P-BLOCK ELEMENTS

VA GROUP ELEMENTS

SUBTOPIC-I (PRACTICE QUESTIONS)

1. The correct order of second ionization potential of C, N, O and F is

1. C > N > O > F 2. O > N > F > C 3. O > F > N > C 4. F > O > N > C

2. Which of the following has maximum complex forming ability with a given metal ion?

1. PH_3 2. BiH_3 3. NH_3 4. SbH_3

3. Which of the following does not show allotropy?

1. Bismuth 2. Phosphorus 3. Arsenic 4. Antimony

4. The electronic configuration of an atom is $1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 3d^{10}\ 4s^2\ \ 4p^3$. The chemistry of this of

1. Silicon 2. Sulphur 3. Nitrogen 4. Chlorine

5. Of the different allotropic forms of phosphorus, most reactive is

1. Violet phosphorus 2. White phosphorus

3. Scarlet phosphorus 4. Red Phosphorus

6. The P-P-P bond angle in white phosphorus is

1. 120^0 2. 90^0 3. $109^0\ 28'$ 4. 60^0

7. The total number of lone pairs of electrons present in a P_4 molecule is

1. 2 2. 6 3. 4 4. 8

8. Nitrogen does not form complexes because

1. There are no d-orbitals in the valence shell

2. The dissociation energy of nitrogen is very high

3. Electro negativity of nitrogen is quite high

4. It has a stable electronic configuration

9. Both BF_3 and NF_3 are covalent compounds but BF_3 is non-polar and NF_3 is polar. This is because

1. Boron is a metal and nitrogen is a non metal

2. B-F bonds have no dipole moment but N-F bonds have

3. Atomic size of boron is smaller than that of nitrogen

4. BF_3 is planar but NF_3 is pyramidal in nature.

10. Which of the following trihalides is not hydrolysed

1. NF_3 2. PCl_3 3. $AsCl_3$ 4. $SbCl_3$

11. Nitrogen forms nitride, (N^{-3}) ion more readily. This is due to

1. Its small size 2. Its high electronegativity

3. Both (a) and (b) 4. None of these

12. Which of the following trihalides of nitrogen is most stable?

1. NCl_3 2. NF_3 3. NBr_3 4. NI_3

13. In Nitrogen molecule, the two atoms of nitrogen are joined by

1. One sigma bond and one Pi bond 2. Two sigma bonds and one Pi bond

3. One sigma bond and two Pi bonds 4. Three sigma bonds

14. Paramagnetic oxide is

1. N_2O 2. N_2O_3 3. NO 4. N_2O_4

15. In the reaction

$4P + 3KOH + 3H_2O \rightarrow 3KH_2PO_2 + PH_3$

1. Phosphors is reduced only

2. Phosphorus is oxidized only

3. Phosphorus is neither oxidized nor reduced

4. Phosphorus is both oxidized and reduced.

16. Of the different allotropic forms of phosphorus, the one which has a metallic luster is

1. Black phosphorus
2. Red phosphorus
3. White phosphorus
4. Scarlet phosphorus

17. The reddish brown gas formed when nitric oxide is oxidized by air is

1. N_2O_5
2. N_2O_4
3. NO_2
4. N_2O_3

18. Mixture used for the tips of match stick is

1. S + K
2. Sb_2S_3
3. $K_2Cr_2O_7 + S +$ White
4. $K_2Cr_2O_7 + K + S$

19. The bonds present in N_2O_5 are

1. Only ionic
2. Covalent and coordinate
3. Only covalent
4. Covalent ionic

20. $FeSO_4$ forms brown ring with

1. NO_2
2. N_2O_3
3. NO
4. N_2O_5

21. When concentrated H_2SO_4 is added to dry KNO_3, brown fumes evolve. These fumes are due to

1. SO_2
2. SO_3
3. NO_2
4. NO

22. $BiCl_3$ on hydrolysis forms a white precipitate of

1. Bismuthio acid
2. Bismuth oxychloride
3. Bismuth pentachloride
4. Bismuth hydroxide

23. Which oxide does not act as a reducing agent

1. NO
2. NO_2
3. N_2O
4. N_2O_5

24. Which of the nitrates on strong heating leaves the metal as the residue?

1. $AgNO_3$
2. $Pb(NO_3)_2$
3. $Cu(NO_3)_2$
4. $Cl(NO_3)_3$

25. Nitric acid on standing develops brownish colour which may be attributed to the presence of

1. NO_2^+ Ions
2. NO_3^- Ions
3. NO_2^-
4. NO_2

26. The sequence of acidic character is

1. $SO_2 > CO_2 > CO > N_2O_5$
2. $SO_2 > N_2O_5 > CO > CO_2$
3. $N_2O_5 > SO_2 > CO > CO_2$
4. $N_2O_5 > SO_2 > CO_2 > CO$

27. When a vapour, at atmospheric pressure was gradually heated form 25^0C its colour was found to deepen at first and then to fade as the temperature was raised above 160^0C. At 600^0C the vapour was almost colourless, but its colour deepened when the pressure was raised at this temperature. The vapour was

1. The bromine
2. mixture of nitrogen dioxide and dinitrogen tetroxide
3. Pure nitrogen dioxide
4. Pure dinotrogen tetroxie

28. An element (X) forms compounds of the formula XCl_3, X_2O_5 and Ca_3X_2 but does not form XCl_5. Which of the following is the element X?

1. B
2. Al
3. N
4. P

29. A deep brown gas is formed by mixing two colourless gases which are

1. NO_2 and O_2
2. N_2O and NO
3. NO and O_2
4. NH_3 and HCl

30. What is not true about P_4?

1. It represents yellow phosphorus
2. It is a tetrahedral molecule
3. It is soluble in CS_2 and water
4. It polymerises when heated in inert atom sphere at 570 K

31. Which is not true for phosphorus?

1. Phosphorus exists in different allotropic forms
2. Black phosphorus has layer type structure
3. Yellow phosphorus is less reactive than red phosphorus
4. Yellow phosphorus exists in tetrahedral molecular solid

32. What is not true about N_2O_5?

1. It is anhydride of HNO_3
2. In solid state it exists as $NO_2^+N_3^-$
3. It is structurally similar to P_2O_5
4. It can be prepared by heating HNO_3 over P_2O_5

33. When some heat is supplied to the equilibrium system $N_2O_2 \rightleftharpoons 2NO_2$, the colour changes from

1. colourless to colour
2. colour to colourless
3. colourless to colourless
4. colour to colour

34. The ease of hydrolysis of trichlorides of group 15 elements decreases in the order

1. $NCl_3 > PCl_3 > AsCl_3 > SbCl_3 > BiCl_3$
2. $PCl_3 > NCl_3 > AsCl_3 > SbCl_3 > BiCl_3$
3. $AsCl_3 > NCl_3 > PCl_3 > SbCl_3 > BiCl_3$
4. $SbCl_3 > BiCl_3 > NCl_3 > PCl_3 > AsCl_3$

35. The correct order of decreasing Lewis acid strength of trichlorides of group 15 elements is

1. $AsCl_3 > PCl_3 > BiCl_3 > SbCl_3$
2. $PCl_3 > AsCl_3 > SbCl_3 > BiCl_3$
3. $NCl_3 > PCl_3 > AsCl_3 > SbCl_3$
4. $SbCl_3 > BiCl_3 > PCl_3 > AsCl_3$

36. Which of the following pentahalides of bismuth exists?

1. $BiCl_5$ 2. $BiBr_5$ 3. BiI_5 4. BiF_5

37. P-O-P bonds is present is

1. $H_4P_2O_6$ 2. $H_4P_2O_5$ 3. Both (1) and (2) 4. None of these

38. In which of the following halide, the M-X bond lengths are not equal?

1. PCl_3 2. NF_3 3. PF_5 4. NCl_3

39. Solid PCl_5 exist as

1. Dimmer P_2Cl_{10} 2. $[PCl_4]^+[PCl_6]^-$ 3. $(PCl_3)(Cl_2)$ 4. PCl_5 as such

40. The correct order of increasing stability is

1. $NH_3PH_3AsH_3$ 2. $NH_3SbH_3AsH_3PH_3$

3. $SbH_3\ AsH_3\ PH_3\ NH_3$ 4. $AsH_3\ AsH_3\ NH_3\ PH_3$

41. The basic strength of hydrides of group 15 elements decreases in the order

1. $NH_3 > PH_3 > AsH_3 > SbH_3$ 2. $PH_3 > AsH_3 > SbH_3 > NH_3$

3. $SbH_3 > PH_3 > AsH_3 > NH_3$ 4. $NH_3 > AsH_3 > PH_3 > SbH_3$

42. Glacial phosphoric acid is

1. H_3PO_4 2. HPO_3 3. $H_4P_2O_6$ 4. H_3PO_2

43. P-P linkage is present in

1. Pyrophosphoric acid 2. Hypophosphoric acid

3. Peroxy phosphoric acid 4. Metaphosphoric acid

44. Dipole moment of the hydrides of group 15 elements decreases in the order

1. $AsH_3 > BiH_3 > SbH_3 > NH_3 > PH_3$ 2. $BiH_3 > SbH_3 > AsH_3 > PH_3 > NH_3$

3. $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ 4. $PH_3 > NH_3 > AsH_3 > SbH_3 > BiH_3$

45. The correct order of decreasing acid strength of oxy acids of group 15 element is

1. $HNO_3, H_3SbO_4, H_3AsO_4, H_3PO_4$
2. $H_3PO_3, H_3AsO_4, H_3SbO_4, HNO_4$
3. $HNO_3, H_3PO_4, H_3AsO_4, H_3SbO_4$
4. $HNO_3, H_3PO_4, H_3AsO_4, H_3SbO_4$

46. Liquid ammonia is used in refrigeration because of its

1. High dipole moment
2. High heat of vaporization
3. Base
4. Stability

47. AgCl dissolves in NH_4OH due to the formation of

1. AgOH
2. Ag
3. Ag_2O
4. $\left[Ag\left(NH_3\right)_2\right]Cl$

48. Which of the following salts is used in the bead test for basic radicals?

1. $Na\left(NH_4\right)HPO_4 4H_2O$
2. Na_2HPO_4
3. $\left(NH_4\right)_2.FeSO_4.6H_2O$
4. $\left(NH_4\right)_2 HPO_2 2H_2O$

49. The bond angle in PH_3 is less than the bond angle in PF_3. This is attributed to

1. Enhanced repulsion due to presence of double bond in PF_3
2. Increased bond pair-bond pair repulsion due to multiple bond
3. Both 1 and 2
4. Displacement of electron cloud P-F bond towards F in PF_3

50. When orthophosophoric acid is heated to 600^0C the product formed is

1. PH_3
2. P_2O_5
3. H_3PO_3
4. HPO_3

51. In P_4O_6, the number of oxygen atoms bonded to each phosphorus atom is

1. 1.5
2. 2
3. 3
4. 4

52. With respect to protonic acids, which of the following statements is correct?

1. PH_3 is more basic than NH_3
2. PH_3 is less basic than NH_3
3. PH_3 is equally basic as NH_3
4. PH_3 is amphoteric while NH_3 is basic

53. There is very little difference in acid strength in the series H_3PO_4, H_3PO_3 and H_3PO_2 because

1. Phosphorus in these acids exists in different oxidation states
2. Number of unprotonated oxygen responsible for increase of acidity due to inductive Effect remains the same
3. Phosphorus is not a highly electronegative element
4. Phosphorus oxides are less basic

VA GROUP ELEMENTS (SUBTOPIC-I)

KEY

1) 3	2) 3	3) 1	4) 3	5) 2	6) 4	7) 3	8) 1	9) 2	10) 1
11) 3	12) 2	13) 3	14) 3	15) 4	16) 1	17) 3	18) 3	19) 2	20) 3
21) 3	22) 2	23) 4	24) 1	25) 4	26) 4	27) 2	28) 3	29) 3	30) 3
31) 3	32) 3	33) 1	34) 1	35) 2	36) 4	37) 2	38) 3	39) 2	40) 3
41) 1	42) 2	43) 2	44) 3	45) 3	46) 2	47) 4	48) 1	49) 3	50) 4
51) 3	52) 2	53) 2							

SUB TOPIC-I (SOLUTIONS)

1. In O^+ exactly half filled orbitals are present and hence.

2. Due to small atomic size nitrogen have great tendency to donate electrons

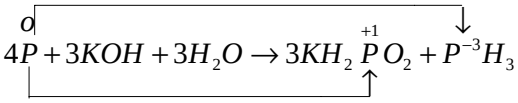
6. DIAGRAM

7. As shows above

9. For $BF_3\ \mu = 0,$ for $NF_3\ \mu \neq 0$.

14. Due to presence of odd no of electrons.

15.



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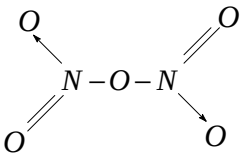


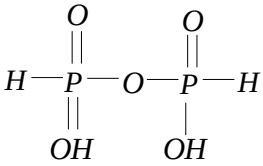
23. Due to highest oxidation number.

29. $2NO + O_2 \rightarrow 2NO_2$

NO_2 is reddish brown poisonous gas.

32. The structures P_5O_5 & N_2O_5 are difference.

37.



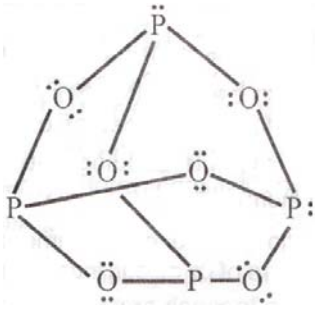
39. $2PCl_5 \rightleftharpoons [PCl_4]^+ [PCl_6]^-$

40. Down the group the stability of Hydrides decreases.

45. Down the group the acidic nature decreases

50. $H_3PO_4 \xrightarrow[-H_2O]{350^0C} H_4P_2O_7 \xrightarrow[-H_2O]{600^0C} HPO_3$

51.



52. Due to more atomic radius.

SUB TOPIC-II (PRACTICE QUESTIONS)

1. H_3PO_2 **is the molecular formula of an acid of phosphorus, its name and basicity respectively is**

1. Phosphorus acid and two
2. Hypophosphorous acid and two
3. Hypophosphorous acid and one
4. Hypophosphoric acid and two

2. NH_3 **has much higher b.p. than** PH_3 **because**

1. NH_3 has larger molecular weight
2. NH_3 undergoes umbrella inversion
3. NH_3 forms hydrogen bond
4. NH_3 contains ionic bonds whereas PH_3 contains covalent bonds

3. Which of the following has least covalent P-H bond?

1. PH_3
2. $P_2H_6^{2+}$
3. $P_2H_5^{+}$
4. PH_4^{+}

4. In nitrogen family, the H-M-H bond angle in the hydrides gradually becomes closer to 90^0 on going form N to Sb. This shows that gradually

1. The basic strength of the hydrides increases

2. Almost pure s-orbitals are used for M-H bonding

3. The bond energies M-H bonds increase

4. The bond pairs of electrons become nearer to the central atom

5. The equivalent weight of phosphoric acid (H_3PO_4) in the reaction

$NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$ **is**

1. 25 2. 49 3. 59 4. 98

6. The number of P-O-P bonds in cyclic metaphosphoric acid is

1. Zero 2. Two 3. Three 4. Four

7. A metal X on heating in nitrogen gas gives Y,Y on treatment with H_2O gives a colourless gas which when passed through $CuSO_4$, solution gives a blue colour, Y is

1. $Mg(NO_3)_2$ 2. Mg_3N_2 3. NH_3 4. Mgo

8. Bones glow in dark because

1. They contain shining material 2. They contain red phosphorus

3. They contain white phosphorus which under goes slow combustion in contact with air

4. White phosphorus changes to red phosphorus

9. In the compounds of the POX_3, P atoms show multiple bonding of the type

1. $p\pi - p\pi$ 2. $d\pi - d\pi$ 3. $p\pi - d\pi$ 4. None of these

10. Oxyacid of phosphorous (x) on heating to red hot temperature gives (y) a monobasic acid ofphosphorous. (y) when reacts with $AgNO_3$ gives a white precipitate (z). Then x,y,z are respectively

	X	Y	Z
1.	H_3PO_3	HPO_3	$AgPO_3$
2.	$H_4P_2O_7$	HPO_3	$AgPO_3$
3.	H_3PO_4	HPO_3	$AgPO_4$
4.	$H_4P_2O_7$	H_3PO_4	$AgPO_4$

11. How many P-H and O-H bonds respectively, are present in $H_4P_2O_7$ molecule?

1. 1 and 3 2. 0 and 4 3. 4 and 0 4. 2 and 3

12. $X \xleftarrow{H_2O} H_4P_2O_7 \xrightarrow{825K} Y.$

In the above sequence of reactions X and Y are respectively

1. H_3PO_4, H_3PO_4 2. HPO_3, H_3PO_4 3. H_3PO_4, HPO_3 4. HPO_3, HPO_3

13. $P_4O_{10} \xrightarrow{H_2O} A \xrightarrow{H_2O} B \xrightarrow{H_2O} C.$ **(C) when heated with Ammonium molybdate in presence of HNO_3, a canary yellow precipitate is formed. Then A,B,C are respectively**

1. $HPO_3, H_4P_2O_7, H_3PO_4$ 2. $H_4P_2O_6, H_4P_2O_7, H_3PO_3$

3. H_3PO_3, H_3PO_4, HPO_3 4. H_3PO_2, H_3PO_3, HPO_3

14. A and B are two gases 'A' is identified with a glass rod dipped in NH_3 and the 'B' is identified with a glass rod dipped in HCl. 'A' and 'B' are respectively

1. HCl, NO_2 2. HCl, NH_3 3. NH_3, HCl 4. NH_3, SO_2

15. $CaCO_3 \xrightarrow{\Delta} A + CO_2; A + coke \rightarrow B$

$B + N_2 \xrightarrow{\Delta} C + Graphite; C \xrightarrow{H_2O} D.$ **Hence A,B,C and D are**

1. $CaO, CaC_2, CaCN_2, NH_3$ 2. $CaO_2, CaO, CaCN_2, NH_3$

3. CO_2, CO, C, CH_2CH 4. $CaCN_2, CaO, NH_3, CaC_2$

16. $A_{(s)} \xrightarrow{\Delta} B_{(s)} + X_{(g)}; B_{(s)} + coke \xrightarrow{\Delta} C_{(s)} + Y_{(g)}; C_{(s)} + Z_{(g)} \rightarrow D_{(s)}$ **+ grahite :**

$D_{(s)} + H_2O \rightarrow A_{(s)} + NH_{3(g)}$ **The gaseous products X,Y and Z are**

1. N_2, CO, CO_2 2. CO_2, CO, N_2 3. CO, CO_2, NO_2 4. CO, CO_2, NO

17.

	List-I	**List-II**
A)	**HNO_3**	**1) -3, + 5 oxidation state**
B)	**NH_4NO_3**	**2) -1/3 oxidation state**
C)	**N_3H**	**3) + 5 oxidation state**
D)	**H_3PO_3**	**4) + 3 oxidation state**
		5) + 1/3 oxidation state

The correct match is

	A	B	C	D
1.	3	1	2	4
2.	5	2	3	4
3.	1	2	3	4
4.	4	3	2	5

18.

	List-I	List-II
A)	**H_3NO_2**	**1) tribasic**
B)	**H_3PO_3**	**2) Mono basic**
C)	**H_3PO_4**	**3) Tetrabasic**
D)	**$H_4P_2O_6$**	**4) Di basic**
		5) Zero basicity

The correct match is

	A	B	C	D
1.	3	2	1	5
2.	2	4	1	3
3.	2	5	3	4
4.	1	2	3	4

19.

	List-I	List-II
A)	**NH_3**	**1) sp^3d, Trigonal bipyramidal**
B)	**N_2O_5**	**2) sp^3, Terahedral**
C)	**$PC/_5$**	**3) sp, linear**
D)	NH_4^+	**4) sp^3, pyramidal**
		5) Two coordinate and six covalent

The correct match is

	A	B	C	D
1.	1	4	3	2
2.	1	2	3	4
3.	4	5	1	2
4.	2	5	3	1

20. The correct statement is

1. Most reactive and most poisonous V group element is white phosphorus molecule

2. High reactivity of white phosphorus is due to large internal strain in P_4 molecule

3. Bismuth is mono atomic

4. All the above

21. The correct statement is

1. High reactivity of white phosphorus is due small bond angle (60^0) in P_4 molecule which causes large strain

2. Low reactivity of red phosphorus is due to polymeric structure

3. Black phosphorus conducts electricity due to presence of delocalized π electrons

4. All the above

22. The wrong statement about VA group Hydrides is

1. VA group elements form both tri and penta Hydrides

2. The decreasing order of stability of VA group hydrides in $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$

3. The increasing order of reducing power among VA group Hydrides is

$NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$

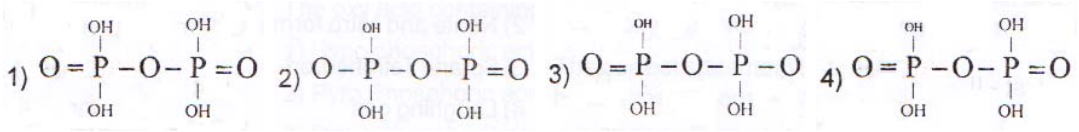
4. The increasing order of poisonous nature of VA group Hydrides is

$NH_3 < PH_3 < AsH_3 < SbH_3 < BiH_3$

23. Bottle of PCl3 is kept stoppered because it

1. Explodes 2. Gets oxidized 3. is volatilized 4. Reacts with moisture

24. Structural formula of pyrophosphoric acid is



25.

	List-I	**List-II**
A)	**Haber's process**	**1) Nitric acid**
B)	**Ostwald's process**	**2)** $N_2 + 3H_2 \rightarrow 2NH_3$
C)	**Contact process**	**3) Ammonia + $CaCO_3$**
D)	**Cyanamide process**	**4) Sulphuric acid**
		5) Perdisulpuric acid

The correct match is

	A	B	C	D
1.	1	4	5	2
2.	2	1	4	3
3.	1	4	3	2
4.	5	3	1	4

26.

	List-I	**List-II**
A)	**Phosphorite**	**1) KNO_3**
B)	**Bengal salt petre**	**2)** $Ca(H_2PO_4)_2 + 2(CaSO_4.2H_2o)$
C)	**flourapatite**	**3)** $NaNO_3$
D)	**Superphosphate of lime**	**4)** $3Ca_3(PO_4)_2\,CaF_2$
		5) $Ca_3(PO_4)_2$

The correct match is

	A	B	C	D
1.	1	2	3	5
2.	2	4	3	2
3.	4	3	5	2
4.	5	1	4	2

27. PCl_3 on hydrdysis gives (X) and (Y). When PCl_3 reacts with oxialic acid gives (Z) and libertes CO_2 and CO. (Y) gives dense fumes with NH_3. Then (X) and (Z) are

1. $H_3PO_3; H_3PO_4$ 2. $H_3PO_4; H_3PO_3$ 3. $H_3PO_3; H_3PO_2$ 4. $H_3PO_3; H_3PO_3$

28. Phosphine is not obtained by the reaction when

1. White P is heated with NaOH
2. Red P is heated with NaOH
3. Ca_3P_2 reacts with water
4. P_4O_6 is boiled with water

29. Brown color in HNO_3 can be removed by

1. Adding Mg Powder
2. Boiling the acid
3. Passing NH_3 through acid
4. Passing air through warm acid

30. "Thomas slag" which is used as a fertilizer is composed of

1) $CaCO_3$ and $CaSO_4$
2. CaO and SiO_2
3. $Ca_3(PO_4)_2$ and $CaSiO_3$
4. $MgCO_3$ and $Al_2(SiO_3)_3$

31. $P_4 \xrightarrow{Limited\ O_2} X \xrightarrow{Cl_2} Y + Z$ **In this sequence, Y and Z are respectively**

1. PCl_3 and PCl_5
2. $POCl_3$ and PO_2Cl
3. PCl_2 and $POCl_3$
4. $POCl_3$ and PCl_3

32. When nitric acid is treated with P_2O_5 gives nitrogen compound (X). When P_4 is oxidized with conc. HNO_3 gives nitrogen compound (Y). (X) and (Y) are respectively

1. NO and N_2O_5 2. N_2O_5 and N_2O 3. N_2O_4 and NO_2 4. N_2O_5 and NO_2

33. White phosphorus is converted into red phosphorus by heating it

1. To 250^0C in a current of air

2. In an inert atmosphere to 250^0C in presence of a trace of iron

3. In an inert atmosphere to 250^0C in presence of a trace of iodine

4. In oxygen to 250^0C in presence of a trace of iodine.

34. The CN^-ion and N_2 are isoelectronic. But in constrast to CN^-,N_2 is chemically inert because of

1. Low bond energy

2. Absence of bond polarity

3. Unsymmetrical electron distribution

4. Presence of more number of electrons in bonding orbitals

35. The BCl_3 is planar molecule wherease, NCl_3 is pyramidal because

1. N-Cl bond is more covalent than B-Cl bond

2. B-Cl bond is more polar than N-Cl bond

3. Nitrogen atom is smaller than boron

4. BCl_3 has no lone pair but NCl_3 has a lone pair electron

36. Nitrogen form N_2 but phosphorous is converted into P_4 form P_2. The reason for this is:

1. Triple bond is present between phosphorous atoms

2. $p\pi - p\pi$ bonding is weak

3. $p\pi - p\pi$ bonding is strong

4. Multiple bond is formed easily

37. Copper metal in treatment with dilute HNO_3 produces 1 gas (X). (X) when passed though acidic solution of stannous chloride, a nitrogen containing compound (Y) is obtained. (Y) on reaction with nitrous acid produces a gas (Z). Gas (Z) is

1) NO 2) N_2 3) NO_2 4) N_2O

38. Pure nitrogen can be prepared from

1. NH_4OH 2. NH_4NO_2 3. $Ba(NO_3)_2$ 4. Ca_3N_2

39. Which statement is not correct for nitrogen?

1. It has a small size
2. It does not readily react with O_2
3. It is a typical non-metal
4. d-orbitals are available for bonding

40. The element which catches fire in air at 30^0C and is stored under water is

1. Sodium 2. Phosphorus 3. Magnesium 4. Zinc

41. Which of the following phosphorus is most stable?

1. White 2. Red 3. Black 4. All stable

42. By the action of hot conc H_2SO_4, Phosphorus changes to

1. phosphorous acid
2. metaphosphoric acid
3. pyrophosphoric acid
4. orthophosphoric acid

43. Each of the following is true for white and red phosphorus except that they

1. Can be oxidised heating in air
2. Are both soluble in CS_2
3. Consists of same kind of atoms
4. Can be converted into one another

44. White phosphorus (P_4) does not contain

1. Six P – P single bond
2. Four P – P single bond
3. Four lone pairs of electrons
4. P – P – P angle of 60^0

45. **In NH_3 and PH_3 the common is**

1. Basic nature 2. odour 3. Combustibility 4. None of these

46. **The number of P – O – P bonds in cyclic metaphosporic acid is**

1. Zero 2. Three 3. Two 4. Four

47. **In Birkeland Eyde process, the raw material used is**

1. Air 2. NO_2 3. HNO_3 4. NH_3

48. **Which oxide of nitrogen is colored gas?**

1. N_2O 2. NO_2 3. N_2O_5 4. NO

49. **Which of the following compounds do not exist?**

1. N_4, NCl_5, PO_2 2. N_2, NCl_3, NO_2 3. PCl_5, P_2O_5, NCl_3 4. PO_2, P_4, NCl_3

50. **Phosphine is produced by adding water to**

1. CaC_2 2. HPO_3 3. Ca_3P_2 4. P_4O_{10}

51. **What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid?**

1. CrO_4^{2-} is reduced to + 3 state of Cr 2. CrO_4^{2-} is oxidized to + 7 state of Cr

3. $Cr_5O_7^{2-}$ and H_2O are formed 4. Cr^{3-} and $Cr_2O_7^{2-}$ are formed

52. **In the reaction, $HNO_3 + P_4O_{10} \rightarrow 4HPO_3 + x$, the product x is**

1. NO_2 2. N_2O_5 3. N_2O_3 4. H_2O

53. Assertion: Red phosphorus is less volatile than white phosphorus.

Reason: PCl_5 **is solid state consisting of tetrahedral** PCl_5^+ **cation and octahedral** PCl_6^- **anion**.

1. Statement I is true; Statement II is true; Statement II is a correct explanation for Statement I.

2. Statement I is true; Statement II is true; Statement II is not a correct explanation for Statement I.

3. Statement I is true; Statement II is false. 4. Statement I is false; Statement II is true.

54. Assertion: The is a very little difference in acidic strengths of H_3PO_4, H_3PO_3 **and** H_3PO_2**.**

Reason: Number of unprotonated oxygen responsible for increase of acidic strength due to inductive effect remains the same.

1. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3. Assertion is true but Reason is false.

4. Both Assertion and Reason are false

55. Assertion: PCl_5 **and** $PbCl_5$ **are thermally unstable.**

Reason: They produce same gas on thermal decomposition.

1. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3. Assertion is true but Reason is false.

4. Both Assertion and Reason are false

56. Assertion: Red phosphorus is less volatile then white phosphorus.

Reason: Red phosphorus has a discrete tetrahedral structure.

1. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

2. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

3. Assertion is true but Reason is false. 4. Both Assertion and Reason are false

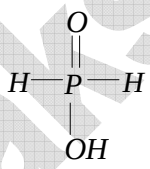
VA GROUP ELEMENTS (SUBTOPIC-II)

KEY

1) 3	2) 3	3) 2	4) 4	5) 4	6) 3	7) 2	8) 3	9) 3	10) 2
11) 2	12) 3	13) 1	14) 2	15) 1	16) 2	17) 1	18) 2	19) 3	20) 4
21) 4	22) 1	**23)***	24) 4	25) 2	26) 4	27) 4	28) 2	29) 4	30) 3
31) 2	32) 1	33) 3	34) 2	35) 2	36) 2	37) 4	38) 2	39) 4	40) 2
41) 2	42) 4	43) 2	44) 2	45) 1	46) 2	47) 1	48) 2	49) 1	50) 3
51) 3	52) 2	53) 2	54) 1	55) 2	56) 3				

VA GROUP ELEMENTS SUB TOPIC-II (SOLUTIONS)

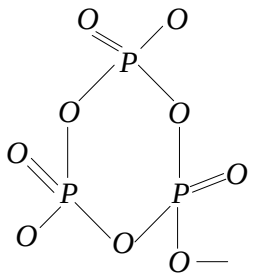
1.



2. NH_3 have ability to form intermoleculere hydrogen bonds.

5. $NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$

$$\text{Eq.wt} = \frac{98}{1} = 98$$

6. 

7. $\frac{3Mg}{x} + N_2 \rightarrow \frac{Mg_3N_2}{y}$

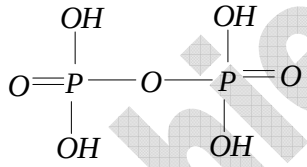
$Mg_3N_2 + 6H_2O \rightarrow 3Mg(OH)_2 + NH_3 \uparrow$

$CuSO_4 + NH_3 \rightarrow [CuSO_4 6NH_3]$

Blue colour

10. $\frac{H_4P_2O7}{X} \xrightarrow[-H_2O]{870K} \frac{HPO_3}{Y}$

$HPO_3 + AgNO_3 \rightarrow \frac{AgPO_3}{2} + HNO_3$

13. 

14. $HCl + NH_3 \rightarrow NH_4Cl$

15. $CaCO_3 \rightarrow CaO + CO_2$
$CaO + COCa \rightarrow CaC_2O$
$CaC_2 + N_2 \rightarrow CaCN_2 + C$

17. A) $H\overset{+5}{N}O_3$

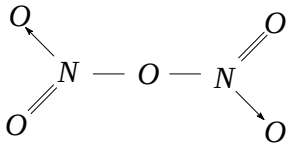
B) $NH_4NO_3 \rightarrow \overset{-3}{N}H_4^+ + \overset{+5}{N}O_3^-$

C) $N_3H - + \frac{1}{3}$

D) $H_3\overset{+5}{P}O_3 -$

19. A) $NH_3 \rightarrow Sp^3$, Pyramidal

B)

$N_2O_5 \rightarrow$ 

C) $PCl_5 \rightarrow Sp^3d$, Trigonal bipyramidal

D) $NH_4^+ \rightarrow Sp^3$, Telianedal

27. $PCl_3 + 3H_2O \rightarrow \frac{H_3PO_3}{X} + \frac{3HCl}{Y}$

$PCl_3 + 2H_2C_2O_4 \rightarrow \frac{H_3PO_3}{Z} + CO_2 + 3CO + 3HCl$

36. $PCl_3 + 3N_2O \rightarrow (x)H_3PO_3 + 3HCl.(y)$

$PCl_3 + 3H_2C_2O_4 \rightarrow \frac{H_3PO_3}{(2)} + 3CO_2 + 3CO + 3HCl$

$HCl + NH_3 \rightarrow NH_4Cl$

37. $Cu + dil\ HNO_3 \rightarrow \frac{No}{x} \xrightarrow{SnCl_2/HCl} \frac{NH_2OH.HC,}{y} \xrightarrow{HNO_2} \frac{N_2O}{z}$

41. Red phosphorous is most stable.

50. $Ca_3P_2 + 6H_2O \rightarrow 3Ca10H_2 + 2PH_3$