Chapter
21

p-Block Elements (Group 15 to 18)

1. Match the interhalogen compounds of column-I with the geometry in column-II and assign the correct code.

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

Code :

	A	B	C	D
(a)	(iii)	(i)	(iv)	(ii)
(b)	(v)	(iv)	(iii)	(ii)
(c)	(iv)	(iii)	(ii)	(i)
(d)	(iii)	(iv)	(i)	(ii)

(NEET 2017)

2. In which pair of ions both the species contain S — S bond?

(a) $S_4O_6^{2-}$, $S_2O_3^{2-}$ (b) $S_2O_7^{2-}$, $S_2O_8^{2-}$

(c) $S_4O_6^{2-}$, $S_2O_7^{2-}$ (d) $S_2O_7^{2-}$, $S_2O_3^{2-}$

(NEET 2017)

3. Match the compounds given in column I with the hybridisation and shape given in column II and mark the correct option.

Column I	Column II
(A) XeF_6	(i) distorted octahedral
(B) XeO_3	(ii) square planar
(C) $XeOF_4$	(iii) pyramidal
(D) XeF_4	(iv) square pyramidal

Code :

	A	B	C	D
(a)	(iv)	(iii)	(i)	(ii)
(b)	(iv)	(i)	(ii)	(iii)
(c)	(i)	(iii)	(iv)	(ii)
(d)	(i)	(ii)	(iv)	(iii)

(NEET-I 2016)

4. Which is the correct statement for the given acids?

(a) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid.

(b) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid.

(c) Both are diprotic acids.

(d) Both are triprotic acids. *(NEET-I 2016)*

5. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?

(a) $Br_2 > I_2 > F_2 > Cl_2$ (b) $F_2 > Cl_2 > Br_2 > I_2$

(c) $I_2 > Br_2 > Cl_2 > F_2$ (d) $Cl_2 > Br_2 > F_2 > I_2$

(NEET-I 2016)

6. When copper is heated with conc. HNO_3 it produces

(a) $Cu(NO_3)_2$, NO and NO_2

(b) $Cu(NO_3)_2$ and N_2O

(c) $Cu(NO_3)_2$ and NO_2

(d) $Cu(NO_3)_2$ and NO *(NEET-I 2016)*

7. Among the following, the correct order of acidity is

(a) $HClO_2 < HClO < HClO_3 < HClO_4$

(b) $HClO_4 < HClO_2 < HClO < HClO_3$

(c) $HClO_3 < HClO_4 < HClO_2 < HClO$

(d) $HClO < HClO_2 < HClO_3 < HClO_4$

(NEET-I 2016)

8. Strong reducing behaviour of H_3PO_2 is due to

(a) high electron gain enthalpy of phosphorus

(b) high oxidation state of phosphorus

(c) presence of two –OH groups and one P—H bond

(d) presence of one –OH group and two P—H bonds. *(2015)*

9. The variation of the boiling points of the hydrogen halides is in the order $HF > HI > HBr > HCl$.

What explains the higher boiling point of hydrogen fluoride?

(a) There is strong hydrogen bonding between HF molecules.
(b) The bond energy of HF molecules is greater than in other hydrogen halides.
(c) The effect of nuclear shielding is much reduced in fluorine which polarises the HF molecule.
(d) The electronegativity of fluorine is much higher than for other elements in the group.
(2015)

10. Which of the statements given below is incorrect?
(a) O_3 molecule is bent.
(b) ONF is isoelectronic with O_2N^-.
(c) OF_2 is an oxide of fluorine.
(d) Cl_2O_7 is an anhydride of perchloric acid.
(2015)

11. The formation of the oxide ion, $O^{2-}_{(g)}$ from oxygen atom requires first an exothermic and then an endothermic step as shown below :
$O_{(g)} + e^- \rightarrow O^-_{(g)}$; $\Delta_f H° = -141$ kJ mol^{-1}
$O^-_{(g)} + e^- \rightarrow O^{2-}_{(g)}$; $\Delta_f H° = +780$ kJ mol^{-1}
Thus, process of formation of O^{2-} in gas phase is unfavourable even though O^{2-} is isoelectronic with neon. It is due to the fact that,
(a) O^- ion has comparatively smaller size than oxygen atom
(b) oxygen is more electronegative
(c) addition of electron in oxygen results in larger size of the ion
(d) electron repulsion outweighs the stability gained by achieving noble gas configuration.
(2015)

12. Nitrogen dioxide and sulphur dioxide have some properties in common. Which property is shown by one of these compounds, but not by the other?
(a) Is soluble in water.
(b) Is used as a food preservative.
(c) Forms 'acid-rain'.
(d) Is a reducing agent. *(2015, Cancelled)*

13. Acidity of diprotic acids in aqueous solutions increases in the order
(a) $H_2S < H_2Se < H_2Te$
(b) $H_2Se < H_2S < H_2Te$
(c) $H_2Te < H_2S < H_2Se$
(d) $H_2Se < H_2Te < H_2S$ *(2014)*

14. Which is the strongest acid in the following?
(a) $HClO_4$ (b) H_2SO_3
(c) H_2SO_4 (d) $HClO_3$
(NEET 2013)

15. Which one of the following molecules contains no π bond?
(a) SO_2 (b) NO_2
(c) CO_2 (d) H_2O
(NEET 2013)

16. Which of the following does not give oxygen on heating?
(a) $K_2Cr_2O_7$ (b) $(NH_4)_2Cr_2O_7$
(c) $KClO_3$ (d) $Zn(ClO_3)_2$
(NEET 2013)

17. Identify the incorrect statement, regarding the molecule XeO_4 :
(a) XeO_4 molecule is square planar.
(b) There are four $p\pi$ - $d\pi$ bonds.
(c) There are four sp^3 - p, σ bonds.
(d) XeO_4 molecule is tetrahedral.
(Karnataka NEET 2013)

18. In which of the following compounds, nitrogen exhibits highest oxidation state?
(a) N_2H_4 (b) NH_3
(c) N_3H (d) NH_2OH
(2012)

19. Which of the following statements is not valid for oxoacids of phosphorus?
(a) Orthophosphoric acid is used in the manufacture of triple superphosphate.
(b) Hypophosphorous acid is a diprotic acid.
(c) All oxoacids contain tetrahedral four coordinated phosphorus.
(d) All oxoacids contain atleast one P═O unit and one P—OH group. *(2012)*

20. Sulphur trioxide can be obtained by which of the following reaction?
(a) $CaSO_4 + C \xrightarrow{\Delta}$
(b) $Fe_2(SO_4)_3 \xrightarrow{\Delta}$
(c) $S + H_2SO_4 \xrightarrow{\Delta}$
(d) $H_2SO_4 + PCl_5 \xrightarrow{\Delta}$ *(2012)*

21. In which of the following arrangements the given sequence is not strictly according to the property indicated against it?
(a) HF < HCl < HBr < HI : increasing acidic strength
(b) $H_2O < H_2S < H_2Se < H_2Te$: increasing pK_a values

(c) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing acidic character
(d) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidising power *(Mains 2012)*

22. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$ are respectively
(a) +3, +5, +4 (b) +5, +3, +4
(c) +5, +4, +3 (d) +3, +4, +5 *(2010)*

23. The correct order of increasing bond angles in the following species is
(a) $Cl_2O < ClO_2 < ClO_2^-$
(b) $ClO_2 < Cl_2O < ClO_2^-$
(c) $Cl_2O < ClO_2^- < ClO_2$
(d) $ClO_2^- < Cl_2O < ClO_2$ *(2010)*

24. How many bridging oxygen atoms are present in P_4O_{10}?
(a) 6 (b) 4
(c) 2 (d) 5 *(Mains 2010)*

25. Among the following which is the strongest oxidising agent?
(a) Br_2 (b) I_2
(c) Cl_2 (d) F_2 *(2009)*

26. The angular shape of ozone molecule (O_3) consists of
(a) 1σ and 1π bond (b) 2σ and 1π bond
(c) 1σ and 2π bonds (d) 2σ and 2π bonds *(2008)*

27. Which one of the following orders correctly represents the increasing acid strengths of the given acids?
(a) $HOClO < HOCl < HOClO_3 < HOClO_2$
(b) $HOClO_2 < HOClO_3 < HOClO < HOCl$
(c) $HOClO_3 < HOClO_2 < HOClO < HOCl$
(d) $HOCl < HOClO < HOClO_2 < HOClO_3$ *(2007, 2005)*

28. The electronegativity difference between N and F is greater than that between N and H yet the dipole moment of NH_3 (1.5 D) is larger than that of NF_3 (0.2 D). This is because
(a) in NH_3 the atomic dipole and bond dipole are in the opposite directions whereas in NF_3 these are in the same direction
(b) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction
(c) in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions
(d) in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in opposite directions. *(2006)*

29. Which one of the following orders is not in accordance with the property stated against it?
(a) $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy
(b) $F_2 > Cl_2 > Br_2 > I_2$: Oxidising power
(c) $HI > HBr > HCl > HF$: Acidic property in water
(d) $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity. *(2006)*

30. In which of the following molecules are all the bonds are not equal?
(a) NF_3 (b) ClF_3
(c) BF_3 (d) AlF_3 *(2006)*

31. What is the correct relationship between the pH of isomolar solutions of sodium oxide, Na_2O (pH_1), sodium sulphide, Na_2S (pH_2), sodium selenide, Na_2Se (pH_3) and sodium telluride Na_2Te (pH_4)?
(a) $pH_1 > pH_2 > pH_3 > pH_4$
(b) $pH_1 > pH_2 \approx pH_3 > pH_4$
(c) $pH_1 < pH_2 < pH_3 < pH_4$
(d) $pH_1 < pH_2 < pH_3 \approx pH_4$ *(2005)*

32. Which one of the following oxides is expected to exhibit paramagnetic behaviour?
(a) CO_2 (b) SiO_2
(c) SO_2 (d) ClO_2 *(2005)*

33. Which of the following would have a permanent dipole moment?
(a) SiF_4 (b) SF_4
(c) XeF_4 (d) BF_3 *(2005)*

34. Among K, Ca, Fe and Zn, the element which can form more than one binary compound with chlorine is
(a) Fe (b) Zn
(c) K (d) Ca *(2004)*

35. Which of the following statement is true?
(a) Silicon exhibits 4 coordination number in its compound.
(b) Bond energy of F_2 is less than Cl_2.
(c) Mn(III) oxidation state is more stable than Mn(II) in aqueous state.
(d) Elements of 15^{th} gp shows only + 3 and +5 oxidation states. *(2002)*

36. Which of the following order is wrong?
(a) $NH_3 < PH_3 < AsH_3$ – acidic
(b) Li < Be < B < C – 1^{st} IP

(c) $Al_2O_3 < MgO < Na_2O < K_2O$ – basic
(d) $Li^+ < Na^+ < K^+ < Cs^+$ – ionic radius.
(2002)

37. Correct order of 1st ionisation potential among following elements Be, B, C, N, O is
(a) B < Be < C < O < N
(b) B < Be < C < N < O
(c) Be < B < C < N < O
(d) Be < B < C < O < N *(2001)*

38. Which compound has planar structure?
(a) XeF_4 (b) $XeOF_2$
(c) XeO_2F_2 (d) XeO_4 *(2000)*

39. Which of the following oxides is most acidic?
(a) As_2O_5 (b) P_2O_5
(c) N_2O_5 (d) Sb_2O_5 *(1999)*

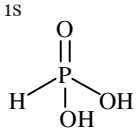
40. Which of the following phosphorus is the most reactive?
(a) Scarlet phosphorus
(b) White phosphorus
(c) Red phosphorus
(d) Violet phosphorus *(1999)*

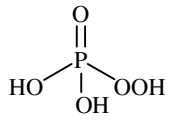
41. Which of the following is used in the preparation of chlorine?
(a) Both MnO_2 and $KMnO_4$
(b) Only $KMnO_4$
(c) Only MnO_2
(d) Either MnO_2 or $KMnO_4$ *(1999)*

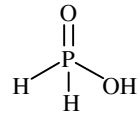
42. Repeated use of which one of the following fertilizers would increase the acidity of the soil?
(a) Ammonium sulphate
(b) Superphosphate of lime
(c) Urea
(d) Potassium nitrate *(1998)*

43. Which of the following has the highest dipole moment?
(a) SbH_3 (b) AsH_3
(c) NH_3 (d) PH_3 *(1997)*

44. The structural formula of hypophosphorous acid is

(a) 

(b) 

(c) 

(d) None of these
(1997)

45. Which of the following bonds has the highest energy?
(a) S–S (b) O–O
(c) Se–Se (d) Te–Te *(1996)*

46. The basic character of hydrides of the V group elements decreases in the order
(a) $NH_3 > PH_3 > AsH_3 > SbH_3$
(b) $SbH_3 > AsH_3 > PH_3 > NH_3$
(c) $SbH_3 > PH_3 > AsH_3 > NH_3$
(d) $NH_3 > SbH_3 > PH_3 > AsH_3$ *(1996)*

47. Among the following oxides, the lowest acidic is
(a) As_4O_6 (b) As_4O_{10}
(c) P_4O_6 (d) P_4O_{10} *(1996)*

48. Which of the following has the greatest electron affinity?
(a) I (b) Br
(c) F (d) Cl *(1996)*

49. Which of the following represents calcium chlorite?
(a) $Ca(ClO_3)_2$ (b) $Ca(ClO_2)_2$
(c) $CaClO_2$ (d) $Ca(ClO_4)_2$
(1996)

50. Reaction of sodium thiosulphate with iodine gives
(a) tetrathionate ion (b) sulphide ion
(c) sulphate ion (d) sulphite ion.
(1996)

51. About 20 km above the earth, there is an ozone layer. Which one of the following statements about ozone and ozone layer is true?
(a) It is beneficial to us as it stops U.V. radiation.
(b) Conversion of O_3 to O_2 is an endothermic reaction.
(c) Ozone has a triatomic linear molecule.
(d) It is harmful as it stops useful radiation.
(1995)

52. The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$. What is the atomic number of the element, which is just below the above element in the periodic table?
(a) 36 (b) 49
(c) 33 (d) 34 *(1995)*

53. Which of the following oxides of nitrogen is paramagnetic?
(a) NO_2 (b) N_2O_3
(c) N_2O (d) N_2O_5 *(1994)*

54. Which of the following displaces Br_2 from an aqueous solution containing bromide ions?
(a) I_2 (b) I_3^-
(c) Cl_2 (d) Cl^- *(1994)*

55. Which of the following fluorides does not exist?
(a) NF_5 (b) PF_5
(c) AsF_5 (d) SbF_5 *(1993)*

56. Which of the following species has four lone pairs of electrons?
(a) I (b) O
(c) Cl^- (d) He *(1993)*

57. Which of the following sets has strongest tendency to form anions?
(a) Ga, Ni, Tl (b) Na, Mg, Al
(c) N, O, F (d) V, Cr, Mn.
(1993)

58. A solution of potassium bromide is treated with each of the following. Which one would liberate bromine?
(a) Hydrogen iodide
(b) Sulphur dioxide
(c) Chlorine (d) Iodine *(1993)*

59. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution of its compound?
(a) Cl (b) Br
(c) Al (d) Na *(1993)*

60. Number of electrons shared in the formation of nitrogen molecule is
(a) 6 (b) 10
(c) 2 (d) 8 *(1992)*

61. Sugarcane on reaction with nitric acid gives
(a) CO_2 and SO_2
(b) $(COOH)_2$
(c) 2HCOOH(two moles)
(d) no reaction. *(1992)*

62. Nitrogen is relatively inactive element because
(a) its atom has a stable electronic configuration
(b) it has low atomic radius
(c) its electronegativity is fairly high
(d) dissociation energy of its molecule is fairly high. *(1992)*

63. H_3PO_2 is the molecular formula of an acid of phosphorus. Its name and basicity respectively are
(a) phosphorous acid and two
(b) hypophosphorous acid and two
(c) hypophosphorous acid and one
(d) hypophosphoric acid and two. *(1992)*

64. Which of the following bonds will be most polar?
(a) N – Cl (b) O – F
(c) N – F (d) N – N *(1992)*

65. Elements of which of the following groups will form anions most readily?
(a) Oxygen family (b) Nitrogen family
(c) Halogens (d) Alkali metals
(1992)

66. Strongest hydrogen bonding is shown by
(a) water (b) ammonia
(c) hydrogen fluoride
(d) hydrogen sulphide. *(1992)*

67. When chlorine is passed over dry slaked lime at room temperature, the main reaction product is
(a) $Ca(ClO_2)_2$ (b) $CaCl_2$
(c) $CaOCl_2$ (d) $Ca(OCl)_2$
(1992)

68. In the manufacture of bromine from sea water, the mother liquor containing bromides is treated with
(a) carbon dioxide (b) chlorine
(c) iodine
(d) sulphur dioxide. *(1992)*

69. Which would quickly absorb oxygen?
(a) Alkaline solution of pyrogallol
(b) Conc. H_2SO_4
(c) Lime water
(d) Alkaline solution of $CuSO_4$. *(1991)*

70. Oleum is
(a) castor oil (b) oil of vitriol
(c) fuming H_2SO_4 (d) none of these.
(1991)

71. Aqueous solution of ammonia consists of
(a) H^+ (b) OH^-
(c) NH_4^+ (d) NH_4^+ and OH^-.
(1991)

72. P_2O_5 is heated with water to give
(a) hypophosphorous acid
(b) phosphorous acid
(c) hypophosphoric acid
(d) orthophosphoric acid. *(1991)*

73. Basicity of orthophosphoric acid is
(a) 2 (b) 3
(c) 4 (d) 5 *(1991)*

74. PCl_3 reacts with water to form
(a) PH_3 (b) H_3PO_3, HCl
(c) $POCl_3$ (d) H_3PO_4 *(1991)*

75. PH_4I + NaOH forms
(a) PH_3 (b) NH_3
(c) P_4O_6 (d) P_4O_{10} *(1991)*

76. Pure nitrogen is prepared in the laboratory by heating a mixture of
(a) NH_4OH + NaCl (b) NH_4NO_3 + NaCl
(c) NH_4Cl + NaOH (d) NH_4Cl+$NaNO_2$.
(1991)

77. The bleaching action of chlorine is due to
(a) reduction (b) hydrogenation
(c) chlorination (d) oxidation.
(1991)

78. Which of the following statement is not correct for nitrogen?
(a) Its electronegativity is very high.
(b) *d*-orbitals are available for bonding.
(c) It is a typical non-metal.
(d) Its molecular size is small. *(1990)*

79. Which of the following compound does not exist?
(a) NCl_5 (b) AsF_5
(c) $SbCl_5$ (d) PF_5 *(1989)*

80. Each of the following is true for white and red phosphorus except that they
(a) are both soluble in CS_2
(b) can be oxidised by heating in air
(c) consist of the same kind of atoms
(d) can be converted into one another.
(1989)

81. When orthophosphoric acid is heated to 600°C, the product formed is
(a) PH_3 (b) P_2O_5
(c) H_3PO_3 (d) HPO_3
(1989)

82. Which one has the lowest boiling point?
(a) NH_3 (b) PH_3
(c) AsH_3 (d) SbH_3 *(1989)*

83. Oxygen will directly react with each of the following elements except
(a) P (b) Cl
(c) Na (d) S *(1989)*

84. The gases respectively absorbed by alkaline pyrogallol and oil of cinnamon are
(a) O_3, CH_4 (b) O_2, O_3
(c) SO_2, CH_4 (d) N_2O, O_3.
(1989)

85. It is possible to obtain oxygen from air by fractional distillation because
(a) oxygen is in a different group of the periodic table from nitrogen
(b) oxygen is more reactive than nitrogen
(c) oxygen has higher b.p. than nitrogen
(d) oxygen has a lower density than nitrogen.
(1989)

86. Bleaching powder reacts with a few drops of conc. HCl to give
(a) chlorine
(b) hypochlorous acid
(c) calcium oxide
(d) oxygen. *(1989)*

87. Which of the following is a nitric acid anhydride?
(a) NO (b) NO_2
(c) N_2O_5 (d) N_2O_3
(1988)

88. Bleaching powder is obtained by the action of chlorine gas and
(a) dilute solution of $Ca(OH)_2$
(b) concentrated solution of $Ca(OH)_2$
(c) dry CaO
(d) dry slaked lime.
(1988)

Answer Key

1.	(a)	**2.**	(a)	**3.**	(c)	**4.**	(a)	**5.**	(d)	**6.**	(c)	**7.**	(d)	**8.**	(d)	**9.**	(a)	**10.**	(c)
11.	(d)	**12.**	(b)	**13.**	(a)	**14.**	(a)	**15.**	(d)	**16.**	(b)	**17.**	(a)	**18.**	(c)	**19.**	(b)	**20.**	(b)
21.	(b)	**22.**	(d)	**23.**	(d)	**24.**	(a)	**25.**	(d)	**26.**	(b)	**27.**	(d)	**28.**	(c)	**29.**	(a)	**30.**	(b)
31.	(a)	**32.**	(d)	**33.**	(b)	**34.**	(a)	**35.**	(b)	**36.**	(b)	**37.**	(a)	**38.**	(a)	**39.**	(c)	**40.**	(b)
41.	(a)	**42.**	(a)	**43.**	(c)	**44.**	(c)	**45.**	(a)	**46.**	(a)	**47.**	(a)	**48.**	(d)	**49.**	(b)	**50.**	(a)
51.	(a)	**52.**	(c)	**53.**	(a)	**54.**	(c)	**55.**	(a)	**56.**	(b)	**57.**	(c)	**58.**	(c)	**59.**	(a)	**60.**	(a)
61.	(b)	**62.**	(d)	**63.**	(c)	**64.**	(c)	**65.**	(c)	**66.**	(c)	**67.**	(c)	**68.**	(b)	**69.**	(a)	**70.**	(c)
71.	(d)	**72.**	(d)	**73.**	(b)	**74.**	(b)	**75.**	(a)	**76.**	(d)	**77.**	(d)	**78.**	(b)	**79.**	(a)	**80.**	(a)
81.	(d)	**82.**	(b)	**83.**	(b)	**84.**	(b)	**85.**	(c)	**86.**	(a)	**87.**	(c)	**88.**	(d)				