

P Block Elements – Part 2

(Group 15, 16, 17 & 18 Elements)

1. Group 15 Elements & their Compounds

- Q 1. The presence of Nitrogen in earth crust is due to Stability of
 (A) NO_3^- ions (B) NO_2^- ions
 (C) N^{3-} ions (D) N_3^- ions
- Q 2. The natural layer on teeth is
 (A) $Ca_3(PO_4)_2$ (B) $3Ca_3(PO_4)_2 \cdot CaF_2$
 (C) $3Ca_3(PO_4)_2 \cdot Ca(OH)_2$ (D) None of these
- Q 3. Which of the element from group VA does not show allotropy? [NCERT Exemplar]
 (A) Nitrogen (B) Antimony
 (C) Bismuth (D) all shows
- Q 4. Nitrogen form N_2 but phosphorous when form P_2 converts into P_4 , because [CBSE PMT 2001]
 (A) triple bond present between P atoms
 (B) $p\pi - p\pi$ bonding is weak
 (C) $p\pi - p\pi$ bonding is Strong
 (D) multiple bond form easily
- Q 5. Which of the following compound has tendency to undergo disproportionation reaction?
 (A) N_2 (B) N_2H_4
 (C) HNO_2 (D) All of these
- Q 6. In $R_3P=O$, the π bond formation occur due to
 (A) $P\pi - P\pi$ overlapping (B) $P\pi - d\pi$ overlapping
 (C) $d\pi - d\pi$ overlapping (D) None of these
- Q 7. Why $R_3P=O$ exist but not $R_3N=O$ (R = alkyl group) [NCERT]
- Q 8. VA elements do not form hydrides EH_5 , because
 (A) absence of Vacant orbital
 (B) Large Energy difference between S, P & d – orbitals
 (C) Inert Pair effect
 (D) All of these in different cases
- Q 9. In case of Nitrogen, NCl_3 is possible but not NCl_5 , while in case of phosphorous, PCl_3 as well as PCl_5 are possible. It is due to [AIIEEE 2002]
 (A) Availability of vacant d orbitals in P but not in N
 (B) Lower Electronegativity of P than N
 (C) Lower tendency of H Bond formation in P than N
 (D) Occurance of P in Solid while N in gaseous state at room temperature
- Q 10. The correct order of basic strength of hydrides of VA element is
 (A) $NH_3 > PH_3 > AsH_3$ (B) $NH_3 < PH_3 < AsH_3$
 (C) $PH_3 > NH_3 > AsH_3$ (D) $PH_3 > AsH_3 > NH_3$
- Q 11. Bond dissociation enthalpy of E – H bonds is given below. Which of the compounds will act as strongest reducing agent? [NCERT Exemplar]
- | Compounds | NH_3 | PH_3 | AsH_3 | SbH_3 |
|-------------|--------|-------------|---------|---------|
| B.E.(E–H) | 389 | 322 | 297 | 255 |
| (A) NH_3 | | (B) PH_3 | | |
| (C) AsH_3 | | (D) SbH_3 | | |
- Q 12. The hydride of nitrogen group element (of the type AH_3) having lowest boiling point is
 (A) SbH_3 (B) AsH_3
 (C) PH_3 (D) NH_3
- Q 13. Which of the following oxide is Neutral?
 (A) NO (B) N_2O
 (C) NO_2 (D) Both A & B
- Q 14. Which is least acidic?
 (A) P_4O_6 (B) P_4O_{10}
 (C) As_4O_6 (D) As_4O_{10}
- Q 15. The correct decreasing order of bond angle is
 (A) $PF_3 > NF_3 > PH_3 > NH_3$
 (B) $PF_3 > NH_3 > NF_3 > PH_3$
 (C) $NH_3 > NF_3 > PF_3 > PH_3$
 (D) $NH_3 > NF_3 > PH_3 > PF_3$
- Q 16. The hydrides having the maximum and minimum boiling points among NH_3 , PH_3 , AsH_3 and BiH_3 are respectively
 (A) BiH_3 , NH_3 (B) NH_3 , BiH_3
 (C) BiH_3 , PH_3 (D) NH_3 , PH_3

2. Compounds of Group 15 Elements & Nitrogen

- Q 1. The correct order of decreasing Lewis acid strength of trichlorides of group 15 elements is
 (A) $\text{AsCl}_3 > \text{PCl}_3 > \text{BiCl}_3 > \text{SbCl}_3$
 (B) $\text{PCl}_3 > \text{AsCl}_3 > \text{SbCl}_3 > \text{BiCl}_3$
 (C) $\text{NCl}_3 > \text{PCl}_3 > \text{AsCl}_3 > \text{SbCl}_3$
 (D) $\text{SbCl}_3 > \text{BiCl}_3 > \text{PCl}_3 > \text{AsCl}_3$
- Q 2. The following are some statements related to VA group hydrides. [AIIMS 2011]
 I. Reducing property increases from NH_3 to BiH_3
 II. Tendency to donate lone pair decreases from NH_3 to BiH_3
 III. Thermal stability decreases from NH_3 to BiH_3
 IV. Bond angle decreases from NH_3 to BiH_3
 (A) I, II, III & IV (B) I, III & IV
 (C) I, II & IV (D) I & IV
- Q 3. Which of the halides only exist as ammoniates?
 (A) NF_3 (B) NCl_3
 (C) NBr_3 (D) NI_3
- Q 4. Which of the following statement is wrong? [AIEEE 2011]
 (A) the stability of hydrides increases from NH_3 to BiH_3 in Group 15 of the periodic table
 (B) Nitrogen can not form $d\pi - p\pi$ bonds
 (C) Single N-N bond is weaker than single P-P bond
 (D) N_2O_4 has two resonating structures
- Q 5. $\text{PBr}_5(\text{s})$ dissociates as
 (A) $\text{PBr}_4^+, \text{Br}^-$ (B) $\text{PBr}_4^+, \text{PBr}_6^-$
 (C) $\text{PBr}_6^+, \text{Br}^-$ (D) $\text{PBr}_4^-, \text{PBr}_6^+$
- Q 6. Fixation of nitrogen means
 (A) Reaction of nitrogen with oxygen
 (B) Conversion of free nitrogen of atmosphere into nitrogen compounds
 (C) Decomposition of nitrogenous compounds to yield free nitrogen
 (D) The action of denitrifying bacteria on nitrogen compound
- Q 7. The essential elements of nitrogen fixation is
 (A) Zn (B) Cu
 (C) Mo (D) B
- Q 8. Bismuth chloride (BiCl_3) on hydrolysis, yields a white precipitate of [AIIMS 1996]
 (A) Bismuth Hydroxide (B) Bismuth Oxyacid
 (C) Bismuth Oxychloride (D) None of these
- Q 9. Pure N_2 is prepared by heating [IIT JEE 2011]
 (A) $\text{Ba}(\text{N}_3)_2$ (B) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$
 (C) $\text{CuO} + \text{NH}_3$ (D) NH_4NO_2
- Q 10. Nitrogen is produced when NaNO_2 is heated with
 (A) NH_4Cl (B) NH_4NO_3
 (C) $(\text{NH}_4)_2\text{CO}_3$ (D) NH_4OH
- Q 11. Ammonium oxalate on decomposition gives
 (A) Basic gas (B) Acidic gas
 (C) Neutral gas (D) Water
- Q 12. Nitrogen is used to fill electric bulbs because it
 (A) is lighter than air
 (B) makes the bulb give more light
 (C) Nitrogen trioxide
 (D) is not-oxide
- Q 13. Man dies when nitrous oxide is inhaled in large quantity because
 (A) It is poisonous
 (B) It causes laughing hysteria
 (C) It deactivates hemoglobin
 (D) None
- Q 14. When lightning flash through air is produced, which gas may be formed?
 (A) Nitrous acid (B) Nitric acid
 (C) Nitrous oxide (D) Nitric oxide
- Q 15. Nitric oxide is prepared by the action of HNO_3 on
 (A) Fe (B) Cu
 (C) Zn (D) Sn
- Q 16. The yellow colour shown by nitric acid can be removed by
 (A) Adding Mg powder
 (B) Boiling the acid
 (C) Passing NH_3 through acid
 (D) Passing air through warm acid
- Q 17. Conc. Nitric acid, upon long standing turns yellow brown due to formation of [JEE Adv. 2013]
 (A) NO (B) NO_2
 (C) N_2O (D) N_2O_4
- Q 18. Conc. HNO_3 stains skin yellow because
 (A) The proteins converted into xanthoproteins
 (B) The water is removed by the acid
 (C) the skin is burnt by acid
 (D) Nitrocellulose is formed

3. Compounds of Nitrogen

- Q 1. A hydride of nitrogen which is acidic is
(A) NH_3 (B) N_2H_4
(C) N_2H_2 (D) N_3H
- Q 2. In the manufacture of ammonia Haber process involving the reaction
 $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g}) + 24 \text{Kcal}$
the favourable conditions for higher yield would include
(A) higher temperature and lower pressure
(B) higher temperature and higher pressure
(C) lower temperature and low pressure
(D) higher pressure and lower temperature
- Q 3. Ammonia can be dried by [IIT JEE 1980]
(A) conc. H_2SO_4 (B) P_2O_5
(C) Anhydrous CuSO_4 (D) None
- Q 4. Ammonia reacts with excess of chlorine to form:
(A) N_2 & NH_4Cl (B) NCl_3 & HCl
(C) NH_4Cl & NCl_3 (D) N_2 & HCl
- Q 5. **Assertion (A)** : Liquid Ammonia is used in refrigeration.
Reason (R) : It vaporizes quickly. [AIIMS 1997]
(A) Both A & R are correct and R is the correct explanation of A
(B) Both A & R are correct but R is not the correct explanation of A
(C) A is true but R is false
(D) Both A & R are False
- Q 6. N_2O reacts with NaNH_2 & produces
(A) NaN_3 (B) NH_3
(C) NaOH (D) All of these
- Q 7. NO is prepared by
(A) NH_3 & O_2 (B) $\text{Cu} + \text{HNO}_3$
(C) NaNO_2 & FeSO_4 (D) All of these
- Q 8. Blue liquid which is obtained on reacting equimolar amounts of two gases at -30°C is? [IIT JEE 2005S]
(A) N_2O (B) N_2O_3
(C) N_2O_4 (D) N_2O_5
- Q 9. N_2O_3 is an anhydride of
(A) HNO_3 (B) HNO_2
(C) both A & B (D) HNO_4
- Q 10. In an equilibrium reaction
 $2\text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$, NO_2 dominant at equilibrium
(A) Low Temperature
(B) High Temperature
(C) Does not depend on Temperature
(D) None of these
- Q 11. **Assertion (A)** : On cooling brown colour of NO_2 disappears.
Reason (R) : On cooling, NO_2 undergoes dimerisation resulting in the pairing of odd electron of NO_2 . [AIIMS 2013]
(A) Both A & R are correct and R is the correct explanation of A
(B) Both A & R are correct but R is not the correct explanation of A
(C) A is true but R is false
(D) Both A & R are False
- Q 12. Which of the following oxyacids of Nitrogen is/are unstable?
(A) $\text{H}_2\text{N}_2\text{O}_2$ (B) HNO_4
(C) HNO_2 (D) $\text{H}_4\text{N}_2\text{O}_4$
- Q 13. HNO_3 is prepared by
(A) Contact Process (B) Ostwald Process
(C) Haber Process (D) None of these
- Q 14. In the preparation of HNO_3 , we get NO gas by catalytic oxidation of ammonia. The mole of NO produced by the oxidation of two moles of NH_3 will be [AIIMS 2013]
(A) 2 (B) 3 (C) 4 (D) 6
- Q 15. When HNO_3 is passed over Zn , which gas is produced?
(A) NO_2 (B) NO
(C) N_2O (D) All of these
- Q 16. Zn gives H_2 gas with H_2SO_4 & HCl but not gives with HNO_3 because [CBSE PMT 2002]
(A) Zn act as reductant when react with HNO_3
(B) HNO_3 is a weaker acid than H_2SO_4 & HCl
(C) In Electrochemical Series, Zn is Placed above Hydrogen
(D) NO_3^- is reduced in presence of Hydronium ion
- Q 17. Among the metals Fe , Zn , Pb & Pt , which do not give metal nitrate on treatment with concentrated HNO_3 ? [AIIMS 2015]
(A) Fe & Pt (B) Fe & Zn
(C) Fe , Ag & Pt (D) Pb & Ag & Pt
- Q 18. Cane sugar on reaction with Nitric acid gives [CBSE PMT 1992]
(A) CO_2 & SO_2 (B) 2HCOOH
(C) $(\text{COOH})_2$ (D) No reaction

4. Nitrogen Compounds, Allotropes of Phosphorous

- Q 1. **Assertion (A)** : HNO_3 makes Iron passive
Reason (R) : HNO_3 form a protective layer of $\text{Fe}(\text{NO}_3)_3$ on the surface of Fe.

[NCERT Exemplar]

- (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 2. Brown ring is observed due to formation of
 (A) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$ (B) $[\text{Fe}(\text{H}_2\text{O})_4(\text{NO})_2]^{2+}$
 (C) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{3+}$ (D) $[\text{Fe}(\text{NO})_6]^{2+}$
- Q 3. The mixture of conc. HCl & HNO_3 in 3:1 molar ratio contains [AIIMS 2002]
 (A) ClO_2 (B) NOCl
 (C) NCl_3 (D) N_2O_4
- Q 4. **Assertion (A)** : NF_3 is weaker ligand than $\text{N}(\text{CH}_3)_3$.
Reason (R) : NF_3 ionises to give F^- ions in aqueous solution. [AIIMS 2003]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 5. Of the different allotropic forms of phosphorous, the one which has a metallic lusture is
 (A) Black phosphorus (B) Red phosphorous
 (C) White phosphorous (D) Scarlet phosphorous
- Q 6. **Assertion (A)** : Elementary Phosphorous exists in three principle allotropic forms, white (or Yellow), Red (or Violet) and Black.
Reason (R) : Of the three forms, white phosphorous is the most important and most reactive. [AIIMS 2015]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False

- Q 7. Which if the following statement is not true for white phosphorous?
 (A) It is nonpoisonous (B) it glows in the dark
 (C) It has low ignition temperature
 (D) It is a powerful reducing agent
- Q 8. The percentage of π – character in the orbital of P–P bonds in P_4 is [IIT JEE 2007S]
 (A) 25 (B) 33 (C) 50 (D) 75
- Q 9. The total number of lone pairs of electrons present in a P_4 molecule is
 (A) 2 (B) 6 (C) 4 (D) 8
- Q 10. White phosphorous is much more reactive than nitrogen because
 (A) ionisation energy of P is low
 (B) nitrogen has greater electronegativity than P
 (C) P–P bond is stronger than $\text{N}\equiv\text{N}$ bond
 (D) P–P bond is weaker than $\text{N}\equiv\text{N}$ bond
- Q 11. Red phosphorus is chemically unreactive because:
 (A) It does not contain P–P bonds
 (B) It does not contain tetrahedral P_4 molecules
 (C) It does not catch fire in air even up to 400°C
 (D) It has a polymeric nature
- Q 12. On heating with conc. NaOH solution in an inert atmosphere of CO_2 , white phosphorous gives a gas. Which of the following statement is INCORRECT about gas? [NCERT Exemplar]
 (A) it is highly poisonous and has smell like rotten fish
 (B) its solution in water is decomposes in the presence of light
 (C) it is more basic than NH_3
 (D) it is less basic than NH_3
- Q 13. The metallic form of phosphorus is
 (A) White P (B) Red P
 (C) β -black P (D) α -black P
- Q 14. Phosphorus vapour consist of
 (A) P molecule (B) P_2 molecule
 (C) P_3 molecule (D) P_4 molecule
- Q 15. White phosphorus may be removed from red phosphorus by
 (A) dissolving it in CS_2 (B) boiling it with NaOH
 (C) sublimation (D) both (A) and (B)

5. Compounds of Phosphorous

- Q 1. Phosphine is not obtained by the reaction when
 (A) White P is heated with NaOH
 (B) Red P is heated with NaOH
 (C) Ca_3P_2 reacts with water
 (D) Red P is heated with NaOH
- Q 2. Which of the following reactions are disproportionation reactions?
 (1) Heating P_4 with conc. NaOH
 (2) Heating Cl_2 with conc. NaOH
 (3) Heating of H_3PO_3
 (4) Heating of H_3PO_4
 (A) 1, 2, 3 (B) 1, 2, 4
 (C) 1, 2 (D) 2, 3
- Q 3. The most stable form of Phosphorous is
 (A) White Phosphorous (B) Black Phosphorous
 (C) Red Phosphorous (D) Yellow Phosphorous
- Q 4. Phosphine is not obtained by the reaction of
 (A) white phosphorous with NaOH
 (B) red phosphorous with NaOH
 (C) heating phosphorous acid
 (D) P_2O_3 boiling with water
- Q 5. Phosphine is generally prepared in laboratory
 (A) By heating phosphorus in a current of H_2
 (B) By the decomposition of P_2H_4 at 110°C
 (C) By heating red phosphorus with an aqueous solution of caustic soda
 (D) By heating white phosphorus with KOH
- Q 6. Which of the statement is correct about PH_3 ?
 [AIIMS 2012]
 (A) it is less poisonous than NH_3
 (B) it is less basic than NH_3
 (C) Electronegativity of $\text{PH}_3 > \text{NH}_3$
 (D) it does not show reducing properties
- Q 7. $\text{PH}_4\text{I} + \text{NaOH}$ forms [CBSE PMT 1991]
 (A) PH_3 (B) NH_3
 (C) P_4O_6 (D) P_4O_{10}
- Q 8. Mixture used in holme's signal is:
 (A) CaC_2 and CaCl_2 (B) CaCl_2 and Ca_3N_2
 (C) CaC_2 and Ca_3N_2 (D) CaC_2 and Ca_3P_2
- Q 9. Vortex rings is the
 (A) White smoke of P_2O_5 formed on combustion of phosphine in air
 (B) White smoke forms on burning of P in air
 (C) White fumes forms due to hydrolysis of PCl_3
 (D) None of the above
- Q 10. Which of the following form vortex ring?
- (A) P_2O_5 (B) PH_3
 (C) NH_3 (D) P_4O_{10}
- Q 11. Hydrolysis of PI_3 yields:
 (A) Monobasic acid and a salt
 (B) monobasic acid and dibasic acid
 (C) dibasic acid and tri basic acid
 (D) monobasic acid and tribasic acid
- Q 12. PCl_3 reacts with water to form [CBSE PMT 1991]
 (A) PH_3 (B) $\text{H}_3\text{PO}_3, \text{HCl}$
 (C) POCl_3 (D) H_3PO_4
- Q 13. Which possesses the least stable P–H bond ?
 (A) PH_3 (B) P_2H_6
 (C) P_2H_5 (D) PH_6^+
- Q 14. When Ag is reacted with PCl_5 , the product formed are
 (A) $\text{AgCl}, \text{PCl}_3$ (B) $\text{Ag}, \text{PCl}_3, \text{Cl}_2$
 (C) $\text{Ag}^+, \text{PCl}_6^-, \text{Cl}_2$ (D) $\text{Ag}^+, \text{PCl}_4^-, \text{Cl}_2$
- Q 15. When PCl_5 is reacted with KF, the product formed are
 (A) $\text{PCl}_4^+ \text{F}^-$ (B) KPF_6, KCl
 (C) $\text{K}^+ \text{PCl}_6^-$ (D) None of these
- Q 16. Which acid is not formed by the action of water on phosphorus pentoxide?
 (A) HPO_3 (B) $\text{H}_4\text{P}_2\text{O}_7$
 (C) H_3PO_4 (D) H_3PO_3
- Q 17. The reaction of P_4 with X leads selectively to P_4O_6 . The X is [AIIMS 2013]
 (A) dry O_2 (B) a mixture of O_2 & N_2
 (C) moist O_2 (D) O_2 in presence of aq. NaOH
- Q 18. Among the following oxide the lowest acidic is:
 (A) P_2O_6 (B) P_4O_{10}
 (C) As_4O_6 (D) As_4O_{10}

6. Oxides & oxyacids of Phosphorous

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- Q 1. P_2O_5 is heated with water to give [CBSE PMT 2015]
 (A) Hypophosphorous
 (B) Orthophosphorous acid
 (C) Hypophosphoric acid
 (D) Orthophosphoric acid
- Q 2. In the compound $POCl_3$, the P–O multiple bond is due to
 (A) $p\pi - p\pi$ overlap (B) $p\pi - d\pi$ overlap
 (C) $d\pi - d\pi$ overlap (D) s and p overlap
- Q 3. In P_4O_6 , the number of oxygen atoms bonded to each P atom is
 (A) 4 (B) 2 (C) 3 (D) 6
- Q 4. The number of P–O–P bridges in the structure of phosphorous pentoxide and phosphorous trioxide are respectively [AIIMS 2004]
 (A) 6, 6 (B) 5, 5
 (C) 5, 6 (D) 6, 5
- Q 5. In P_4O_{10} , the number of oxygen atoms bonded to each phosphorous atoms is [IIT JEE 1992]
- Q 6. The pair in which P atom has formal oxidation state of +3 is [JEE Main 2016]
 (A) orthophosphorous and hypophosphoric acid
 (B) Pyrophosphorous and Pyrophosphoric acid
 (C) orthophosphorous and Pyrophosphoric acid
 (D) Pyrophosphorous and hypophosphoric acid
- Q 7. The oxyacid of phosphorus which are strongest and weakest among H_3PO_4 , H_3PO_3 and H_3PO_2 are respectively
 (A) H_3PO_4 , H_3PO_2 (B) H_3PO_2 , H_3PO_4
 (C) H_3PO_4 , H_3PO_3 (D) H_3PO_3 , H_3PO_4
- Q 8. The true statement for the acids of Phosphorous H_3PO_2 , H_3PO_3 & H_3PO_4 is [AIIMS 2016]
 (A) the order of acidity is
 $H_3PO_2 > H_3PO_3 > H_3PO_4$
 (B) all of them are reducing in nature
 (C) all of them are tribasic acids
 (D) the geometry of phosphorous is tetrahedral in all three
- Q 9. Which of the following is correct statement for the given acid? [NEET 2016, I]
 (A) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid
 (B) Phosphonic acid is a diprotic acid while phosphonic acid is a monoprotic acid
 (C) Both are triprotic acid
 (D) Both are diprotic acid
- Q 10. Strong reducing property of H_3PO_2 is due to
 (A) presence of 1 –OH group & 2 P–H bonds
 (B) High electron gain enthalpy of phosphorous
 (C) High oxidation state of phosphorous
 (D) Presence of 1 –OH groups & 1 P–H bond
- Q 11. Which is not an acidic salt?
 (A) NaH_2PO_3 (B) NaH_2PO_2
 (C) $NH_3HP_2O_6$ (D) $Na_4P_2O_7$
- Q 12. The reaction of P_4 with X leads selectively to P_4O_6 . The X is [IIT JEE 2009]
 (A) Dry O_2 (B) A mixture of O_2 and N_2
 (C) Moist O_2 (D) O_2 in the presence of aqueous NaOH
- Q 13. In Cyclic form of HPO_3 the no of π bonds present are
 (A) 1 (B) 2 (C) 3 (D) 4
- Q 14. In a cyclotrimetaphosphoric acid molecule, how many single and double bonds are present? [NCERT Exemplar]
 (A) 3 double bond & 9 single bond
 (B) 6 double bond & 6 single bond
 (C) 3 double bond & 12 single bond
 (D) zero double bond & 12 single bond
- Q 15. The water content in oxyacid is in order
 (A) Ortho > Meta > Pyro
 (B) Ortho > Pyro > Meta
 (C) Ortho < Meta < Pyro
 (D) Ortho < Pyro < Meta
- Q 16. The oxidation state of phosphorous and Basicity of Acid in Pyrophosphoric acid respectively are [AIIMS 2017]
 (A) + 4 & three (B) + 1 & four
 (C) + 5 & four (D) + 3 & one
- Q 17. In P_4O_{10} some P–O bonds are smaller and some are longer. The number of P–O bonds in this compound is
 (A) 1 (B) 2 (C) 3 (D) 4

7. Group 16 Elements & their Compounds

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- Q 1. Which element of VIA Group is not a Chalcogenes?
(A) O (B) S (C) Te (D) Po
- Q 2. Which element shows polymorphism?
(A) O (B) S (C) Se (D) all
- Q 3. The order of electron affinity values in chalcogens is
(A) $S > O > Se > Te > Po$
(B) $S > Se > Te > Po > O$
(C) $S > Se > O > Te > Po$
(D) $O > S > Se > Te > Po$
- Q 4. The decreasing order of catenation in group VIA elements is
(A) $Se > S > O > Te$ (B) $O > S > Se > Te$
(C) $S > Se > O > Te$ (D) $S > Se > Te > O$
- Q 5. In S_8 molecule, the type of hybridization exhibited by sulphur is
(A) SP^2 (B) SP^3
(C) SP (D) SP^3d
- Q 6. Negative oxidation state is NOT shown by
(A) O (B) S (C) Te (D) Po
- Q 7. Which one has the lowest B.P. Temperature?
(A) H_2O (B) H_2S
(C) H_2Se (D) H_2Te
- Q 8. The correct order of thermal stability is
(A) $H_2O > H_2S > H_2Se > H_2Te$
(B) $H_2Te > H_2Se > H_2S > H_2O$
(C) $H_2S > H_2O > H_2Se > H_2Te$
(D) None of these
- Q 9. Which of the following hydrides does not have reducing property?
(A) H_2O (B) H_2S
(C) H_2Se (D) H_2Te
- Q 10. SO_2 can act as strong oxidizing agent in
(A) Acidic medium (B) Basic medium
(C) Neutral medium (D) None
- Q 11. When SO_2 is passed through a solution of H_2S in water
(A) Sulphuric acid is formed
(B) A clear solution is formed
(C) sulphur is precipitated
(D) No change is observed
- Q 12. The correct statements about SO_2 among the following are:
(A) SO_2 forms discrete molecules in solid state.
(B) Bond angle in SO_2 is around 100° .
(C) There are two $p\pi-d\pi$ double bonds in SO_2 .
(D) There is one $p\pi-d\pi$ and one $p\pi-p\pi$ bonding in SO_2 .
- Q 13. Gaseous SO_3 molecule
(A) is plane triangle in shape with 3 σ bonds from sp^2 -p overlap & 3 π bonds formed by 2 $p\pi-p\pi$ overlap & 1 $p\pi-d\pi$ overlap
(B) is plane triangle in shape with three σ bonds from sp^2 -p overlap and three π bonds formed by 1 $p\pi-p\pi$ overlap and 2 $p\pi-d\pi$ overlap
(C) is a pyramidal molecule with one double bond and two single bonds
(D) plane triangle in shape with two double bonds between S and O & 1 single bond
- Q 14. The trioxide of oxygen group metal that exists as a cyclic tetramer in solid state and a monomer in gaseous state is
(A) SO_3 (B) SeO_3
(C) TeO_3 (D) PoO_3
- Q 15. The S-S bond in Sulphur trioxide trimer (S_3O_9) is
(A) 3 (B) 2 (C) 1 (D) 0
- Q 16. Which of the following statements regarding the structure of $SOCl_2$ is not correct?
(A) The sulphur is sp^3 hybridised and it has a tetrahedral shape.
(B) The sulphur is sp^3 hybridised and it has a trigonal pyramid shape.
(C) The S-O bond is $d\pi-p\pi$ bond.
(D) It contains one lone pair of electrons in the sp^3 hybrid orbital of sulphur.
- Q 17. Oxygen form halides with
(A) F (B) Cl
(C) Br (D) All of these
- Q 18. Which of the following halides does not undergo hydrolysis?
(A) SF_6 (B) SF_4
(C) SeF_6 (D) TeF_6

8. Oxygen & Ozone

- Q 1. It is possible to obtain oxygen from air by fractional distillation because:
 (A) O_2 is in different group of P.T. from N_2
 (B) Oxygen is more active than nitrogen
 (C) O_2 has higher boiling point than that of N_2
 (D) Oxygen has lower density than nitrogen
- Q 2. Oxygen is paramagnetic. The unpaired electrons exists in:
 (A) Antibonding orbitals (B) Bonding orbital
 (C) P – orbitals (D) f – orbitals
- Q 3. In which of the following reactions, dioxygen is not producted?
 (A) Ozone gas is passed through an aqueous solution of potassium iodine.
 (B) Ozone is passed through an acidified stannous chloride.
 (C) Acidified potassium permanganate is added to solid sodium peroxide.
 (D) Solid manganese dioxide is heated.
- Q 4. Which would likely to absorb oxygen?
 [CBSE PMT 1991]
 (A) Alkaline solution of pyrogallol
 (B) Conc. H_2SO_4 (C) Lime water
 (D) Alkaline solution of $CuSO_4$
- Q 5. From the following descriptions identify the gas.
 (1) It causes mercury to stick to the sides of the glass tube.
 (2) It is used as a disinfectant and germicide in the purification of drinking water.
 (A) O_2 (B) O_3
 (C) Cl_2 (D) Cl_2O
- Q 6. The percentage of ozone in ozonised oxygen is about
 (A) 40 % (B) 80 %
 (C) 10 % (D) 100 %
- Q 7. In the upper layer of atmosphere O_3 is formed by
 (A) action of electric discharge on O_2 molecule
 (B) action of ultraviolet rays on oxygen molecule
 (C) action of infrared rays on oxygen molecule
 (D) Due to sudden drop of pressure
- Q 8. On heating 'Ozone' its volume
 (A) Increases to $3/2$ times (B) decreases to half
 (C) Remain unchanged (D) becomes double
- Q 9. Starch paper moistened with KI solution turns blue in ozone because of:
 (A) Iodine liberation (B) oxygen formation
 (C) Alkali formation
 (D) ozone reacts with litmus paper
- Q 10. Ozone reacts with dry iodine to give:
 (A) IO_2 (B) I_2O_3
 (C) I_2O_4 (D) I_4O_9
- Q 11. Ozone
 (A) Turns benzidine solution brown
 (B) Turns tetramethyl base violet
 (C) It tested by tailing of mercury
 (D) All
- Q 12. Pick out the statement/s that is/are wrong
 (A) Oxygen is paramagnetic in all 3 states.
 (B) Ozone is diamagnetic
 (C) Ozone is highly exothermic molecule.
 (D) The O–O bonds in ozone have considerable double bond character.
- Q 13. **Assertion (A)** : Ozone in the upper atmosphere (Stratosphere) is beneficial but it is harmful in the lower atmosphere.
Reason (R) : Ozone absorbs UV light and is a strong oxidizing agent.
 (A) Both A and R are true and R is the correct explanation of A
 (B) Both A and R are true but R is NOT is correct explanation of A
 (C) A is true but R is false
 (D) A is false but R is true
- Q 14. Which O_2 molecule is more reactive?
 (A) Singlet (B) Triplet
 (C) Both A & B (D) None of these
- Q 15. Liquid Oxygen is
 (A) important constituent of rocket fuel
 (B) used for artificial respiration with CO_2
 (C) mixed with finely divided carbon is explosive
 (D) All

9. Sulphur & its compounds

- Q 1. The most stable allotropic form of sulphur is
 (A) Rhombic sulphur (B) monoclinic sulphur
 (C) Plastic sulphur (D) Flower of sulphur
- Q 2. When H_2S is passed through nitric acid solution, the product formed is: [AIIMS 2010]
 (A) Milk of sulphur (B) Colloidal sulphur
 (C) γ – sulphur (D) β – sulphur
- Q 3. **Assertion (A)** : The S–S–S bond angle in S_8 molecule is 105° .
Reason (R) : S_8 has V shape [AIIMS 2008]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 4. When S_8 reacts with NaOH, the products formed are
 (A) Na_2S, H_2O (B) $Na_2S_2O_3, H_2O$
 (C) $Na_2S, Na_2S_2O_3, H_2O$ (D) None of these
- Q 5. Sulphur trioxide can be obtained by which of the following reaction? [CBSE PMT 2012]
 (A) $CaSO_4 + C \xrightarrow{\Delta}$
 (B) $Fe_2(SO_4)_3 \xrightarrow{\Delta}$
 (C) $S + H_2SO_4 \xrightarrow{\Delta}$
 (D) $PbCl_2 + H_2SO_4 \xrightarrow{\Delta}$
- Q 6. When SO_2 is passed through a solution of H_2S in water
 (A) Sulphuric acid is formed
 (B) A clear solution is formed
 (C) sulphur is precipitated
 (D) No change is observed
- Q 7. When HNO_3 reacts with Nitric Oxide, a gas is released, which converts H_2S into [AIIMS 2009]
 (A) SO_4^{2-} (B) S^{2-}
 (C) S (D) $S_2O_5^{2-}$
- Q 8. Sulphur reacts with chlorine in 1:2 ratio and forms X. Hydrolysis of X gives a sulphur compound Y. what is the structure and hybridization of anion of Y? [AIIMS 2008]
 (A) Tetrahedral, SP^3 (B) Linear, SP
 (C) Pyramidal, SP^3 (D) Trigonal Planar, SP^2
- Q 9. Conc. H_2SO_4 displaces hydrogen chloride from chlorides because
 (A) It is stronger acid
 (B) Sulphates are less soluble than chlorides
 (C) Sulphates are more soluble than chlorides
 (D) HCl is a gas while H_2SO_4 is a liquid
- Q 10. Hydrolysis of one mole of peroxy disulphuric acid produces:
 (A) Two mole of sulphuric acid
 (B) Two moles of peroxy monosulphuric acid
 (C) One mole of sulphuric acid and one mole of peroxy mono sulphuric acid and one mole of hydrogen peroxide
 (D) One mole of sulphuric acid, one mole of peroxy mono sulphuric acid and one mole of hydrogen peroxide
- Q 11. The lead chamber process involves oxidation of SO_2 by atomic oxygen under the influence of As catalyst. [IIT JEE 1992]
- Q 12. H_2SO_4 is added while preparing a standard solution of mohr's salt to prevent:
 (A) Hydration (B) Reduction
 (C) Hydrolysis (D) complex formation
- Q 13. Sulphuric acid is dibasic in nature; hence it forms:
 (A) Acidic salt (B) acidic & basic salt
 (C) acidic & normal salt (D) double salt
- Q 14. Hot conc. H_2SO_4 act as oxidising agent. It oxidizes both metal and non metal. Which of the following element is oxidized by conc. H_2SO_4 into two gaseous products? [NCERT Exemplar]
 (A) Cu (B) S (C) C (D) Zn
- Q 15. Mark the correct statement. When H_2S is passed through ammonical sodium nitroprusside solution
 (A) The complex $Na_2[Fe(CN)_5NOS]$ is formed
 (B) The complex $[Fe(CN)_3NOS]^{2-}$ is formed
 (C) The complex $[Fe(CN)_2NOS]^{4-}$ is formed
 (D) No violet colour is produced
- Q 16. S^{2-} and SO_3^{2-} can be distinguished by using [AIIMS 2008]
 (A) $(CH_3COO)_2Pb$ (B) $Na_2[Fe(CN)_5NO]$
 (C) Both A & B (D) None of these

10. Oxides & Oxyacids of Sulphur

- Q 1. Which of the following is used to absorb sulphur dioxide?
 (A) Conc. H_2SO_4 (B) KOH solution
 (C) Water (D) Anhydrous $CaCl_2$
- Q 2. When SO_2 is passed through acidified $K_2Cr_2O_7$ solution
 (A) A white precipitate is obtained
 (B) The solution becomes colourless
 (C) The solution becomes colourless and a white precipitate of Cu_2Cl_2 is obtained
 (D) No visible change takes place
- Q 3. SO_2 is incombustible and non-supporter of combustion but strongly burning potassium Magnesium continues to burn in a jar of the gas because
 (A) Magnesium has high molecular energy.
 (B) The heat of reaction is enough to dissociate the gas into S and free oxygen
 (C) Mg has low ignition Point
 (D) Mg has great affinity for SO_2
- Q 4. Bleaching action of SO_2 is due to
 (A) Reduction (B) Oxidation
 (C) Hydrolysis (D) Its acidic nature
- Q 5. There is no S-S bond in [IIT JEE 1991]
 (A) $S_2O_4^{2-}$ (B) $S_2O_5^{2-}$
 (C) $S_2O_3^{2-}$ (D) $S_2O_7^{2-}$
- Q 6. Sodium thiosulphate is prepared by
 (A) reducing Na_2SO_4
 (B) boiling Na_2SO_3 with S in alkaline medium
 (C) Neutralising $H_2S_2O_3$
 (D) boiling Na_2SO_3 with S in an acidic medium
- Q 7. The two S atoms in $Na_2S_2O_3$ have oxidation state
 (A) +2 and +4 (B) +4 and +6
 (C) +2 and +6 (D) same oxidation state
- Q 8. In the following reaction sequence in aq solution, the species X, Y & Z respectively are [JEE Adv. 2016]
 $S_2O_3^{2-} \xrightarrow{Ag^+} X \text{ (Clear Solution)}$
 $X \xrightarrow{Ag^+} Y \text{ (white)} \downarrow \xrightarrow{\text{with Lime}} Z \text{ (Black)} \downarrow$
 (A) $[Ag(S_2O_3)_3]^{3-}$, $Ag_2S_2O_3$, Ag_2S
 (B) $[Ag(S_2O_3)_3]^{5-}$, Ag_2SO_3 , Ag_2S
 (C) $[Ag(SO_3)_3]^{3-}$, $Ag_2S_2O_3$, Ag
 (D) $[Ag(SO_3)_3]^{3-}$, Ag_2SO_4 , Ag
- Q 9. The product formed in the reaction of $SOCl_2$ with White phosphorous is [JEE Adv. 2014]
 (A) PCl_3 (B) SO_2Cl_2
 (C) SCL_2 (D) $POCl_3$
- Q 10. Which of the following is not a true "per acid"?
 (A) $HClO_4$ (B) H_2SO_5
 (C) $H_2S_2O_8$ (D) H_3PO_5
- Q 11. Which of the following is not a peroxy acid? [AIIMS 2011]
 (A) Perphosphoric acid (B) Pernitric acid
 (C) Perdisulphuric acid (D) Perchloric acid
- Q 12. Match the following

Column I	Column II
(1) Caro's acid	(A) –S–S– bond
(2) polythionic acid	(B) –S–S–S– bond
(3) Pyrosulphuric acid	(C) –S–O–S– bond
(4) Dithionic acid	(D) –S–O–O– bond
- Q 13. Regular use of which of the following fertilizers increases the acidity of soil [AIEEE 2007]
 (A) Ammonium sulphate (B) Potassium Nitrate
 (C) Urea (D) Superphosphate of lime
- Q 14. In qualitative analysis when H_2S is passed through an aqueous solution of salt acidified with dil. HCl a black precipitate is obtained. On boiling the precipitate with dil. HNO_3 , it forms a solution of blue colour. Addition of excess of aqueous solution of ammonia of this solution gives..... [NCERT Exemplar]
 (A) deep blue precipitate of $Cu(OH)_2$
 (B) deep blue solution of $[Cu(NH_3)_4]^{2+}$
 (C) deep blue solution of $Cu(NO_3)_2$
 (D) deep blue solution of $Cu(OH)_2.Cu(NO_3)_2$
- Q 15. Assertion (A) : SF_6 can not be hydrolysed
 Reason (R) : Six F atoms in SF_6 prevent the attack of H_2O on sulphur atom of SF_6 [NCERT Exemplar]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 16. How is SO_2 as air pollutant? [NCERT]

11. Group 17 Elements & their Compounds

- Q 1. VIIA elements are named as Halogen because
 (A) they are highly electronegative
 (B) they form salt with metal
 (C) they form large no of oxides
 (D) they are non – metallic
- Q 2. Abundance of halogen is in order
 (A) $F > Cl > Br > I$ (B) $Cl > Br > I > F$
 (C) $Cl > F > Br > I$ (D) $I > Br > Cl > F$
- Q 3. The incorrect statement among the following regarding halogens is
 (A) order of electronegativity: $F_2 > Cl_2 > Br_2 > I_2$
 (B) order of electron affinity : $Cl_2 > F_2 > Br_2 > I_2$
 (C) order of bond energy: $Cl_2 > F_2 > Br_2 > I_2$
 (D) order of Hydration Energy:
 $F^-(g) > Cl^-(g) > Br^-(g) > I^-(g)$
- Q 4. Halide ions are reducing agents. Which one of the following is their correct sequence in the increasing order of their reducing power ?
 (A) $Cl^- > F^- > Br^- > I^-$ (B) $I^- > Br^- > Cl^- > F^-$
 (C) $F^- > Cl^- > Br^- > I^-$ (D) $Br^- > Cl^- > F^- > I^-$
- Q 5. The electron affinity of fluorine is less than that of chlorine. But still fluorine is the strongest O.A. among halogens, and not chlorine. This is because
 (A) F has highest electronegativity in halogens.
 (B) fluorine has very low heat of dissociation
 (C) fluorine has the highest heat of hydration
 (D) fluorine has the highest ionisation energy
- Q 6. **Assertion (A)** : Reaction of conc. H_2SO_4 on NaBr and NaI does not give HBr and HI.
Reason (R) : Both HBr & HI are oxidized by conc. H_2SO_4 to Br_2 & I_2 . [AIIMS 1994]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 7. Which of the following is used in preparation of Chlorine? [CBSE PMT 1999]
 (A) only MnO_2 (B) Both MnO_2 & $KMnO_4$
 (C) Only $KMnO_4$ (D) Either MnO_2 & $KMnO_4$
- Q 8. In which of the following element, lowest energy photon is needed to excite electrons?
 (A) F_2 (B) Cl_2
 (C) Br_2 (D) I_2
- Q 9. Iodine vapour are violet in colour because
 (A) the molecule of Iodine in vapour phase absorbs green and yellow radiation
 (B) the molecule of iodine absorbs red and then emit violet radiations
 (C) it is a solid
 (D) it is easily volatile
- Q 10. On addition of conc. H_2SO_4 to chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes comes out. This is because [NCERT Exemplar]
 (A) H_2SO_4 reduces HI to I_2
 (B) HI is of violet colour
 (C) HI gets oxidised to I_2
 (D) HI changes to HIO_3
- Q 11. Which of the following HX is best prepared by direct mixing of H_2 & X_2 ?
 (A) HF (B) HCl (C) HBr (D) HI
- Q 12. A one lit. flask is full of brown Bromine vapours. The intensity of brown colour of vapours will not decrease appreciably on adding to the flask some [CBSE PMT 1998]
 (A) pieces of marble
 (B) Animal charcoal powder
 (C) Carbon tetrachloride
 (D) Carbon disulphide
- Q 13. Which one is the most basic in character?
 (A) F^- (B) Cl^- (C) Br^- (D) I^-
- Q 14. The correct order of boiling point of HX is
 (A) $HF > HCl > HBr > HI$
 (B) $HF > HI > HBr > HCl$
 (C) $HF > HBr > HI > HCl$
 (D) $HI > HF > HCl > HBr$
- Q 15. In above question The correct order of Melting point is
- Q 16. The correct order in formation of stable oxide is
 (A) $I > Cl > Br$ (B) $I > Br > Cl$
 (C) $Br > Cl > I$ (D) $Cl > Br > I$
- Q 17. Fluorine reacts with water to give
 (A) HF and O_2 (B) HF and OF_2
 (C) HF and O_3 (D) HF, O_2 and O_3
- Q 18. Among the C–X bond (where X = Cl, Br, I) the correct bond energy is
 (A) $C-Cl > C-Br < C-I$ (B) $C-I > C-Cl > C-Br$
 (C) $C-Br > C-Cl > C-I$ (D) $C-I > C-Br > C-Cl$

12. Compounds of Halogens

- Q 1. Bleaching powder reacts with a few drops of conc. HCl to give [CBSE PMT 1989]
 (A) Chlorine (B) Hypochlorous acid
 (C) Calcium Oxide (D) Oxygen
- Q 2. HBr & HI reduce Sulphuric acid, HCl can reduce $KMnO_4$ and HF can reduce [IIT JEE 1981]
 (A) H_2SO_4 (B) $KMnO_4$
 (C) $K_2Cr_2O_7$ (D) None of the above
- Q 3. Bromine can be liberated from KBr solution by the action of [IIT JEE 1987]
 (A) Iodine Solution (B) Chlorine water
 (C) Sodium Chloride (D) Potassium Iodide
- Q 4. **Assertion (A)** : HI can not prepared by action of KI with conc. H_2SO_4
Reason (R) : HI has lowest H – X bond strength among halogen acids [NCERT Exemplar]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 5. **Assertion (A)** : NaCl reacts with Conc. H_2SO_4 to give colourless fumes with pungent smell. But on adding MnO_2 the fumes becomes greenish yellow
Reason (R) : MnO_2 oxidises HCl to chlorine gas which is greenish yellow. [NCERT Exemplar]
 (A) Both A & R are correct and R is the correct explanation of A
 (B) Both A & R are correct but R is not the correct explanation of A
 (C) A is true but R is false
 (D) Both A & R are False
- Q 6. Which of the following interhalogen compound is more reactive?
 (A) Cl_2 (B) ClF (C) ClBr (D) ICl
- Q 7. Match the following interhalogen compounds of Column I with the geometry in column II and assign the correct code. [NEET 2017]
- | | Column I | | Column II |
|---|----------|-------|------------------------|
| a | XX' | (i) | T – shape |
| b | XX'_3 | (ii) | Pentagonal Bipyramidal |
| c | XX'_5 | (iii) | Linear |
| d | XX'_7 | (iv) | Square pyramidal |
| | | (v) | Tetrahedral |
- Q 8. Which of the following Ion is NOT pseudohalides?
 (A) NC^- (B) SCN^-
 (C) N_3^- (D) NH_2^-
- Q 9. I_4O_9 (s) consist of
 (A) IO^+, IO_3^- (B) I^{3+}, IO_3^-
 (C) I_3^+, IO_3^- (D) I^+, IO_3^-
- Q 10. Which of the following is the true covalent oxide of Iodine? [AIIMS 2007]
 (A) I_2O_4 (B) I_2O_5
 (C) I_2O_7 (D) I_2O_9
- Q 11. The correct stability order of HXO_3 is
 (A) $HClO_3 < HBrO_3 < HIO_3$
 (B) $HClO_3 > HBrO_3 > HIO_3$
 (C) $HBrO_3 > HClO_3 > HIO_3$
 (D) $HBrO_3 < HClO_3 < HIO_3$
- Q 12. Which of the following products are expected from the disproportionation reaction of Hypochlorous acid? [AIEEE 2006]
 (A) HCl & Cl_2O (B) HCl & $HClO_3$
 (C) $HClO_3$ & Cl_2O (D) $HClO_2$ & $HClO_4$
- Q 13. The oxidising power of XO_4^- is [NCERT Exemplar]
 (A) $BrO_4^- > IO_4^- > ClO_4^-$
 (B) $ClO_4^- > IO_4^- > BrO_4^-$
 (C) $IO_4^- > BrO_4^- > ClO_4^-$
 (D) $ClO_4^- > BrO_4^- > IO_4^-$
- Q 14. In solid state, ICl_3 exist as
 (A) ICl_2^+, ICl_4^- (B) ICl_2^+, ICl_3^-
 (C) ICl_2^-, ICl_4^+ (D) None of these
- Q 15. The products obtained when chlorine reacts with cold and dilute solution of NaOH are
 (A) $Cl^- + ClO^-$ (B) $Cl^- + ClO_2^-$
 (C) $Cl^- + ClO_3^-$ (D) $Cl^- + ClO_4^-$
- Q 16. Identify the incorrect statement among the following? [AIEEE 2007]

- (A) Br₂ reacts with hot and strong NaOH solution to give NaBr and H₂O
 (B) Ozone reacts with SO₂ to give SO₃
 (C) Silicon reacts with NaOH in the presence of air to give Na₂SiO₃ and H₂O
 (D) Cl₂ reacts with excess of NH₃ to give N₂ & HCl

13. Oxides & Oxyacids of Halogen

- Q 1. Which of the following is the strongest acid?
 (A) ClCO₃(OH) (B) ClO₂(OH)
 (C) SO(OH)₂ (D) SO₂(OH)₂
- Q 2. Which one is the anhydride of HClO₄?
 (A) Cl₂O (B) ClO₂
 (C) Cl₂O₆ (D) Cl₂O₇
- Q 3. The oxide of halogen which is ionic in nature is
 (A) BrO₂ (B) I₂O₄
 (C) Cl₂O (D) I₂O₅
- Q 4. Which of the following oxides of chlorine is obtained by passing dry chlorine over silver chlorate at 90°C? [CBSE PMT 1994]
 (A) Cl₂O (B) ClO₃
 (C) ClO₂ (D) ClO₄
- Q 5. The incorrect statement regarding ClO₂ is
 (A) ClO₂ contains odd no. of e & so paramagnetic
 (B) ClO₂ dimerises
 (C) C–O bond length is shorter than Cl–O bond
 (D) it is a highly reactive species
- Q 6. Molten iodine conducts electricity. This is due to
 (A) I₂ I⁺ → + I⁻ (B) 3I₂ → I₃⁺ + I₃⁻
 (C) 2I₂ → I₂⁺ + I₂⁻ (D) I₂ + I⁻ → I₃⁻
- Q 7. Only iodine forms heptafluoride IF₇. But chlorine and bromine give only pentafluorides. The reason for this is
 (A) low electron affinity of iodine
 (B) usual pentagonal bipyramidal structure of IF₇
 (C) that larger iodine atoms can pack more number of smaller fluorine atom around it
 (D) the low chemical reactivity of IF₇
- Q 8. The chlorofluorocarbons are of much environmental concern mainly because
 (A) they cause greenhouse effect
 (B) they destroy the OH radical generated photochemically form water vapour which is an effective scavenger for polluting gases like CO, NO_x, H₂S
 (C) they photochemically generate Cl atom which catalytically destroys the stratospheric ozone
 (D) they generate extremely toxic 'COCl₂ and COF₂ by reacting with atmospheric O₂ in a photochemical process
- Q 9. The increase in solubility of Iodine in an aqueous solution of KI is due to formation of [IIT JEE 1981]
- Q 10. When KI is added to CuSO₄ solution
 (A) Cuprous iodide is formed
 (B) Iodine is liberated
 (C) KI is formed
 (D) All
- Q 11. Excess of KI reacts with CuSO₄ solution and then Na₂S₂O₃ solution is added to it. Which of the following statement is incorrect for the reaction? [AIIEE 2004]
 (A) Na₂S₂O₃ is oxidized
 (B) CuI₂ is formed
 (C) Cu₂I₂ is formed
 (D) Evolved I₂ is reduced
- Q 12. Bromine water reacts with SO₂ to form [AIIMS 2015]
 (A) H₂O & HBr (B) H₂SO₄ & HBr
 (C) HBr & S (D) S & H₂O
- Q 13. When aqueous solution of hypochlorite is heated
 (A) Chlorine is evolved
 (B) Chlorite is formed
 (C) Oxygen is evolved
 (D) Chlorine peroxide is formed
- Q 14. Iodide of Million's base is [AIIMS 1999]
 (A) HIO₃ (B) K₂HgI₄
 (C) NH₂HgO.HgI (D) Hg(NH₂)I
- Q 15. Euchlorine is produced by heating a mixture of [AIIMS 1995]
 (A) KCl + conc. H₂SO₄
 (B) KCl + Conc. HCl
 (C) K₂ClO₃ + Conc. H₂SO₄
 (D) KClO₃ + Aqs. HCl
- Q 16. Aqueous solution of Na₂S₂O₃ on reaction with Cl₂ gives – [IIT JEE 2008S]

- (A) $\text{Na}_2\text{S}_4\text{O}_6$ (B) NaHSO_4
(C) NaCl (D) NaOH
- Q 17. Write balanced equations for the following [NCERT]
(i) NaCl is heated with H_2SO_4 in presence of MnO_2
(ii) Chlorine gas is passed into a solution of NaI in water
- 14. Noble Gases & its Compounds**
- Q 1. Noble gases can be separated by:
(A) Passing them through some solution
(B) Electrolysis of their compounds
(C) Adsorption, desorption on coconut Charcoal
(D) None
- Q 2. The noble gas was first time discovered by
(A) cavandish (B) William Ramsay
(C) Rayleigh (D) Frankland
- Q 3. In atmosphere, Ar gas is present which is explained by
(A) electron capture by K atom
(B) β decay by Cl atom
(C) electron capture by Cl atom
(D) β decay by K atom
- Q 4. The ease of Liquefaction of noble gases decreases in the order:
(A) $\text{He} > \text{Ne} > \text{Ar} > \text{Kr} > \text{Xe}$
(B) $\text{Xe} > \text{Kr} > \text{Ar} > \text{Ne} > \text{He}$
(C) $\text{Kr} > \text{Xe} > \text{He} > \text{Ar} > \text{Ne}$
(D) $\text{Ar} > \text{Kr} > \text{Xe} > \text{He} > \text{Ne}$
- Q 5. The solubility of noble gases in water shows the order:
(A) $\text{He} > \text{Ar} > \text{Kr} > \text{Ne} > \text{Xe}$
(B) $\text{He} > \text{Ne} > \text{Ar} > \text{Kr} > \text{Xe}$
(C) $\text{Xe} > \text{Kr} > \text{Ar} > \text{Ne} > \text{He}$
(D) None
- Q 6. Which of the following has highest boiling point?
(A) He (B) Ne (C) Ar (D) Kr
- Q 7. In which of the following sets, the order of Boiling point is incorrect? [AIIMS 2016]
(A) $\text{Xe} > \text{Ar} > \text{Ne}$ (B) $\text{HF} > \text{HCl} > \text{HBr}$
(C) $\text{H}_2\text{O} > \text{H}_2\text{Se} > \text{H}_2\text{S}$ (D) $\text{C}_3\text{H}_6 > \text{C}_2\text{H}_6 > \text{CH}_4$
- Q 8. Helium is added to oxygen used by deep sea divers because:
(A) It is less soluble in blood than nitrogen under high pressure
(B) It is lighter than nitrogen
(C) It is readily miscible with oxygen
(D) It is less poisonous than nitrogen
- Q 9. A chatharate is defined as a
(A) Cage compound (B) Liquid crystal
(C) Mixture (D) Solid solution
- Q 10. In analogy to $\text{O}_2^+[\text{PtF}_6]^-$ a compound $\text{N}_2^+[\text{PtF}_6]^-$ will not be formed because
(A) The ionization energy of N_2 gas is higher than that of O_2 gas
(B) The ionization energy of N_2 gas is lower than that of O_2 gas
(C) The ionization energy of N_2 gas is higher than that of N atoms
(D) None of these
- Q 11. Which of the following statement is false? [CBSE PMT 1994]
(A) Radon is obtained from decay of radium
(B) Helium is inert gas
(C) Xe is the most reactive among the rare gas
(D) The most abundant rare gas in atmosphere is He
- Q 12. Which of the following does not exist?
(A) $[\text{KrF}]^+[\text{SbF}_6]^-$ (B) $[\text{KrF}_3]^+[\text{SbF}_4]^-$
(C) $[\text{KrF}]^+[\text{MoOF}_5]^-$ (D) $[\text{KrF}]^+[\text{WOF}_5]^-$
- Q 13. XeF_2 reacts with SbF_5 to form
(A) $[\text{XeF}]^+[\text{SbF}_6]^-$ (B) $[\text{XeF}_3]^+[\text{SbF}_4]^-$
(C) $[\text{XeF}][\text{SbF}_6]^+$ (D) XeF_4
- Q 14. XeF_6 on reaction with CsF gives
(A) $[\text{XeF}_5]^+[\text{CsF}_2]^-$ (B) XeF_6
(C) $[\text{XeF}_4]^{2+}[\text{CsF}_3]^{2-}$ (D) $\text{Cs}^+[\text{XeF}_7]^-$
- Q 15. The halide that does not exist is
(A) KrF_4 (B) XeF_4
(C) HeF_2 (D) OF_2
- Q 16. In XeF_4 hybridisation of Xe is
(A) sp^3d^2 (B) sp^3
(C) sp^3d (D) sp^2d
- 15. Compounds of Xe, Use of Noble Gas**
- Q 1. The shapes of XeOF_2 and XeOF_4 are respectively

- (A) Plane triangle, trigonal bipyramidal
 (B) T-shaped, square pyramidal
 (C) Trigonal pyramidal, trigonal bipyramidal
 (D) T-shaped, trigonal bipyramidal
- Q 2. Consider the following reactions
- $$\text{Xe} + \text{F}_2 \xrightarrow{\text{Xe (Excess)}} \xrightarrow{400^\circ \text{C}, 1 \text{atm}} \text{X}$$
- $$\text{Xe} + \text{F}_2 \xrightarrow{1:5 \text{ Mixt.}} \xrightarrow{400^\circ \text{C}, 7 \text{atm}} \text{Y}$$
- $$\text{Xe} + \text{F}_2 \xrightarrow{1:20 \text{ Mixt.}} \xrightarrow{300^\circ \text{C}, 60 \text{atm}} \text{Z}$$
- Here X, Y & Z respectively are [AIIMS 2017]
 (A) XeF₂, XeF₆, XeF₄ (B) XeF₂, XeF₄, XeF₆
 (C) XeF₄, XeF₂, XeF₆ (D) XeF₆, XeF₄, XeF₂
- Q 3. Xenon atom in the excited state reacts to form a compound. The molecular formula of the compound is
 (A) F₂ (B) XeF₄
 (C) XeF₆ (D) XeOF₄
- Q 4. Radon is formed by emission of alpha particle by
 (A) Radium (B) Polonium
 (C) Xenon (D) Lead
- Q 5. Partial hydrolysis of XeF₆ gives a product (A). The same products (A) is obtained when XeF₆ reacts with
 (A) SiO₂ (B) Ozone
 (C) NaOH (D) MoO₃
- Q 6. On hydrolysis of XeF₂, which species is produced?
 (A) XeO₂ (B) XeOF₂
 (C) Xe (D) None of these
- Q 7. On hydrolysis of XeF₆, which species is produced?
 (A) XeOF₄ (B) XeO₂F₂
 (C) XeO₃ (D) All of these
- Q 8. XeF₂ is isoelectronic and isostructural with
 (A) TeF₂ (B) ICl₂
 (C) SbCl₃ (D) BaCl₂
- Q 9. XeO₃ is prepared by
 (A) the direct combination of Xe and O₂
 (B) the hydrolysis of XeF₂
 (C) the oxidation of XeO₂
 (D) the hydrolysis of XeF₆
- Q 10. Under the ambient conditions, the total number of gases released as products in the final step of the reaction scheme shown below [JEE Adv. 2014]
- $$\text{XeF}_6 \xrightarrow{\text{Complete Hydrolysis}} \text{P} + \text{other products}$$
- $$\text{P} \xrightarrow{\text{OH}^- / \text{H}_2\text{O}} \text{Q} \xrightarrow[\text{in OH}^- / \text{H}_2\text{O}]{\text{disproportionation}} \text{Pr oducts}$$
- (A) 0 (B) 1 (C) 2 (D) 3
- Q 11. Which of the following reactions of Xenon compounds is not feasible? [AIIMS 2013]
 (A) $3\text{XeF}_4 + 6\text{H}_2\text{O} \longrightarrow 2\text{Xe} + \text{XeO}_3 + 12\text{HF} + 15\text{O}_2$
 (B) $2\text{XeF}_2 + 2\text{H}_2\text{O} \longrightarrow 2\text{Xe} + 4\text{HF} + \text{O}_2$
 (C) $\text{XeF}_6 + \text{RbF} \longrightarrow \text{Rb}[\text{XeF}_7]$
 (D) $\text{XeO}_3 + 6\text{HF} \longrightarrow \text{XeF}_6 + 3\text{H}_2\text{O}$
- Q 12. Helium is used in balloons instead of hydrogen because it is
 (A) Lighter than hydrogen
 (B) More abundant than hydrogen
 (C) incombustible
 (D) Radioactive and easily detected
- Q 13. The colour discharge tubes for advertisement mainly contains
 (A) xenon (B) Helium
 (C) Neon (D) Argon
- Q 14. Which of the following is the life saving mixture for asthma patient?
 (A) Mixture of neon and oxygen
 (B) Mixture of neon and oxygen
 (C) Mixture of xenon and nitrogen
 (D) Mixture of argon and oxygen
- Q 15. Helium is added to oxygen used by deep sea divers because:
 (A) It is less soluble in blood than nitrogen under high pressure
 (B) It is lighter than nitrogen
 (C) It is readily miscible with oxygen
 (D) It is less poisonous than nitrogen
- Q 16. Which of the following statement about He is incorrect? [AIEEE 2004]
 (A) It is used to produce and sustain powerful superconducting magnet.
 (B) It is used as a cryogenic agent for carrying out experiment at low temperature
 (C) it is used to fill gas balloons instead of H₂ because it is lighter and non – inflammable
 (D) it is used in gas cooled nuclear reactor

Answer Key

1. Group 15 Elements & their Compounds

- (1). A (2). B (3). C
 (4). B (5). C (6). B
 (7). Because N can not form more than 4 bonds
 (8). D (9). A (10). A
 (11). D (12). C (13). D
 (14). C (15). C (16). C

2. Compounds of Group 15 Elements & Nitrogen

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

3. Compounds of Nitrogen

- (1). D (2). D (3). D
 (4). B (5). B (6). D
 (7). D (8). B (9). B
 (10). B (11). A (12). B, D
 (13). B (14). A (15). D
 (16). D (17). A (18). D

4. Nitrogen Compounds, Allotropes of Phosphorous

- (1). C (2). A (3). B
 (4). B (5). A (6). A
 (7). A (8). D (9). C
 (10). D (11). D (12). C
 (13). D (14). D (15). D

5. Compounds of Phosphorous

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

6. Oxides & oxyacids of Phosphorous

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

7. Group 16 Elements & their Compounds

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

8. Oxygen & Ozone

- (1). C (2). A (3). B
 (4). A (5). B (6). C
 (7). B (8). A (9). C
 (10). D (11). D (12). C
 (13). C (14). A (15). D

9. Sulphur & its compounds

- (1). A (2). B (3). C
 (4). C (5). B (6). C
 (7). C (8). C (9). D
 (10). C (11). Nitric oxide
 (12). C (13). C (14). C
 (15). A (16). C

10. Oxides & Oxyacids of Sulphur

- (1). B (2). C (3). B
 (4). A (5). D (6). D
 (7). C (8). A (9). A
 (10). A (11). D
 (12). (1) – (D); (2) – (B); (3) – (C); (4) – (A)
 (13). A (14). B (15). A
 (16).

11. Group 17 Elements & their Compounds

- | | | |
|---------|-----------|---------|
| (1). B | (2). B | (3). C |
| (4). B | (5). B, C | (6). A |
| (7). B | (8). D | (9). A |
| (10). C | (11). A | (12). A |
| (13). A | (14). B | (15). D |
| (16). B | (17). D | (18). A |

12. Compounds of Halogens

- | | | |
|---------|---------|---------|
| (1). A | (2). D | (3). B |
| (4). B | (5). A | (6). D |
| (7). B | (8). D | (9). B |
| (10). B | (11). A | (12). B |
| (13). A | (14). A | (15). A |
| (16). D | | |

13. Oxides & Oxyacids of Halogen

- | | | |
|---------|---------|-------------|
| (1). A | (2). D | (3). B |
| (4). C | (5). B | (6). B |
| (7). C | (8). C | (9). KI_3 |
| (10). D | (11). B | (12). B |
| (13). C | (14). C | (15). D |
| (16). B | (17). | |

14. Noble Gases & its Compounds

- | | | |
|---------|---------|---------|
| (1). C | (2). B | (3). A |
| (4). B | (5). A | (6). D |
| (7). B | (8). A | (9). A |
| (10). A | (11). D | (12). B |
| (13). A | (14). D | (15). C |
| (16). A | | |

15. Compounds of Xe, Use of Noble Gas

- | | | |
|---------|---------|---------|
| (1). B | (2). B | (3). B |
| (4). A | (5). A | (6). C |
| (7). D | (8). D | (9). D |
| (10). C | (11). D | (12). C |
| (13). C | (14). A | (15). A |
| (17). C | | |