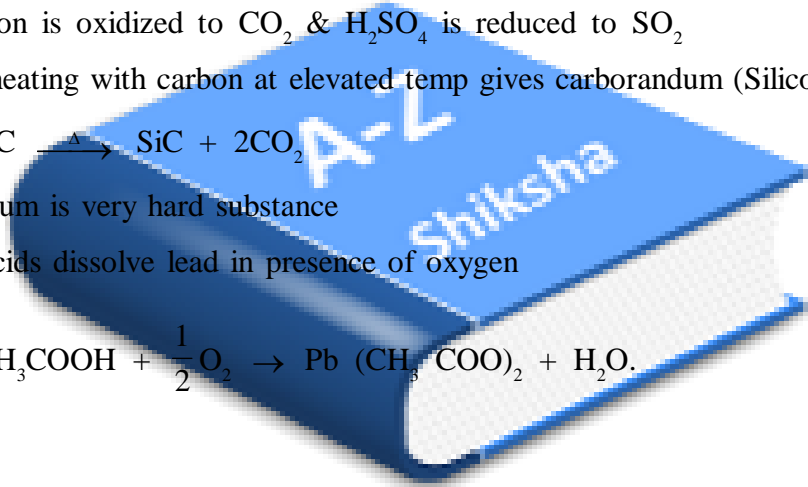
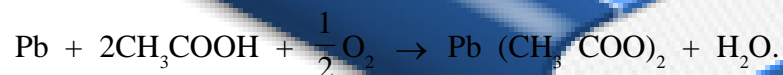
Here carbon is oxidized to  $\text{CO}_2$  &  $\text{H}_2\text{SO}_4$  is reduced to  $\text{SO}_2$

(66) Silica on heating with carbon at elevated temp gives carborandum (Silicon Carbide)



Carborandum is very hard substance

(67) Organic acids dissolve lead in presence of oxygen



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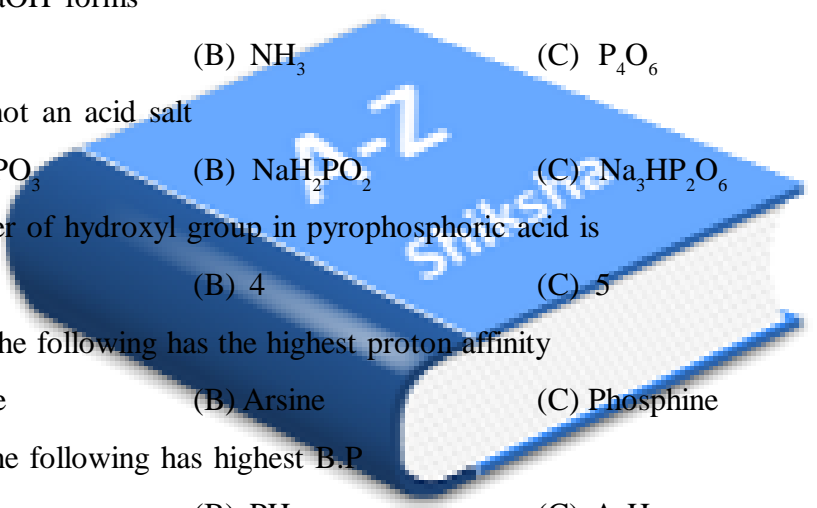
### NITROGEN FAMILY : 15

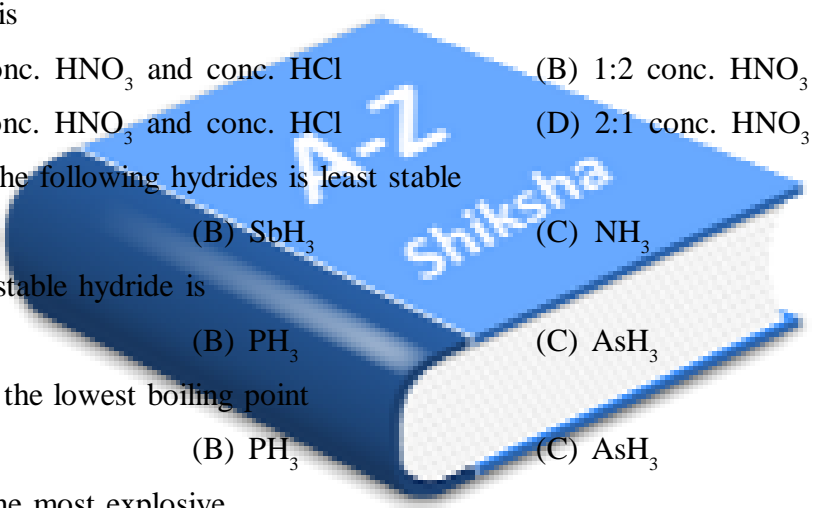
- (1) Which of the following elements does not form stable diatomic molecules  
(A) Iodine                      (B) Phosphorous                      (C) Nitrogen                      (D) Oxygen
- (2)  $\text{HNO}_3 + \text{P}_2\text{O}_5 \rightarrow \text{A} + \text{B}$ , A is an Oxyacid of phosphorous and B is an oxide of N. A and B respectively are  
(A)  $\text{H}_3\text{PO}_4$ ,  $\text{N}_2\text{O}_3$                       (B)  $\text{HPO}_3$ ,  $\text{N}_2\text{O}_3$                       (C)  $\text{HPO}_3$ ,  $\text{N}_2\text{O}_5$                       (D)  $\text{H}_3\text{PO}_3$ ,  $\text{N}_2\text{O}_5$
- (3) When heated  $\text{NH}_3$  is passed over CuO gas evolved is  
(A)  $\text{N}_2$                       (B)  $\text{N}_2\text{O}$                       (C)  $\text{HNO}_3$                       (d)  $\text{NO}_2$
- (4) When concentrated nitric acid is heated it decomposes to give  
(A)  $\text{O}_2$  and  $\text{N}_2$                       (B)  $\text{NO}$                       (C)  $\text{N}_2\text{O}_5$                       (D)  $\text{NO}_2$  and  $\text{O}_2$
- (5) Which of the following metal produces nitrous oxide with dil  $\text{HNO}_3$   
(A) Fe                      (B) Zn                      (C) Cu                      (D) Ag
- (6) Which Nitrogen trihalides is least basic  
(A)  $\text{NF}_3$                       (B)  $\text{NCl}_3$                       (C)  $\text{NBr}_3$                       (D)  $\text{NI}_3$
- (7)  $\text{P}_4\text{O}_6$  reacts with water to give  
(A)  $\text{H}_3\text{PO}_3$                       (B)  $\text{H}_4\text{P}_2\text{O}_7$                       (C)  $\text{HPO}_3$                       (D)  $\text{H}_3\text{PO}_4$
- (8) Which does not form complex  
(A) N                      (B) P                      (C) As                      (D) Bi
- (9) Nitrogen is relatively inactive element because  
(A) it atom has a stable Electronic Configuration  
(B) it has low atomic radius  
(C) Its electro negativity is fairly high  
(D) Dissociation energy of 15 molecule is fairly high
- (10) Nitrogen dioxide is released by heating  
(A)  $\text{Pb}(\text{NO}_3)_2$                       (B)  $\text{KNO}_3$                       (C)  $\text{NaNO}_2$                       (D)  $\text{NaNO}_3$
- (11) Concentrated nitric acid oxidizes cane sugar to  
(A)  $\text{CO}_2$  and  $\text{H}_2\text{O}$                       (B)  $\text{CO}$  and  $\text{H}_2\text{O}$   
(C)  $\text{CO}$ ,  $\text{CO}_2$  and  $\text{H}_2\text{O}$                       (D) Oxalic acid and water
- (12) Red P can be obtained from white P by  
(A) Heating it with a catalyst in an inert atmosphere  
(B) Distilling it in an inert atmosphere  
(C) Dissolving it in carbon disulphide and crystallising  
(D) Melting it and pouring the liquid into water



- (13) When aluminium phosphide is reacted with dil  $\text{H}_2\text{SO}_4$
- (A)  $\text{SO}_2$  is liberated (B)  $\text{PH}_3$  is evolved  
 (C)  $\text{H}_2\text{S}$  is evolved (D)  $\text{H}_2$  is evolved
- (14) Cyanamide process is used in the formation of
- (A)  $\text{N}_2$  (B)  $\text{HNO}_3$  (C)  $\text{NH}_3$  (D)  $\text{PH}_3$
- (15) Which statement is wrong for NO
- (A) It is anhydride of nitrous acid (B) It dipole moment in 0.22D  
 (C) It forms dimer (D) It is paramagnetic
- (16) Solid  $\text{PCl}_5$  exists as
- (A)  $\text{PCl}_5$  (B)  $\text{PCl}_4^+$  (C)  $\text{PCl}_6^-$  (D)  $\text{PCl}_4^+$  and  $\text{PCl}_6^-$
- (17) How can you synthesise nitric oxide in the lab
- (A) Zinc with cold and dilute  $\text{HNO}_3$  (B) Zinc with Conc.  $\text{HNO}_3$   
 (C) Cu with cold and dil  $\text{HNO}_3$  (D) Heating  $\text{NH}_4\text{NO}_3$
- (18) Which of the following is a cyclic phosphate
- (A)  $\text{H}_5\text{P}_3\text{O}_{10}$  (B)  $\text{H}_6\text{P}_4\text{O}_{13}$  (C)  $\text{H}_5\text{P}_5\text{O}_{15}$  (D)  $\text{H}_7\text{P}_5\text{O}_{16}$
- (19) Which catalyst is used in the haber process for the manufacture of  $\text{NH}_3$
- (A) Pt (B) Fe+Mo (C) CuO (D)  $\text{Al}_2\text{O}_3$
- (20) Which of the following has the highest dipole moment
- (A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{SbH}_3$  (D)  $\text{AsH}_3$
- (21) Which salt can be classified as an acid salt
- (A)  $\text{Na}_2\text{SO}_4$  (B)  $\text{BiOCl}$  (C)  $\text{Pb(OH)Cl}$  (D)  $\text{Na}_2\text{HPO}_4$
- (22) Which of the following is manufactured from the molecular nitrogen by bacteria
- (A)  $\text{NO}_3$  (B)  $\text{NO}_2$  (C) Amino acids (D) Ammonia
- (23) Which of the following Tendencies remains unchanged on going down in the nitrogen family
- (A) Highest Oxi. State (B) Non - metallic character  
 (C) Stability of hydrides (D) Physical state
- (24)  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  on heating liberates a gas. The same gas will be obtained by
- (A) heating  $\text{NH}_4\text{NO}_2$  (B) Heating  $\text{NH}_4\text{NO}_3$   
 (C) Treating  $\text{H}_2\text{O}_2$  and  $\text{NaNO}_2$  (D) Treating  $\text{MF}_3\text{N}_2$  with  $\text{H}_2\text{O}$
- (25) When plants and animals decay, the organic N is converted in to inorganic N. The inorganic N is in the form is
- (A)  $\text{NH}_3$  (B) Elements of N (C) Nitrates (D) Nitrides

- (26) In an organic compound, phosphorus is estimated as  
 (A)  $Mg_2P_2O_7$  (B)  $Mg_3(PO_4)_2$  (C)  $H_3PO_4$  (D)  $P_2O_5$
- (27) 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  $N_2$
- (28) Ammonium nitrate decomposes on heating in to  
 (A)  $NH_3$  and  $HNO_3$  (B) Nitrous oxide and  $H_2O$   
 (C) N, H,  $O_3$  (D) Nitric Oxide,  $NO_2$ ,  $H_2$
- (29) Non - Combustible hydride is  
 (A)  $NH_3$  (B)  $PH_3$  (C)  $AsH_3$  (D)  $SbH_3$
- (30) The element which catches fire in air at  $30^\circ C$  and is stored under water is  
 (A) Calcium (B) Sodium (C) Phosphorous (D) Zinc
- (31) Which of the following acids exist in polymeric form  
 (A)  $HPO_3$  (B)  $H_4P_2O_7$  (C)  $H_3PO_4$  (D) None
- (32) Dehydrated phosphorous trichloride in  $H_2O$  gives  
 (A)  $HPO_3$  (B)  $H_3PO_4$  (C)  $H_3PO_2$  (D)  $NF_3$
- (33) Which of the following is not hydrolysed  
 (A)  $AsCl_3$  (B)  $PF_3$  (C)  $SbCl_3$  (D)  $NF_3$
- (34) The strongest base is  
 (A)  $NH_3$  (B)  $PH_3$  (C)  $AsH_3$  (D)  $SbH_3$
- (35) The cyanide ion,  $CN^-$ ,  $N_2$  are iso electronic. But in contrast to  $CN^-$ ,  $N_2$  is chemically inert because of  
 (A) Low bond energy (B) Absence of bond polarity  
 (C) Unsymmetrical electron distribution  
 (D) Presence of more number of electrons in bonding orbitals
- (36) When lightning flash is produced, which gas may form  
 (A) Nitrous Oxide (B) Nitric Oxide  
 (C) Dinitrogen in oxide (D) Nitrogen pentoxide
- (37) A mixture of ammonia and air at about  $800^\circ C$  in the presence of Pt gauze forms  
 (A)  $N_2O$  (B) NO (C)  $NH_2OH$  (D)  $N_2O_3$
- (38) Which of the following is the most basic oxide  
 (A)  $Bi_2O_3$  (B)  $SeO_2$  (C)  $Al_2O_3$  (D)  $Sb_2O_3$
- (39) Ammonia gas can be collected by the displacement of  
 (A) Conc.  $H_2SO_4$  (B) Brine (C) Water (D) Mercury

- 
- (40) The chemical used for cooling in refrigeration is  
(A)  $\text{CO}_2$  (B)  $\text{NH}_4\text{OH}$  (C)  $\text{NH}_4\text{Cl}$  (D) Liquid  $\text{NH}_3$
- (41) Reaction of  $\text{PCl}_3$  and  $\text{PhMgBr}$ . Would give  
(A) Bromobenzene (B) Chlorobenzene  
(C) Triphenyl phosphine (D) Dichlorobenzene
- (42) Which of the following P is most stable  
(A) Red (B) White (C) Black (D) All stable
- (43) The least stable hydride of 75<sup>th</sup> group elements in  
(A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{AsH}_3$  (D)  $\text{BiH}_3$
- (44) The chemical formula of Tear gas is  
(A)  $\text{COCl}_2$  (B)  $\text{CO}_2$  (C)  $\text{Cl}_2$  (D)  $\text{CCl}_3\text{NO}_2$
- (45)  $\text{PH}_4\text{I} + \text{NaOH}$  forms  
(A)  $\text{PH}_3$  (B)  $\text{NH}_3$  (C)  $\text{P}_4\text{O}_6$  (D)  $\text{P}_4\text{O}_{10}$
- (46) Which is not an acid salt  
(A)  $\text{NaH}_2\text{PO}_3$  (B)  $\text{NaH}_2\text{PO}_2$  (C)  $\text{Na}_3\text{HP}_2\text{O}_6$  (D)  $\text{Na}_4\text{P}_2\text{O}_7$
- (47) The number of hydroxyl group in pyrophosphoric acid is  
(A) 3 (B) 4 (C) 5 (D) 7
- (48) Which of the following has the highest proton affinity  
(A) Stilbine (B) Arsine (C) Phosphine (D) Ammonia
- (49) Which of the following has highest B.P  
(A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{AsH}_3$  (D)  $\text{SbH}_3$
- (50) Which of the following exhibits highest solubility in  $\text{H}_2\text{O}$   
(A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{AsH}_3$  (D)  $\text{SbH}_3$
- (51)  $\text{HNO}_3$  in aqueous solution yields  
(A)  $\text{NO}_3^-$  and  $\text{H}^+$  (B)  $\text{NO}_3^-$  and  $\text{H}_3\text{O}^+$   
(C)  $\text{NO}_2^-$  and  $\text{OH}^-$  (D)  $\text{N}_2\text{O}_5$  and  $\text{H}_2\text{O}$
- (52) The three important oxidation state of P are  
(A) -3, +3, +5 (B) -3, +3, -5 (C) -3, +4, -4 (D) -3,+3,+4
- (53) Which show maximum valency  
(A) P (B) Tin (C) Sb (D) Bi
- 

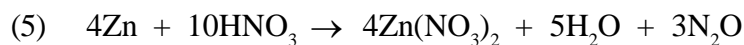
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- (54) Which oxide of N is obtained on heating ammonium nitrate at 250°C  
(A) Nitric oxide (B) Nitrous oxide  
(C) Nitrogen dioxide (D) Dinitrogen oxide
- (55) The number of P-O-P bonds in cyclic metaphosphoric acid is  
(A) 0 (B) 2 (C) 3 (D) 4
- (56) The product obtained by heating  $(\text{NH}_4)_2\text{SO}_4$  and KCNO is  
(A) Hydrocyanic acid (B) Ammonia  
(C) Ammonium cyanide (D) Urea
- (57) Which compound is related to Haber's process  
(A)  $\text{CO}_2$  (B)  $\text{H}_2$  (C)  $\text{NO}_2$  (D)  $\text{NH}_3$
- (58) The carbonate which does not leave a residue on heating is  
(A)  $\text{Na}_2\text{CO}_3$  (B)  $\text{PH}_3$  (C)  $\text{SbH}_3$  (D)  $\text{AsH}_3$
- (59) Aquaregia is  
(A) 1:3 conc.  $\text{HNO}_3$  and conc.  $\text{HCl}$  (B) 1:2 conc.  $\text{HNO}_3$  and conc.  $\text{HCl}$   
(C) 3:1 conc.  $\text{HNO}_3$  and conc.  $\text{HCl}$  (D) 2:1 conc.  $\text{HNO}_3$  and conc.  $\text{HCl}$
- (60) Which of the following hydrides is least stable  
(A)  $\text{AsH}_3$  (B)  $\text{SbH}_3$  (C)  $\text{NH}_3$  (D)  $\text{PH}_3$
- (61) The most stable hydride is  
(A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{AsH}_3$  (D)  $\text{SbH}_3$
- (62) Which has the lowest boiling point  
(A)  $\text{NH}_3$  (B)  $\text{PH}_3$  (C)  $\text{AsH}_3$  (D)  $\text{SbH}_3$
- (63) Which is the most explosive  
(A)  $\text{NCl}_3$  (B)  $\text{PCl}_3$  (C)  $\text{AsCl}_3$  (D) All
- (64) The most acidic is  
(A)  $\text{As}_2\text{O}_3$  (B)  $\text{P}_2\text{O}_3$  (C)  $\text{Sb}_2\text{O}_3$  (D)  $\text{Bi}_2\text{O}_3$
- (65) Non-existing compound is  
(A)  $\text{PH}_4\text{I}$  (B)  $\text{As}_2\text{O}_3$  (C)  $\text{SbCl}_2$  (D)  $\text{As}_2\text{H}_3$
- (66) Pure  $\text{N}_2$  gas is obtained from  
(A)  $\text{NH}_3 + \text{NaNO}_2$  (B)  $\text{NH}_4\text{Cl} + \text{NaNO}_2$  (C)  $\text{N}_2\text{O} + \text{Ca}$  (D)  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$
- (67) Pure nitrogen can be prepared from  
(A)  $\text{NH}_4\text{OH}$  (B)  $\text{Ca}_3\text{N}_2$  (C)  $\text{NH}_4\text{NO}_2$  (D)  $\text{Ba}(\text{NO}_3)_2$
- (68)  $\text{NO}_2$  is released by heating  
(A)  $\text{Pb}(\text{NO}_3)_2$  (B)  $\text{KNO}_3$  (C)  $\text{NaNO}_2$  (D)  $\text{NaNO}_3$
- 

- (69) Which of the following is neutral  
 (A)  $N_2O_5$  (B)  $N_2O_3$  (C)  $N_2O_4$  (D)  $N_2O$
- (70) Which of the following is acidic  
 (A)  $NH_3$  (B)  $N_2H_4$  (C)  $N_2H_2$  (D)  $N_3H$
- (71) Laughing gas is prepared by heating  
 (A)  $NH_4Cl$  (B)  $(NH_4)_2SO_4$  (C)  $NH_4Cl + NaNO_3$  (D)  $NH_4NO_3$
- (72)  $P_4O_6$  reacts with water to give  
 (A)  $H_3PO_3$  (B)  $H_4P_2O_7$  (C)  $HPO_3$  (D)  $H_3PO_4$
- (73) Electrolysis temperature is maximum  
 (A)  $AsH_3$  (B)  $NH_3$  (C)  $PH_3$  (D)  $SbH_3$
- (74) Which of the following is not hydrolysed  
 (A)  $AsCl_3$  (B)  $PF_3$  (C)  $SbCl_3$  (D)  $NF_3$
- (75) On adding  $H_2O$  to  $BiCl_3$  solution in  $HCl$ , the compound produced is  
 (A)  $Bi_2O_3$  (B)  $Bi(OH)_3$  (C)  $BiOCl$  (D)  $BiOCl_2$
- (76) N, P, As, Sb, Bi elements belong to  
 (A) VA Group (B) IV A Group (C) VII A Group (D)  $Hg(OH)_2$
- (77) Which of the following elements occur free in nature  
 (A) Nitrogen (B) Phosphorus (C) Arsenic (D) Antimony
- (78) Which of the following elements of group VA does not show allotropy  
 (A) N (B) Bi (C) P (D) As

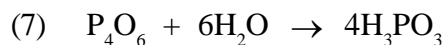
### ANSWER KEY

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

## HINTS

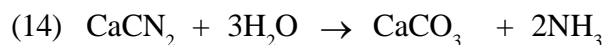
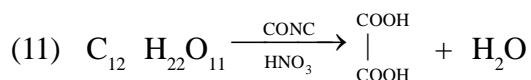
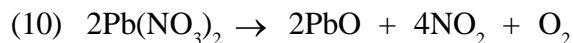


It is least basic because of high electronegativity of 3F atoms. The lone pair present on nitrogen atom is not easily available for donation.



(8) Nitrogen does not form complex because of the absence of d - orbitals.

(9)  $\text{N}\equiv\text{N}$  bond energy is very high  $945\text{KJ mole}^{-1}$



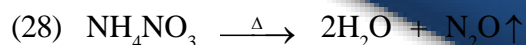
(15) Anhydride of Nitrous acid is  $\text{N}_2\text{O}_3$ .

(16) Solid  $\text{PCl}_5$ , exists as  $\text{PtCl}_4^+$  &  $\text{PtCl}_6^-$

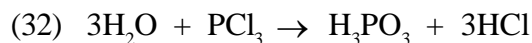


(21)  $\text{Na}_2\text{HPO}_4 \rightarrow \text{Na}_2\text{PO}_4^- + \text{H}^+$  it can give  $\text{H}^+$  ion in solution.

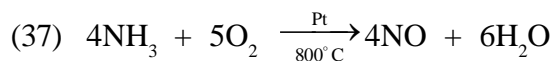
(23) Highest oxidation state is +5 which remains unchanged.



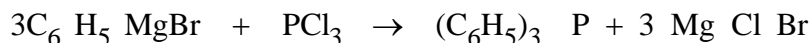
(30) because of its very low ignition temp (303K) it is always kept under water.



(33) Due to absence of d - orbital in N - atom, it can't accept  $e^-$  from  $\text{H}_2\text{O}$  for hydrolysis of  $\text{NF}_3$



(41) Reaction between  $\text{PCl}_3$  &  $\text{Ph MgBr}$  gives triphenyl phosphine.



(42) Due to less reactivity

(46)  $\text{Na}_4\text{P}_2\text{O}_7$  salt of strong acid & strong base.

$\text{NH}_3$	$\text{PH}_3$	.	$\text{AsH}_3$	$\text{SbH}_3$
BP $\rightarrow$ 238.5	185.5		210.6	254.6

(53) P Shows + 5 valancy.



(57) Ammonia generally prepared by Haber's process

(59) One part conc.  $\text{HNO}_3$  & 3parts conc.  $\text{HCl}$  forms aquaregia.



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## OXYGEN FAMILY

- (1) Which is not easily soluble in water  
(A)  $H_2$  (B)  $O_2$  (C)  $SO_2$  (D)  $CO_2$
- (2) The molecular formula of sulphur is  
(A) S (B)  $S_2$  (C)  $S_4$  (D)  $S_8$
- (3) All the elements of oxygen family are  
(A) Non - metal (B) Matalloids (C) Radioactive (D) Polymorphic
- (4) The triatomic species of element oxygen is known as  
(A) Azone (B) Polyzone (C) Trizone (D) Ozone
- (5) Which of the following acts as pickling agent  
(A)  $HNO_3$  (B) HCl (C)  $H_2SO_4$  (D)  $HNO_2$
- (6) Which of the following is no suitable for use in dasiccator to dry substance  
(A) conc  $H_2SO_4$  (B)  $Na_2SO_4$  (C)  $CaCl_2$  (D)  $P_4O_{10}$
- (7) The catalyst used in manufacture of by contact process  
(A)  $Al_2O_3$  (B)  $Cr_2O_3$  (C)  $V_2O_3$  (D)  $MnO_2$
- (8) Which of the following is the best scientific method to test presence of water in a liquid  
(A) Taste (B) Smell  
(C) use of litmus paper (D) use of onhydrous  $CaSO_4$
- (9) Which of the following sulphate is insoluble in water  
(A)  $CaSO_4$  (B)  $CdSO_4$  (C)  $PbSO_4$  (D)  $Bi_2(SO_4)_3$
- (10) When sulphur is boiled with  $Na_2SO_3$  solution, the compound formed is  
(A) Sodium Sulphide (B) Sodium Sulphate  
(C) Sodium persulphate (D) Sodium thiosulphate
- (11) Number of unpaired electrons in sulphur is  
(A) 2 (B) 6 (C) 8 (D) 1
- (12)  $H_2S$  reacts with  $O_2$  in restricted supply of  $O_2$  to form  
(A)  $H_2O + S$  (B)  $H_2O + SO_2$  (C)  $H_2O + SO_3$  (D)  $H_2SO_4 + S$
- (13) Which of the following mixlure is chromic acid  
(A)  $K_2Cr_2O_7$  and Con.  $H_2SO_4$  (B)  $K_2Cr_2O_7$  and HCl  
(C)  $K_2SO_4$  and Con.  $H_2SO_4$  (D)  $H_2SO_4$  and HCl
- (14) Among  $KO_2$ ,  $NO_2^-$ ,  $BaO_2$  and  $NO_2^+$  unpaired electron is present in  
(A)  $NO_2^+$  and  $BaO_2$  (B)  $KO_2$  and  $BaO_2$  (C)  $KO_2$  (D)  $BaO_2$
- (15) Which of the element of the oxygen family is most poisonous to human race  
(A) O (B) S (C) Se (D) None

- (16) Super phosphate is the mixture of  
(A) Calcium phosphate and  $\text{H}_2\text{SO}_4$  (B) Sodium phosphate and  $\text{H}_2\text{SO}_4$   
(C) Potassium phosphate and  $\text{H}_2\text{SO}_4$  (D) None
- (17) Which of the following dissociates to give  $\text{H}^+$  easily  
(A)  $\text{H}_2\text{O}$  (B)  $\text{H}_2\text{S}$  (C)  $\text{H}_2\text{Te}$  (D)  $\text{H}_2\text{Se}$
- (18)  $\text{H}_2\text{SO}_4$  reacts with  $\text{PCl}_5$  to give  
(A) Thionyl chloride (B) Sulphur monochloride  
(C) Sulphur chloride (D) Sulphur tetrachloride
- (19) Among  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{S}$ ,  $\text{H}_2\text{Se}$  and  $\text{H}_2\text{Te}$  the one with highest boiling point  
(A)  $\text{H}_2\text{O}$  (B)  $\text{H}_2\text{Te}$  (C)  $\text{H}_2\text{S}$  (D)  $\text{H}_2\text{Se}$
- (20) Which of the following is used in artificial respiration  
(A)  $\text{O}_2 + \text{CO}_2$  (B)  $\text{O}_2 + \text{CO}$  (C)  $\text{O}_2 + \text{H}_2$  (D) All of these
- (21) Carbogen is  
(A) Pure form of C (B)  $\text{COCl}_2$   
(C) Mixture of CO and  $\text{CO}_2$  (D)  $\text{O}_2$  &  $\text{CO}_2$
- (22) The products of the chemical reaction between  $\text{Na}_2\text{S}_2\text{O}_3$ ,  $\text{Cl}_2$  and  $\text{H}_2\text{O}$  are  
(A)  $\text{S} + \text{HCl} + \text{Na}_2\text{S}$  (B)  $\text{S} + \text{HCl} + \text{Na}_2\text{SO}_4$   
(C)  $\text{S} + \text{HCl} + \text{Na}_2\text{SO}_3$  (D)  $\text{S} + \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$
- (23) The incorrect statement among the following is  
(A)  $\text{C}_{60}$  is an allotropic form of carbon  
(B)  $\text{O}_3$  is an allotropic form of oxygen  
(C)  $\text{S}_8$  is only allotropic form of sulphur  
(D) Red phosphorous is more stable in air than white phosphorous
- (24) Hypo is used in photography because of its  
(A) Reducing behavior (B) Oxidising behavior  
(C) Complex forming behavior (D) Reaction with light
- (25) Aqueous solutions of  $\text{H}_2\text{S}$  and  $\text{SO}_2$  when mixed together yield  
(A) Sulphur and water (B) Sulphur trioxide and water  
(C) Hydrogen peroxide and sulphur (D) Hydrogen and sulphurous acid
- (26) An example of a neutral oxide is  
(A) No (B)  $\text{CO}_2$  (C)  $\text{CaO}$  (D)  $\text{ZnO}$
- (27) Which of the following is used to absorb sulphur dioxide  
(A) conc  $\text{H}_2\text{SO}_4$  (B)  $\text{KOH}$  Solution (C) Water (D) Anhydrous  $\text{CaCl}_2$
- (28) When  $\text{SO}_2$  is passed through acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution  
(A) Solution turns blue (B) Solution decolourizes  
(C)  $\text{SO}_2$  is reduced (D) Green  $\text{Cr}_2(\text{SO}_4)_3$  is formed

- (29) Which of the following is oxidized by  $\text{SO}_2$   
 (A) Mg (B)  $\text{K}_2\text{Cr}_2\text{O}_7$  (C)  $\text{KMnO}_4$  (D) All
- (30) A salt of sulphurous acid is called  
 (A) Sulphate (B) Sulphurate (C) Sulphite (D) Sulphid
- (31) The final acid obtained during the manufacture of  $\text{H}_2\text{SO}_4$  by contact process  
 (A)  $\text{H}_2\text{SO}_4(\text{conc.})$  (B)  $\text{H}_2\text{SO}_4(\text{dil})$  (C)  $\text{H}_2\text{SO}_4$  (D)  $\text{H}_2\text{S}_2\text{O}_7$
- (32) Which compound acts as an oxidizing as well as reducing agent  
 (A)  $\text{SO}_2$  (B)  $\text{MnO}_2$  (C)  $\text{Al}_2\text{O}_3$  (D)  $\text{CrO}_3$
- (33) Bleaching action of  $\text{SO}_2$  is due to  
 (A) Reduction (B) Oxidisation(oxide) (C) Hydrolysis (D) Acidic nature
- (34) About  $\text{H}_2\text{SO}_4$  which is incorrect  
 (A) Reducing agent (B) Dehydrating agent (C) sulphonating agent (D) Highly Viscous
- (35) In the reaction  

$$2\text{Ag} + 2\text{H}_2\text{SO}_4 \rightarrow \text{Ag}_2\text{SO}_4 + 2\text{H}_2\text{O} + \text{SO}_2$$
 $\text{H}_2\text{SO}_4$  acts as  
 (A) Reducing agent (B) Oxidising agent (C) Catalytic agent (D) Dehydrating agent
- (36) In the reaction  

$$\text{HCOOH} \xrightarrow{\text{H}_2\text{SO}_4} \text{CO} + \text{H}_2\text{O}$$
 $\text{H}_2\text{SO}_4$  acts as  
 (A) Dehydrating agent (B) Oxidising agent (C) Reducing agent (D) All of these
- (37) When conc.  $\text{H}_2\text{SO}_4$  comes in contact with sugar it becomes black due to  
 (A) Hydrolysis (B) Hydration (C) Decolourisation (D) Dehydration
- (38) Which one is known as oil of vitriol  
 (A)  $\text{H}_2\text{SO}_3$  (B)  $\text{H}_2\text{SO}_4$  (C)  $\text{H}_2\text{S}_2\text{O}_7$  (D)  $\text{H}_2\text{S}_2\text{O}_8$
- (39) Ozone deplete due to the formation of following compound in Antartica  
 (A) Acrolien (B) Peroxy Acetyl Nitrate  
 (C)  $\text{SO}_2$  &  $\text{SO}_3$  (D) chlorine nitrate
- (40) The acid used in lead storage cells is  
 (A) Phosphoric acid (B) Nitric acid (C) Sulphuric acid (D) Hydrochloric acid
- (41) Which one of the gas dissolves in  $\text{H}_2\text{SO}_4$  to give oleum  
 (A)  $\text{SO}_2$  (B)  $\text{H}_2\text{S}$  (C)  $\text{S}_2\text{O}$  (D)  $\text{SO}_3$
- (42) Oleum is  
 (A) Castor oil (B) Oil of Vitriol (C) Fuming  $\text{H}_2\text{SO}_4$  (D) None
- (43) There is no S - S bond in  
 (A)  $\text{S}_2\text{O}_4^{2-}$  (B)  $\text{S}_2\text{O}_5^{2-}$  (C)  $\text{S}_2\text{O}_3^{2-}$  (D)  $\text{S}_2\text{O}_7^{2-}$
- (44) Which element is found in free state  
 (A) I (B) S (C) Ur (D) Ag

- (45) Which of the following hydrides has the lowest boiling point  
(A)  $\text{H}_2\text{O}$  (B)  $\text{H}_2\text{S}$  (C)  $\text{H}_2\text{Se}$  (D)  $\text{H}_2\text{Te}$
- (46) In the preparation of sulphuric acid,  $\text{V}_2\text{O}_5$  is used in the reaction, which is  
(A)  $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$  (B)  $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$   
(C)  $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$  (D)  $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- (47) Point out of in which of the following properties of oxygen differs from the rest of the members of its family (Group - VIA)  
(A) High value of ionization energy (B) Oxidation state (2,4,6)  
(C) Polymorphism (D) Formation of hydrides
- (48) Ozone turns trimethyl paper  
(A) Green (B) Violet (C) Red (D) Black
- (49) No. of atoms in one molecule of sulphur is  
(A) 8 (B) 4 (C) 3 (D) None of these
- (50) Bond angle is minimum for  
(A)  $\text{H}_2\text{O}$  (B)  $\text{H}_2\text{S}$  (C)  $\text{H}_2\text{Se}$  (D)  $\text{H}_2\text{Te}$
- (51) A solution of  $\text{SO}_2$  in water reacts with  $\text{H}_2\text{S}$  precipitating sulphur. Here  $\text{SO}_2$  acts as  
(A) Oxidising agent (B) Reducing agent (C) Acid (D) Catalyst
- (52) When  $\text{SO}_2$  is passed through cupric chloride solution  
(A) White precipitate is obtained (B) Solution becomes colourless  
(C) Solution becomes colourless & white ppt is obtained of  $\text{Cu}_2\text{Cl}_2$   
(D) No Change
- (53) Which of the following is acidic  
(A)  $\text{SO}_3$  (B)  $\text{N}_2\text{O}$  (C)  $\text{BeO}$  (D)  $\text{HgO}$
- (54) Which of the elements listed below occurs in allotropic forms  
(A) Iodine (B) Copper (C) Sulphur (D) Silver
- (55) Oxygen was discovered by  
(A) Priestly (B) Scheele (C) Boyle (D) Cavendish
- (56) Shape of  $\text{O}_2\text{F}_2$  is similar to that of  
(A)  $\text{C}_2\text{F}_2$  (B)  $\text{H}_2\text{O}_2$  (C)  $\text{H}_2\text{F}_2$  (D)  $\text{C}_2\text{H}_2$
- (57) Which of the following is not a chalcogen  
(A) O (B) S (C) Se (D) Na
- (58) Which of the following is a suboxide  
(A)  $\text{Ba}_2\text{O}$  (B)  $\text{Pb}_2\text{O}$  (C)  $\text{C}_3\text{O}_2$  (D)  $\text{ZnO}$
- (59)  $\text{KO}_2 + \text{CO}_2 \rightarrow ?$  (gas)  
(A)  $\text{H}_2$  (B)  $\text{N}_2$  (C)  $\text{O}_2$  (D)  $\text{CO}$
- (60)  $\text{H}_2\text{SO}_4$  acts as a dehydrating agent in its reaction with  
(A)  $\text{H}_2\text{C}_2\text{O}_4$  (B)  $\text{Ba}(\text{OH})_2$  (C)  $\text{KOH}$  (D)  $\text{Zn}$

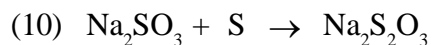
- (61) A gas that can not be collected over water is  
 (A)  $N_2$  (B)  $O_2$  (C)  $SO_2$  (D)  $PH_3$
- (62) The molecular formula of dithionic acid is  
 (A)  $H_2S_2O_4$  (B)  $H_2S_2O_6$  (C)  $H_2S_2O_5$  (D)  $H_2S_2O_7$
- (63) Oxygen is not evolved on reaction of ozone with  
 (A)  $H_2O_2$  (B)  $SO_2$  (C) Hg (D) KI
- (64)  $\alpha$  and  $\beta$  form of sulphur both are stable at  
 (A)  $369^\circ C$  (B)  $369K$  (C)  $4^\circ C$  (D)  $0^\circ C$
- (65)  $SO_2 + H_2S \rightarrow X$  The final product is  
 (A)  $H_2O + S$  (B)  $H_2SO_4$  (C)  $H_2SO_3$  (D)  $H_2S_2O_3$
- (66) Sulphur in +3 oxidation state is present in  
 (A) Sulphurous acid (B) Pyrosulphuric acid  
 (C) Dithionous acid (D) Thiosulphuric acid
- (67)  $H_2S$  is not a/an  
 (A) Reducing agent (B) Acidic (C) Oxidising agent (D) None
- (68) Which one of the following is non-reducing  
 (A)  $H_2S$  (B)  $H_2Te$  (C)  $H_2Se$  (D)  $H_2O$
- (69) When  $PbO_2$  reacts with conc.  $HNO_3$  the gas evolved is  
 (A)  $NO_2$  (B)  $O_2$  (C)  $N_2$  (D)  $N_2O$
- (70) The most efficient agent for the absorption of  $SO_3$  is  
 (A) 80%  $H_2SO_4$  (B) 98%  $H_2SO_4$  (C) 50%  $H_2SO_4$  (D) 20%  $H_2S_2O_7$
- (71) In presence of moisture,  $SO_2$  can  
 (A) Act as oxidant (B) Lose electron (C) Gain electron (D) Not act as reductant

### ANSWER KEY

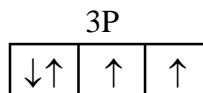
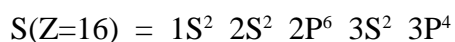
1	C	16	A	31	D	46	B	61	C
2	D	17	C	32	A	47	B	62	B
3	D	18	C	33	A	48	B	63	B
4	D	19	A	34	A	49	A	64	B
5	C	20	A	35	B	50	D	65	A
6	A	21	D	36	A	51	A	66	C
7	C	22	B	37	D	52	C	67	C
8	D	23	C	38	B	53	A	68	D
9	C	24	C	39	D	54	C	69	B
10	D	25	A	40	C	55	A	70	B
11	A	26	A	41	D	56	B	71	B
12	A	27	B	42	C	57	D		
13	A	28	D	43	D	58	C		
14	C	29	A	44	B	59	C		
15	C	30	C	45	B	60	A		

### Hints

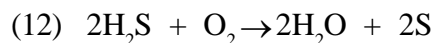
(7)  $V_2O_5$  catalyst are used for manufacture of  $H_2SO_4$  by contact process.



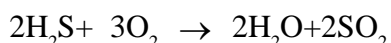
(11) The electronic configuration of sulphure is



Hence it has two unpaired electrons



If the  $O_2$  is not restricted

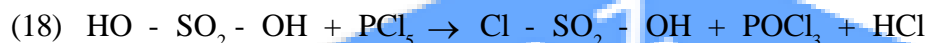


(13) Mixture of  $K_2Cr_2O_7$  and conc.  $H_2SO_4$  known as chromic acid

(14)  $KO_2$  because in  $O_2^-$  (superoxide ion)

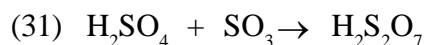
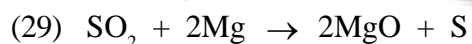
One unpaired electron is present in the antibonding orbital.

(17) The bond between ( $H_2Te$ ) is weakest hence it gives  $H^+$  ion easily.

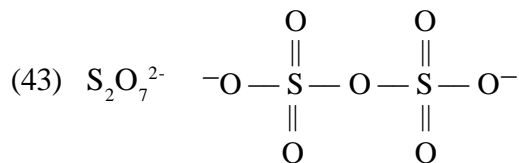
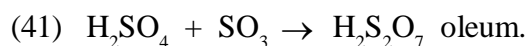


(19)  $H_2O$  containing hydrogen bond,

(21) Mixture of  $O_2$  and  $CO_2$



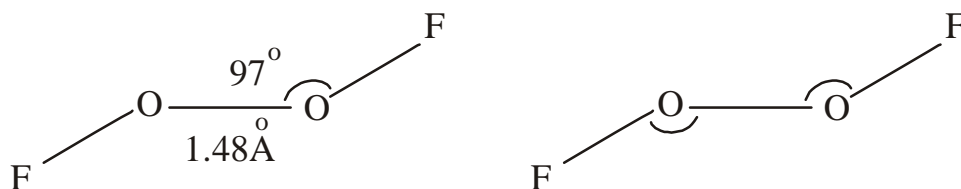
(39) Formation of chlorine nitrate is the main cause of ozone depletion



(54) Sulphur -

(1) monoclinic (2) Rhombic (3) Plastic

(56)  $O_2F_2$  is similar to that of  $H_2O_2$



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## HALOGENS FAMILY

- (1) The correct order of thermal stability of hydrogen halide.  
(A)  $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$  (B)  $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$   
(C)  $\text{HCl} < \text{HF} < \text{HBr} < \text{HI}$  (D)  $\text{HI} > \text{HCl} > \text{HF} > \text{HBr}$
- (2) Phosgene is common name of  
(A) Carbonyl chloride (B) Phosphine  
(C) Phosphorus Oxychloride (D) Phosphorus trichloride
- (3) The solubility of iodine in water increases in presence of  
(A) Alcohol (B) Chloroform  
(C) Sodium hydroxide (D) Potassium trichloride
- (4) On boiling an aqueous solution of  $\text{KClO}_3$  with iodine the following is obtained  
(A)  $\text{KClO}_3$  (B)  $\text{KClO}_4$  (C)  $\text{KClO}_2$  (D)  $\text{KIO}_3$
- (5) Colour of iodine is disappeared by shaking it with aqueous solution of  
(A)  $\text{H}_2\text{SO}_4$  (B)  $\text{Na}_2\text{S}_2\text{O}_3$  (C)  $\text{Na}_2\text{S}$  (D)  $\text{Na}_2\text{SO}_4$
- (6) The stability of interhalogen compound is in order  
(A)  $\text{IF}_3 > \text{UF}_3 > \text{BrF}_3$  (B)  $\text{BrF}_3 > \text{IF}_3 > \text{ClF}_3$   
(C)  $\text{IF}_3 > \text{BrF}_3 > \text{ClF}_3$  (D)  $\text{ClF}_3 > \text{IF}_3 > \text{BrF}_3$
- (7) Bromine is obtained on commercial scale from  
(A) Caliche (B) Carnellite (C) Common Salt (D) Cryolite
- (8) Chlorine was discovered by  
(A) Davy (B) Priestley (C) Rutherford (D) Sheele
- (9) Bromine is liberated when aqueous solution of potassium bromide is treated with  
(A)  $\text{Cl}_2$  (B)  $\text{I}_2$  (C) Dilute  $\text{H}_2\text{SO}_4$  (D)  $\text{SO}_2$
- (10) Chlorine reacts under various conditions with sodium hydroxide to give  
(A) Sodium Chloride (B) Sodium hypochlorite  
(C) Sodium chlorate (D) All of these
- (11)  $\text{Br}_2$  gas turns starch iodide paper  
(A) Blue (B) Red (C) Colourless (D) Yellow
- (12) Which of following is weakest acid?  
(A) HF (B) HCl (C) HBr (D) HI
- (13) Deacon's process is used in manufacture of  
(A) Bleaching powder (B) Sulphonic acid (C) Nitric acid (D) Chlorine
- (15) Which of following is correct?  
(A) Iodine is solid (B) Chlorine is insoluble in water  
(C) Iodine is more reactive than bromine (D) Bromine is more reactive than chlorine

- 
- (16) Sea water is employed as a source of manufacture of  
(A) F (B) I (C) Br (D) Cl
- (17) Which is most reactive halogen  
(A) Cl<sub>2</sub> (B) Br<sub>2</sub> (C) I<sub>2</sub> (D) F<sub>2</sub>
- (18) Which of following represents clear electro positive properties  
(A) F (B) Cl (C) Br (D) I
- (19) Which of following represents outermost shell of halogens  
(A) S<sup>2</sup>P<sup>3</sup> (B) S<sup>2</sup>P<sup>6</sup> (C) S<sup>2</sup>P<sup>4</sup> (D) S<sup>2</sup>P<sup>5</sup>
- (20) Most activeness of fluorine is due to  
(A) F-F bond has less energy (B) F<sub>2</sub> is gas at normal temp  
(C) Its e - affinity is max (D) None of above
- (21) Which of following after reacting with KI do not remove Iodine  
(A) CaSO<sub>4</sub> (B) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> (C) HNO<sub>3</sub> (D) HCl
- (22) Aqueous solution of which of following acid can not be kept in bottle of glass  
(A) HF (B) HCl (C) HBr (D) HI
- (23) Which of following pair is not correctly matched  
(A) Halogen which is liquid at room temp. - Bromine  
(B) Most electronegative element - Fluorine  
(C) Most reactive halogen - Fluorine  
(D) The Strongest oxidizing halogen - Iodine
- (24) Mark element that shows oxidation state only one  
(A) F (B) Cl (C) Br (D) I
- (25) Which of following has lowest boiling point  
(A) HF (B) HCl (C) HBr (D) HI
- (26) Fluorine is stronger oxidizing agent than chlorine in aqueous solution. This is attributed to many factors except.  
(A) Heat of dissociation (B) e-affinity  
(C) Heat of Hydration (D) Ionisation Potential
- (27) Mark the element that displaces 3 halogens from their compound  
(A) F (B) Cl (C) Br (D) I
- (28) Mark smallest atom  
(A) F (B) Cl (C) Br (D) I
- (29) Which of following arrangement for 3 halogens Cl, Br, I when placed in order of increasing e-affinity  
(A) Cl, Br, I (B) I, Br, Cl (C) Br, Cl, I (D) I, Cl, Br

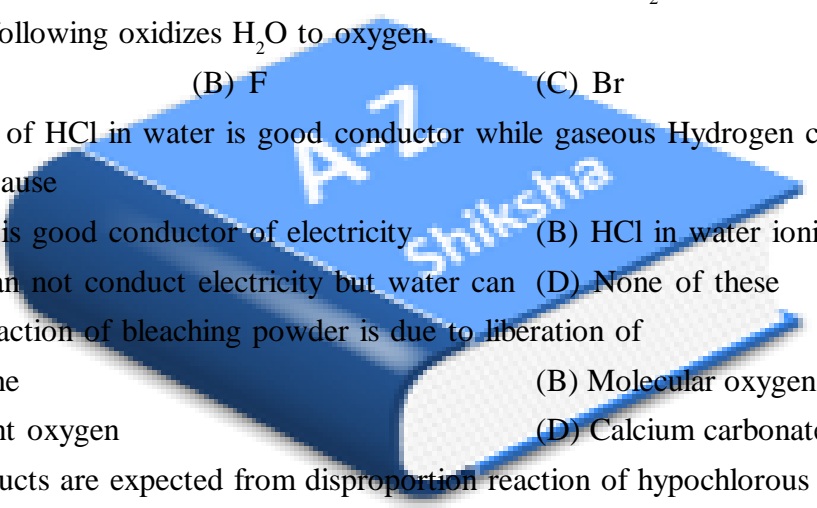


- (30) Fluorine is better oxidizing agent than  $\text{Br}_2$ , It is due to  
 (A) small size of F. (B) More  $e^-$  - repulsion in F.  
 (C) More  $e^-$  neg. in F. (D) Non - Metallic nature of F.
- (31) Which statement is correct about halogens?  
 (A) They are all diatomic (B) They are forming universal solvents  
 (C) They can mutually displace each other from solution of their compound with metals.  
 (D) None of above
- (32) Which of following is most basic?  
 (A) I (B) Br (C) Cl (D) F
- (33) Which of following is not a green house gas?  
 (A)  $\text{CO}_2$  (B)  $\text{CH}_4$  (C)  $\text{O}_3$  (D)  $\text{N}_2\text{X}$
- (34) In isolation of F., a number of difficulties were encountered. Which statement is correct?  
 (A) Potential required for discharge of F. ions is the lowest.  
 (B) F. reacts with most glass vessel  
 (C) F has great affinity for H.  
 (D) Electrolysis of aqueous HF gives ozonised  $\text{O}_2$
- (35) Chlorine gas is dried over  
 (A) CaO (B) NaOH (C) KOH (D) Conc.  $\text{H}_2\text{SO}_4$
- (36) Chlorine is used in water for  
 (A) Killing germs (B) Prevention of pollution  
 (C) Cleansing (D) Removing dirt.
- (37) Chlorine can not be used  
 (A) as bleaching agent (B) Sterilisation  
 (C) Preparation of antiseptic (D) Extraction of silver & copper
- (38) Euchlorine is mixture of  
 (A)  $\text{Cl}_2$  &  $\text{SO}_2$  (B)  $\text{Cl}_2$  &  $\text{ClO}_2$  (C)  $\text{Cl}_2$  & CO (D) None of these
- (39) Which two salts are used in preparing iodised salt.  
 (A)  $\text{KIO}_3$  &  $\text{I}_2$  (B) KI &  $\text{I}_2$  (C)  $\text{KIO}_3$  & HI (D) HI & KI
- (40) Which of following halogen oxides is ionic?  
 (A)  $\text{ClO}_2$  (B)  $\text{BrO}_2$  (C)  $\text{I}_2\text{O}_5$  (D)  $\text{I}_4\text{O}_9$
- (41) Type of bonding in HCl is  
 (A) Pure Covalent (B) Polar Covalent (C) Highly Covalent (D) H - bonding
- (42) Tincture of iodine is  
 (A) Aq. Sol. of  $\text{I}_2$  (B) Solution of  $\text{I}_2$  in Aq. KI  
 (C) alc. Sol. in  $\text{I}_2$  (D) Aq. Sol. of KI

- 
- (43) HBr & HI reduce Sulphuric acid, HCl can reduce  $\text{KMnO}_4$  & HI can reduce  
(A)  $\text{H}_2\text{SO}_4$  (B)  $\text{KMnO}_4$  (C)  $\text{K}_2\text{Cr}_2\text{O}_7$  (D) None
- (44) Hydrogen bonding is present in  
(A) HF (B) HCl (C) HBr (D) HI
- (45) Which one of following orders is not proper  
(A)  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$  : Electronegativity  
(B)  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$  : Bond dissociation energy  
(C)  $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$  : Oxidising power  
(D)  $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$  : Acidic property in water.
- (46) Which of following chemicals contains chlorine?  
(A) Fische's salt (B) Epsom salt (C) Fremy's salt (D) Spirit of salt
- (47) The halide NaF has high melting point than NaCl, NaBr, & NaI because  
(A) Minimum ionic character (B) Maximum ionic character  
(C) Highest oxidizing power (D) Lowest polarity
- (48) Effective component of bleaching powder is -  
(A) Cl (B) Br (C) Al (D) Ca
- (49) Which of following is prepared by electrolytic method?  
(A) Ca (B) Sn (C) S (D)  $\text{F}_2$
- (50) Chlorine dioxide is best prepared by passing dry  
(A) Cl<sub>2</sub> gas over hot HgO (B) Cl<sub>2</sub> & O<sub>2</sub> gas over hot Pt . catalyst  
(C) Chlorine over hot silver chromate (D) None of above
- (51) Which one of following in aqueous solution gives a white precipitate with perchloric acid  
(A) NaCl (B) KCl (C)  $\text{MgCl}_2$  (D)  $\text{FeCl}_3$
- (52) NOCl is used as a bleaching agent & sterilising agent It can be synthesized by action of  
(A) NaCl with  $\text{H}_2\text{O}$  (B)  $\text{NH}_4\text{Cl}$  with NaOH  
(C)  $\text{Cl}_2$  with cold & dilute NaOH (D)  $\text{Cl}_2$  with hot & Conc. NaOH
- (53) A one litre flask is full of brown bromine vapour intensity of brown colour of vapour will not decrease appreciably on adding to flask some of  
(A) Pieces of marble (B) Carbon disulphide  
(C) Carbon tetrachloride (D) Animal Charcoal Powder
- (54) Which of following statement is correct?  
(A) Only Cl & Br forms Oxyacids (B) all halogen form oxyacid  
(C) All halogen except F. form oxyacid (D) Only iodine form oxyacid
- (55) A mixture of  $\text{ZnCl}_2$  &  $\text{PbCl}_2$  can be separated by  
(A) Distillation (B) Crystallization (C) Sublimation (D) adding acetic acid

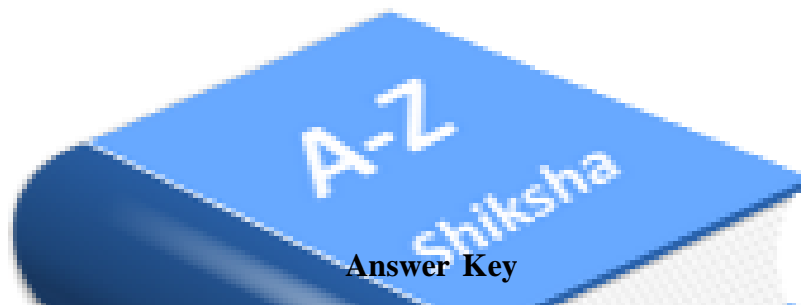
- (56) Hydrogen has a tendency to gain one  $e^-$  to acquire helium configuration. In this respect it resembles.
- (A) Halogens (B) Actinides (C) Transition metals (D) Alkali metals
- (57) The compound added to table salt for maintaining proper health is
- (A) KCl (B) KBr (C) NaI (D)  $MgBr_2$
- (58) Which of following halogen can be purified by sublimation?
- (A)  $F_2$  (B)  $Cl_2$  (C)  $Br_2$  (D)  $I_2$
- (59) Which statement is not true ?
- (A)  $Ni(CO)_4$  is diamagnetic  
 (B)  $BI_3$  is strong Lewis acid than  $BF_3$   
 (C) Graphite conducts electricity where as diamond does not  
 (D)  $CCl_4$  is hydrolysed where as  $BCl_3$  is inert
- (60) Bleaching Powder loses its power on keeping for long time because
- (A) It changes to calcium hypochlorate  
 (B) It changes to calcium chloride & calcium hydroxide  
 (C) It absorbs moisture  
 (D) It changes to  $CaCl_2$  & calcium chlorate.
- (61) Compound that forms dative bond with ammonia
- (A)  $CCl_4$  (B)  $BCl_3$  (C)  $MgCl_2$  (D) NaCl
- (62) Concentrated  $H_2SO_4$  can not be used to prepare HBr from NaBr because it
- (A) reduces HBr (B) Oxidises HBr (C) Reacts slowly (D) None of above
- (63) When Fluoride is heated with conc.  $H_2SO_4$  &  $MnO_2$  the gas evolved is
- (A)  $F_2$  (B)  $SF_6$  (C) HF (D) None
- (64) Unlike other halogens Fluorine does not show higher oxidation states because
- (A) It is highly electronegative (B) It has no d - orbital  
 (C) atomic radius is very small (D) None of Above
- (65) Which of following molecule is theoretically not possible
- (A)  $OF_4$  (B)  $OF_2$  (C)  $SF_4$  (D)  $O_2F_2$
- (66) I is released when potassium iodide reacts with
- (A)  $ZnSO_4$  (B)  $CaSO_4$  (C)  $FeSO_4$  (D)  $NH_4SO_4$
- (67) Among  $Cl^-$ ,  $Br^-$ ,  $I^-$  correct order for being oxidized to dihalogen is
- (A)  $I^- > Cl^- > Br^-$  (B)  $Cl^- > Br^- > I^-$  (C)  $I^- > Br^- > Cl^-$  (D)  $Br^- > I^- > Cl^-$
- (68) Correct order of increasing bond angles in following species is
- (A)  $ClO^- < Cl_2O < ClO_2$  (B)  $Cl_2O < ClO^- < ClO_2$   
 (C)  $ClO_2 < Cl_2O < ClO^-$  (D) None of above

- (69) When thiosulphate ion is oxidized by iodine, which one of the following ions is produced?  
 (A)  $\text{SO}_3^{2-}$  (B)  $\text{SO}_4^{2-}$  (C)  $\text{S}_4\text{O}_6^{2-}$  (D)  $\text{S}_2\text{O}_6^{2-}$
- (70) Which one of the halogen acids is liquid?  
 (A) HF (B) HCl (C) HBr (D) HI
- (71) When  $\text{Cl}_2$  is passed through hot & conc. solution of KOH, the following compound is formed.  
 (A) KCl (B)  $\text{KClO}_3$  (C)  $\text{KClO}_2$  (D)  $\text{KClO}_4$
- (72) Chlorine can remove  
 (A) Br from NaBr Sol. (B) F from NaF Sol.  
 (C) Cl from NaCl Sol. (D) F from  $\text{CaF}_2$  Sol.
- (73) Which one of the following acids is the weakest?  
 (A) HClO (B) HBr (C)  $\text{HClO}_3$  (D) HCl
- (74) Which of the following will displace a halogen from a solution of a halide?  
 (A)  $\text{Br}_2$  added to NaCl (B)  $\text{Cl}_2$  added to KCl  
 (C) KCl added to NaF (D)  $\text{Br}_2$  added to KI
- (75) Chlorine can be manufactured from  
 (A) Electrolysis of NaCl (B) Electrolysis of brine  
 (C) Electrolysis of bleaching powder (D) All above
- (76) Nitric acid converts iodine to  
 (A) Iodic acid (B) Hydroiodic acid  
 (C) Iodine Nitrate (D) Iodine pentoxide
- (77) In the preparation of chlorine from HCl,  $\text{MnO}_2$  acts as  
 (A) Oxidising agent (B) Reducing agent  
 (C) Catalytic agent (D) Dehydration agent
- (78) In KI solution  $\text{I}_2$  readily dissolves & forms  
 (A)  $\text{I}^-$  (B)  $\text{KI}_2$  (C)  $\text{KI}^{2-}$  (D)  $\text{KI}_3$
- (79) When Cl<sub>2</sub> is passed over dry slaked lime at room temperature, the main reaction product is,  
 (A)  $\text{Ca}(\text{ClO}_2)_2$  (B)  $\text{CaCl}_2$  (C)  $\text{CaOCl}_2$  (D)  $\text{Ca}(\text{OCl}_2)_2$
- (80)  $\text{Br}^-$  is converted to  $\text{Br}_2$  by,  
 (A)  $\text{Cl}_2$  (B) Conc. HCl (C) HBr (D)  $\text{H}_2\text{S}$
- (81) Which reaction can't be used for the production of a halogen acid.  
 (A)  $2\text{KBr} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{HBr}$  (B)  $\text{NaHSO}_4 + \text{NaCl} \rightarrow \text{Na}_2\text{SO}_4 + \text{HCl}$   
 (C)  $\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HCl}$  (D)  $\text{CaF}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{HF}$
- (82) When cold NaOH reacts with  $\text{Cl}_2$  it forms  
 (A) NaClO (B)  $\text{NaClO}_2$  (C)  $\text{NaClO}_3$  (D) None

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- (83) Which one is anhydride of  $\text{HClO}_4$   
(A)  $\text{Cl}_2\text{O}$  (B)  $\text{ClO}_2$  (C)  $\text{Cl}_2\text{O}_6$  (D)  $\text{Cl}_2\text{O}_7$
- (84) In dark, which of following reacts with Hydrogen?  
(A)  $\text{Br}_2$  (B)  $\text{F}_2$  (C)  $\text{I}_2$  (D)  $\text{Cl}_2$
- (85) Electrolysis of a liquid resulted in formation of Hydrogen at cathode &  $\text{Cl}_2$  at anode.  
Liquid is  
(A) Pure water (B)  $\text{H}_2\text{SO}_4$  Solution (C)  $\text{NaCl}$  Solution (D)  $\text{CaCl}_2$  Solution
- (86) Concentrated  $\text{HNO}_3$  reacts with  $\text{I}_2$  to give  
(A)  $\text{HI}$  (B)  $\text{HOI}$  (C)  $\text{HOIO}_2$  (D)  $\text{HOIO}_3$
- (87) Manufacture of Bromine from sea water, the mother liquor containing bromides is treated with  
(A)  $\text{CO}_2$  (B)  $\text{Cl}_2$  (C)  $\text{I}_2$  (D)  $\text{SO}_2$
- (88) Formula of some fluorides are given. Which of them will combine with fluorine?  
(A)  $\text{IF}_5$  (B)  $\text{NaF}$  (C)  $\text{CaF}_2$  (D)  $\text{SF}_5$
- (89) Which of following oxidizes  $\text{H}_2\text{O}$  to oxygen.  
(A)  $\text{Cl}$  (B)  $\text{F}$  (C)  $\text{Br}$  (D)  $\text{I}$
- (90) A solution of  $\text{HCl}$  in water is good conductor while gaseous Hydrogen chloride is not .  
This is because  
(A) Water is good conductor of electricity (B)  $\text{HCl}$  in water ionises  
(C) Gas can not conduct electricity but water can (D) None of these
- (91) Bleaching action of bleaching powder is due to liberation of  
(A) Chlorine (B) Molecular oxygen  
(C) Nascent oxygen (D) Calcium carbonate
- (92) What products are expected from disproportion reaction of hypochlorous acid.  
(A)  $\text{HClO}_3$  &  $\text{Cl}_2\text{O}$  (B)  $\text{HClO}_2$  &  $\text{HClO}_4$   
(C)  $\text{HCl}$  &  $\text{Cl}_2\text{O}$  (D)  $\text{HCl}$  &  $\text{HClO}_3$
- (93) Mixture of conc.  $\text{HCl}$  &  $\text{HNO}_3$  made in 3:1 ratio contains  
(A)  $\text{ClO}_2$  (B)  $\text{NOCl}$  (C)  $\text{NCl}_3$  (D)  $\text{N}_2\text{O}_4$
- (94)  $\text{I}^-$  is used for treatment of  
(A) Thyroid disorders (B) Skin disorders (C) Brain tumours (D) Kidney stones
- (95) Least reactive halogen with hydrogen is  
(A)  $\text{Cl}$  (B)  $\text{I}$  (C)  $\text{Br}$  (D)  $\text{F}$
- (96) Bleaching action of chlorine is due to  
(A) Oxidation (B) Reduction (C) Hydrolysis (D) Its acidic nature
- (97) Which among following non metals is liq at  $25^\circ\text{C}$   
(A)  $\text{Br}$  (B)  $\text{C}$  (C)  $\text{P}$  (D)  $\text{S}$ .
- 

- (98) Element that liberates oxygen gas from water is  
 (A) P (B) Na (C) F (D) I.
- (99) On exciting  $\text{Cl}_2$  molecule by UV Light, we get  
 (A) Cl (B)  $\text{Cl}^+$  (C)  $\text{Cl}^-$  (D) All
- (100) Which of following sequence is correct with reference to oxidation number of iodine  
 (A)  $\text{I}_2 < \text{ICl} < \text{HI} < \text{HIO}_4$  (B)  $\text{HIO}_4 < \text{ICl} < \text{I}_2 < \text{HI}$   
 (C)  $\text{I}_2 < \text{HI} < \text{ICl} < \text{HIO}_4$  (D)  $\text{HI} < \text{I}_2 < \text{ICl} < \text{HIO}_4$
- (101) What is obtained on reacting  $\text{HgCl}_2$  &  $\text{Hg}(\text{CN})_2$ .  
 (A)  $(\text{CN})_2$ . (B) addition compound  $\text{HgCl}_2 \cdot \text{Hg}(\text{CN})_2$   
 (C)  $\text{Hg}(\text{CN}) \text{Cl}$  (D)  $\text{Hg} [\text{Hg}(\text{CN})_2\text{Cl}_2]$
- (102) Chlorine is liberated when we heat  
 (A)  $\text{KMnO}_4 + \text{NaCl}$  (B)  $\text{K}_2 \text{Cr}_2\text{O}_7 + \text{MnO}_2$   
 (C)  $\text{Pb}_2 (\text{NO}_3)_4 + \text{MnO}_2$  (D)  $\text{K}_2 \text{Cr}_2\text{O}_7 + \text{HCl}$
- (103) Metal halide, insoluble in water is  
 (A)  $\text{AgI}$  (B)  $\text{KBr}$  (C)  $\text{CaCl}_2$  (D)  $\text{AgF}$
- (104) Which of following oxides is expected exhibit paramagnetic behaviour  
 (A)  $\text{CO}_2$  (B)  $\text{SO}_2$  (C)  $\text{ClO}_2$  (D)  $\text{SiO}_2$
- (105) Iodine dissolves readily in  
 (A) Water (B) Potassium iodide (C)  $\text{CCl}_4$  (D) Alcohol
- (106)  $\text{Cl}_2$  reacts with  $\text{CS}_2$  in presence of  $\text{I}_2$  to form  
 (A)  $\text{CHCl}_3$  (B)  $\text{CCl}_4$  (C)  $\text{C}_2\text{H}_5\text{Cl}$  (D)  $\text{C}_2\text{H}_6$
- (107) Bleaching powder is  
 (A)  $\text{CaOCl}_2$  (B)  $\text{CaO}$  (C)  $\text{CaO}(\text{Cl})$  (D)  $\text{CaCl}(\text{OCl})$
- (108) Bleaching powder is obtained by treating chlorine with  
 (A)  $\text{CaO}$  (B)  $\text{CaCO}_3$  (C)  $\text{CaSO}_4$  (D)  $\text{Ca}(\text{OH})_2$
- (109) Which is formed when F reacts with hot & conc. Sodium Hydroxide.  
 (A)  $\text{O}_2$  (B)  $\text{O}_3$  (C)  $\text{NaO}$  (D)  $\text{HF}$ .
- (110) Bromine water reacts with  $\text{SO}_2$  to form  
 (A)  $\text{H}_2\text{O}$  &  $\text{HBr}$  (B)  $\text{H}_2\text{SO}_4$  &  $\text{HBr}$  (C)  $\text{HBr}$  &  $\text{S}$  (D)  $\text{S}$  &  $\text{H}_2\text{O}$
- (111) On heating  $\text{NaCl} + \text{K}_2 \text{Cr}_2\text{O}_7 + \text{Conc. H}_2\text{SO}_4$ , we get  
 (A)  $\text{O}_2$  (B)  $\text{Cl}_2$  (C)  $\text{CrOCl}_2$  (D)  $\text{CrO}_2\text{Cl}_2$
- (112) Amongst  $\text{LiCl}$ ,  $\text{RbCl}$ ,  $\text{BeCl}_2$  &  $\text{MgCl}_2$ , max. & min. ionic character will be shown by  
 (A)  $\text{LiCl}$ ,  $\text{MgCl}_2$ . (B)  $\text{RbCl}$ ,  $\text{BeCl}_2$  (C)  $\text{RbCl}$ ,  $\text{MgCl}_2$  (D)  $\text{MgCl}_2$ ,  $\text{BeCl}_2$
- (113) Which of following chloride is water insoluble  
 (A)  $\text{HCl}$  (B)  $\text{AgCl}$  (C) both 'a' & b (D) None

- (114) The alkali metal halide are soluble in water but LiF is insoluble because  
 (A) It's Amphoteric (B) Li -F is highly ionic  
 (C) It's Lattice energy is high (D) Li<sup>+</sup> ion is least hydrated.
- (115) Which of following is present as an active ingredient in bleaching powder for bleaching action  
 (A) CaCl<sub>2</sub> (B) CaOCl<sub>2</sub> (C) Ca(OCl)<sub>2</sub> (D) CaO<sub>2</sub>Cl
- (116) ClO<sub>2</sub> reacts with O<sub>3</sub> to give  
 (A) Cl<sub>2</sub>O<sub>4</sub> (B) Cl<sub>2</sub>O (C) Cl<sub>2</sub>O<sub>6</sub> (D) ClO<sub>4</sub>
- (117) Bad conductor Of electricity is  
 (A) H<sub>2</sub>F<sub>2</sub> (B) HCl (C) HBr (D) HI
- (118) When KBr is treated with concentrated H<sub>2</sub>SO<sub>4</sub> redish brown gas evolved, gas is  
 (A) Mixture of Br & HBr (B) Bromine & HNO<sub>3</sub>  
 (C) Bromine (D) None of these.

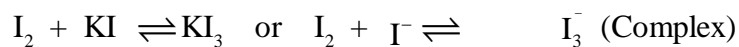


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6	B	26	B	46	D	66	B	86	C	106	B
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10	D	30	C	50	C	70	A	90	B	110	B
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13	D	33	D	53	A	73	A	93	B	113	B
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17	D	37	D	57	C	77	A	97	A	117	A
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## HINTS

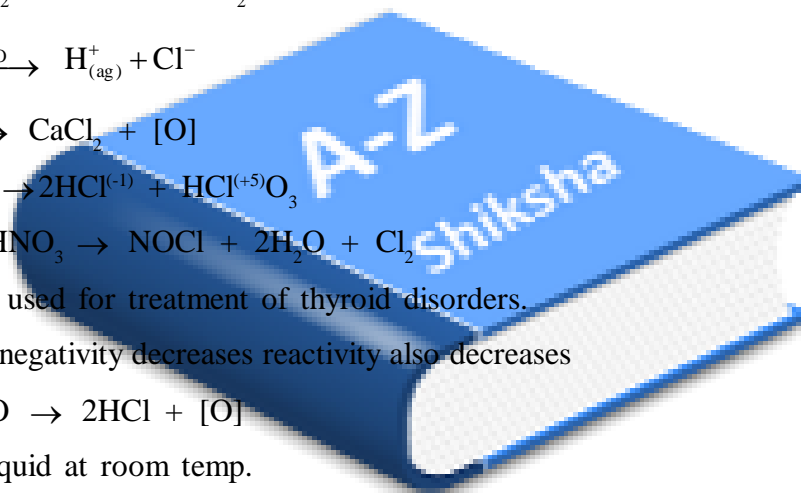
- (1)  $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$  thermal stability
- (2)  $\text{CHCl}_3 + \frac{1}{2} \text{O}_2 \rightarrow \text{COCl}_2 + \text{HCl}$   
Phosgene or carbonyl chloride
- (3) Iodine has the least affinity for water and is only slightly soluble in it. However it is dissolved in 10% aq. Solution of KI due to formation of complex ion i.e.  $\text{I}_3^-$

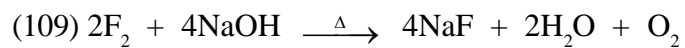
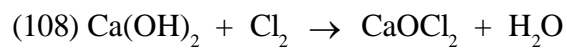
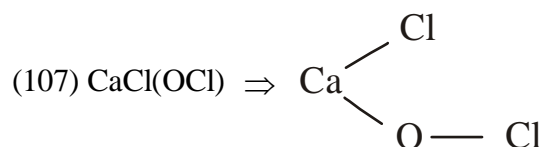


- (4)  $2\text{KClO}_3 + \text{I}_2 \rightarrow 2\text{KIO}_3 + \text{Cl}_2$
- (5)  $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow 2\text{NaI} + \text{Na}_2\text{S}_4\text{O}_6$
- (6) The acidic strength of oxy acids decreases down wards in a group. The correct order of acidic strength of oxy-acids of Halogens is  $\text{HClO}_4 > \text{HBrO}_4 > \text{HIO}_4$
- (7) Carnallite is  $\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ . The mother liquor remain after crystallisation of KCl from carnallite contains about 0.25% of Bromine as  $\text{MgBr}_2$  or  $\text{KBr}$ .
- (9)  $\text{Cl}_2 + 2\text{KBr} \rightarrow 2\text{KCl} + \text{Br}_2$   
A more electronegative halogen can displace less acid because of lowest bond dissociation Energy.
- (10)  $2\text{NaOH}(\text{dil}) + \text{Cl}_2 \xrightarrow{\text{Cold}} \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$  Sod. Hypochlorite.  
 $6\text{NaOH}(\text{conc}) + 3\text{Cl}_2 \xrightarrow{\text{heat}} 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$  Sodium chlorate.
- (12) HF is weakest acid. Since it is not able to give  $\text{H}^+$  ions which are trapped in H - Bonding.
- (69)  $2\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow 2\text{NaI} + \text{Na}_2\text{S}_4\text{O}_6$
- (70) HF is liq. Because of int. molec. H - Bonding
- (71)  $6\text{KOH} + 3\text{Cl}_2 \rightarrow 5\text{KCl} + \text{KClO}_3 + 3\text{H}_2\text{O}$
- (72)  $\text{Cl}_2 + 2\text{NaBr} \rightarrow 2\text{NaCl} + \text{Br}_2$
- (73)  $\text{HClO} \rightleftharpoons \text{H}^+ + \text{ClO}^-$
- (74)  $\text{Br}_2 + 2\text{KI} \rightarrow \text{I}_2 + 2\text{KBr}$
- (75)  $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH}_{(\text{aq})} + \text{Cl}_{2(\text{g})} + \text{H}_{2(\text{g})}$
- (76)  $\text{I}_2 + 10\text{HNO}_3 \rightarrow 2\text{HIO}_3 + 10\text{NO}_2 + 4\text{H}_2\text{O}$
- (77)  $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$   
(4+) (2+)  
| \_\_\_\_\_ Reduction \_\_\_\_\_|



- (78)  $\text{KI} + \text{I}_2 \rightarrow \text{KI}_3$
- (79)  $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$
- (80)  $\text{Cl}_2 + 2\text{Br}^- \rightarrow 2\text{Cl}^- + \text{Br}_2$
- (81)  $2\text{KBr} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{HBr}$
- (82)  $2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaClO} + \text{NaCl} + \text{H}_2\text{O}$
- (83)  $2\text{HClO}_4 \rightarrow \text{H}_2\text{O} + \text{Cl}_2\text{O}_7$
- (84)  $\text{H}_2 + \text{F}_2 \rightarrow 2\text{HF}$  (anode)
- (85)  $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$  (cathode)
- (86)  $\text{I}_2 + 10\text{HNO}_3 \rightarrow 2\text{HIO}_3 + 10\text{NO}_2 + 4\text{H}_2\text{O}$
- (87)  $\text{Mg} + \text{Br}_2 + \text{Cl}_2 \rightarrow \text{MgCl}_2 + \text{Br}_2$
- (88)  $\text{IF}_5 + \text{F}_2 \rightarrow \text{IF}_7$
- (89)  $2\text{F}_2 + 2\text{H}_2\text{O} \rightarrow 4\text{HF} + \text{O}_2$
- (90)  $\text{HCl} \xrightarrow{\text{H}_2\text{O}} \text{H}_{(\text{aq})}^+ + \text{Cl}^-$
- (91)  $\text{CaOCl}_2 \rightarrow \text{CaCl}_2 + [\text{O}]$
- (92)  $3\text{HOCl}^{(+1)} \rightarrow 2\text{HCl}^{(-1)} + \text{HCl}^{(+5)}\text{O}_3$
- (93)  $3\text{HCl} + \text{HNO}_3 \rightarrow \text{NOCl} + 2\text{H}_2\text{O} + \text{Cl}_2$
- (94) I - 131 is used for treatment of thyroid disorders.
- (95) As electronegativity decreases reactivity also decreases
- (96)  $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow 2\text{HCl} + [\text{O}]$
- (97) Br. Is a liquid at room temp.
- (98)  $2\text{H}_2\text{O} + 2\text{F}_2 \rightarrow 4\text{HF} + \text{O}_2$
- (99)  $\text{Cl}-\text{Cl} \xrightarrow{\text{UV}} \text{Cl} + \text{Cl}$  (Free radical)
- (100)  $\text{HI} < \text{I}_2 < \text{ICl} < \text{HIO}_4$   
 $\begin{matrix} (-1) & (0) & (+1) & (+7) \end{matrix}$
- (101)  $\text{HgCl}_2 + \text{Hg(CN)}_2 \rightarrow \text{HgCl}_2 \cdot \text{Hg(CN)}_2$
- (102)  $\text{K}_2\text{Cr}_2\text{O}_7 + 14\text{HCl} \rightarrow 2\text{KCl} + 2\text{CrCl}_3 + 7\text{H}_2\text{O} + 3\text{Cl}_2$
- (103) AgI is covalent compound.
- (104) Due to unpaired  $e^-$  -  $\text{ClO}_2$  is paramagnetic.
- (105)  $\text{KI} + \text{I}_2 \rightarrow \text{KI}_3$
- (106)  $\text{CS}_2 + 3\text{Cl}_2 \rightarrow \text{CCl}_4 + \text{S}_2\text{Cl}_2$





(111)  $\text{CrO}_2\text{Cl}_2$  is a orange red gas

(112) Acc to Fajan's rule , largest cation & smallest an ion

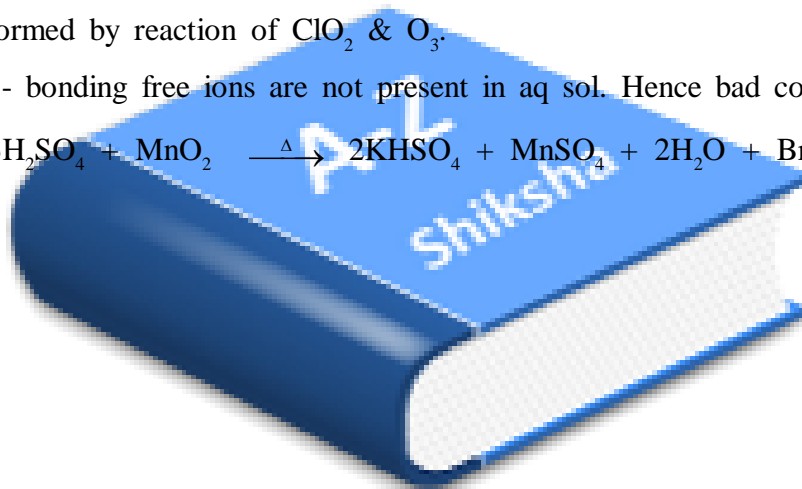
(113)  $\text{AgCl}$  is water insoluble chloride.

(114) Small atomic size of Li & F , lattice energy highest

(115) Fact.

(116)  $\text{Cl}_2\text{O}_6$  is formed by reaction of  $\text{ClO}_2$  &  $\text{O}_3$ .

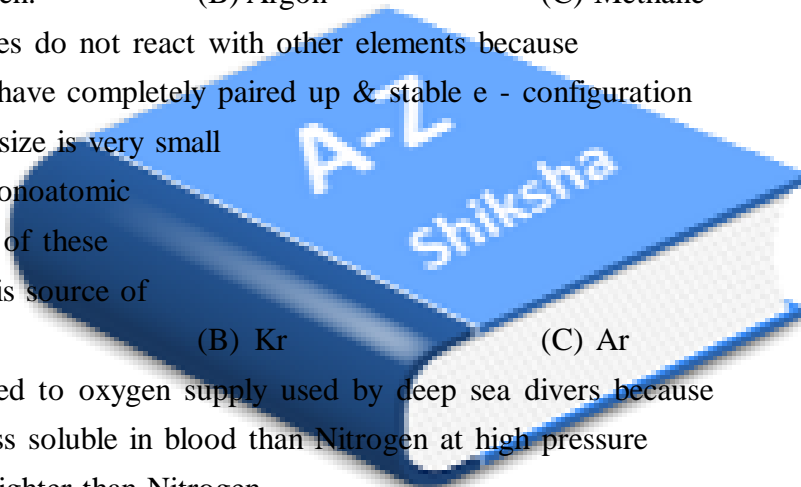
(117) due to H - bonding free ions are not present in aq sol. Hence bad condc.



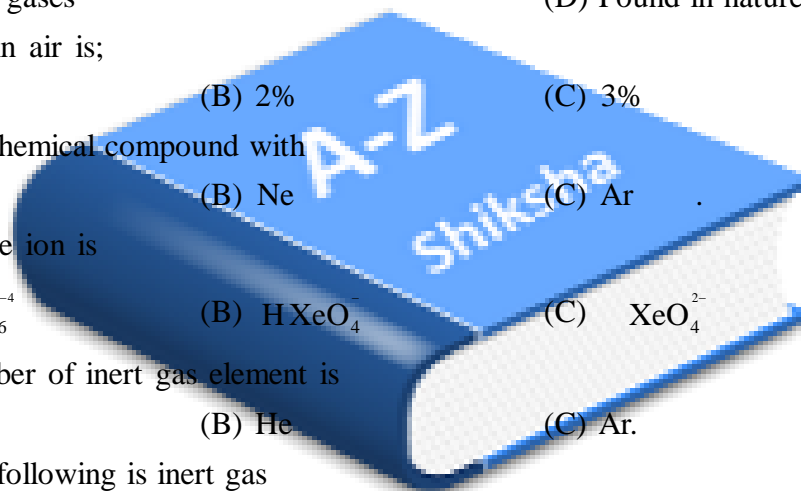
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## NOBLE GASES FAMILY

- (1) Which of following outer electronic configuration represents Ar?  
(A)  $ns^2$  (B)  $ns^2 np^6$  (C)  $ns^2 np^5$  (D)  $ns^2 np^4$
- (2) Which mineral was used in isolation of radium?  
(A) Lime stone (B) Pitch blende (C) Rectile (D) Haematite
- (3) Molecules of noble gas do not possess vibrational energy because noble gas is  
(A) Monoatomic (B) Chemically inert  
(C) Complete filled shells (D) Is diatomic
- (4) Argon was discovered by  
(A) Rayleigh (B) Frankland & Lockyer (C) Jansen (D) Ramsay
- (5) The colour discharge tubes for advertisement mainly contain  
(A) Argon. (B) Neon (C) Helium (D) Xenon
- (6) Least chemical activity is shown by  
(A) Nitrogen. (B) Argon (C) Methane (D) Xenon
- (7) Noble gases do not react with other elements because  
(A) They have completely paired up & stable e - configuration  
(B) Their size is very small  
(C) Are monoatomic  
(D) None of these
- (8) Monazite is source of  
(A) He (B) Kr (C) Ar (D) Ne.
- (9) He is added to oxygen supply used by deep sea divers because  
(A) It's less soluble in blood than Nitrogen at high pressure  
(B) It is Lighter than Nitrogen  
(C) It is readily miscible in oxygen  
(D) It is less poisonous than Nitrogen
- (10) Which of following is not correct for noble gas?  
(A) Ar is used in electric bulbs  
(B) Kr is obtained during radioactive disintegration  
(C) Half life of Rn is 3.8 days  
(D) He is used to produce Low temp.
- (11) Which of following represents noble gas configuration.  
(A)  $1S^2, 2S^2 2P^6, 3S^2 3P^5$  (B)  $1S^2, 2S^2 2P^6, 3S^2 3P^6$   
(C)  $1S^2, 2S^2 2P^6$  (D)  $1S^2, 2S^2$
- (12) Which of following has zero valency  
(A) Sodium (B) Beryllium (C) Aluminium (D) Krypton.



- (13) The forces acting between noble gas atoms are  
 (A) Vander waals forces (B) Ion - dipole forces  
 (C) London - dispersion forces (D) Magnatic forces
- (14) Which of following is correct sequence of noble gas in their group ?  
 (A) Ar, He, Kr, Ne, Xe, Rn (B) He, Ar, Ne, Kr, Xe, Rn  
 (C) He, Ne, Ar, Kr, Xe, Rn (D) He, Ne, Kr, Ar, Xe, Rn
- (15) Which of following is noble gas configuration?  
 (A)  $1s^2$  (B)  $1S^2, 2S^2$   
 (C)  $1S^2, 2S^2, 2P^6, 3S^1$  (D)  $1S^2, 2S^2, 2P^6, 3S^2, 3P^6, 4S^2$
- (16) Which of following noble gas does not have octate of e - in outer most shell.  
 (A) Ne (B) Rn (C) Ar (D) He
- (17) Low chemical reactivity of rare gases can be attributed to their  
 (A) Being nonmetal (B) Having High ioni cation energies  
 (C) Being gases (D) Found in nature in small quantities.
- (18) % of Ar in air is;  
 (A) 1% (B) 2% (C) 3% (D) 4%
- (19) F. forms chemical compound with  
 (A) He (B) Ne (C) Ar (D) Xe.
- (20) Per Xenate ion is  
 (A)  $XeO_6^{-4}$  (B)  $HXeO_4^-$  (C)  $XeO_4^{2-}$  (D) Xe.
- (21) Last member of inert gas element is  
 (A) Ne (B) He (C) Ar. (D) Rn
- (22) Which of following is inert gas  
 (A)  $H_2$  (B)  $O_2$  (C)  $N_2$ . (D) Argon.
- (23) Which inert gas show abnormal behavior on liquefaction  
 (A) Xe (B) He (C) Ar (D) Kr
- (24) Inert gas producing max. number of compounds  
 (A) He & Ne (B) Ar & Ne (C) Kr & Ne (D) Ar & Xe
- (25) Helium was discovered by  
 (A) Crooks (B) Rutherford  
 (C) Frankland & Lockyer (D) Dorn
- (26)  $XeF_4$  &  $XeF_6$  are expected to be  
 (A) Oxidising (B) Reducing (C) Un reactive (D) Strongly basic
- (27) Noble gas forms max. No. of compounds is  
 (A) Ar (B) He (C) Xe (D) Ne



- (28) Nuclear Fusion Produces  
 (A) Ar (B) Duterium . (C) He (D) Krypton
- (29) Among fluorides, one that does not exists is  
 (A) XeF<sub>4</sub>. (B) HeF<sub>4</sub> (C) SF<sub>4</sub> (D) CF<sub>4</sub>
- (30) Last orbit of argon would have \_\_\_ e-  
 (A) 6 (B) 2 (C) 18 (D) 8
- (31) Electronic configuration of neon is  
 (A) 1S<sup>2</sup>, 2S<sup>2</sup> 2P<sup>2</sup> (B) 1S<sup>2</sup>, 2S<sup>2</sup> 2P<sup>6</sup> (C) 1S<sup>2</sup>, 2S<sup>2</sup> (D) 1S<sup>2</sup>
- (32) Which of following noble gas s is least polarizable  
 (A) Xe (B) Ar (C) Ne (D) He
- (33) XeF<sub>6</sub> on hydrolysis gives  
 (A) XeO<sub>3</sub> (B) XeO (C) XeO<sub>2</sub> (D) Xe

### Answer Key

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

### Hints

- (26) all the xenon fluorides are strongly oxidizing
- (27) XeF<sub>2</sub>, XeOF<sub>2</sub>, XeF<sub>4</sub>, XeOF<sub>4</sub>, XeF<sub>6</sub>, XeO<sub>3</sub>
- (28)  $1\text{H}^2 + 1\text{H}^2 \rightarrow 2\text{He}^4$
- (29) HeF<sub>4</sub> does not exists
- (30) Ar<sub>18</sub> → 2, 8, 8
- (31) Ne<sub>10</sub> → 1S<sup>2</sup>, 2S<sup>2</sup> 2P<sup>6</sup>
- (32) He is least polarizable bec. Of small size.
- (33) XeF<sub>6</sub> + 3H<sub>2</sub>O → XeO<sub>3</sub> + 6HF.