



# CHEMISTRY

## BOOKS - SHARAM PUBLICATION

### GROUP 15 ELEMENTS (NITROGEN FAMILY)

#### Exercise

1. Which of the following does not form a pentahalide ?

A. *P*

B. *As*

C. *Sb*

D. *N*

**Answer:**



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2. The element which forms oxides in all oxidation states from  $+1 \rightarrow +5$

A.  $N$

B.  $P$

C.  $As$

D.  $Sb$

**Answer:**



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3. Which of the following is the increasing order of enthalpy of vaporization ?

A.  $NH_3$ ,  $PH_3$ ,  $AsH_3$

B.  $AsH_3$ ,  $PH_3$ ,  $NH_3$

C.  $NH_3$ ,  $AsH_3$ ,  $PH_3$

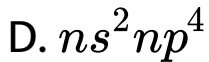
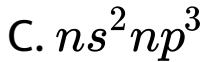
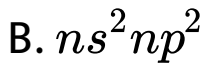
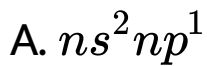
D.  $PH_3$ ,  $AsH_3$ ,  $NH_3$

**Answer:**



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4. Electronic configuration of  $Gr - 15$  elements is

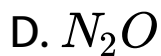


**Answer:**



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5. Sodium nitrate on heating with zinc dust and caustic soda gives



**Answer:**



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**6.** In the manufacture of safety match sticks we use

A. White P

B. Black P

C. Violet P

D. Red P

**Answer:**



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7.  $PH_3$  is prepared by the reaction of :

A. P and  $H_2SO_4$

B. P and  $NaOH$

C. P and  $H_2S$

D. P and  $HNO_3$

**Answer:**



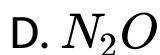
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**8. With excess of  $Cl_2$   $NH_3$  gives :**

A.  $NCl_3$

B.  $HCl$





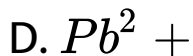
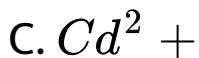
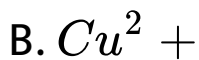
**Answer:**



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9.  $NH_3$  , is a Lewis base. It forms complexes with cations. Which one of the following cations does not form complex with  $NH_3$ ?





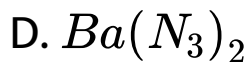
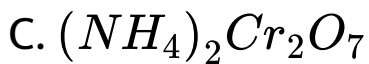
**Answer:**



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**10.** Pure  $N_2$  can be obtained by:.



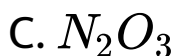
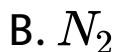
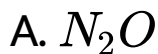


**Answer:**



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**11.** The gas obtained by heating  $NH_4NO_2$  is



D.  $NO_2$

**Answer:**



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**12.** The anhydride of  $HNO_2$ , is

A.  $NO$

B.  $N_2O_3$

C.  $N_2O$

D.  $N_2O_5$

**Answer:**



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**13. Which form of phosphorus is most stable?**

A. Red P

B. White P

C. Black P

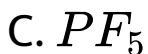
D. All are stable

**Answer:**



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14. Which of the following does not exist?

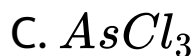


**Answer:**



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15. Which of the following is most explosive?



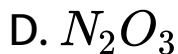
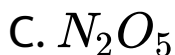
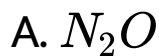
D. all

**Answer:**



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16. Which of the following oxides combines with Fe(II) ions to form a brown complex?



**Answer:**



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17. Oxidation state of nitrogen in  $NH_3$  is

A. +2

B. +3

C. -3

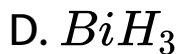
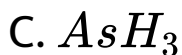
D. -2

**Answer:**



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18. The least stable hydride of 15th group elements is

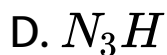
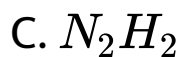
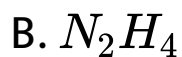


**Answer:**



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19. A hydride of nitrogen which is acidic is



**Answer:**



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20. The element which catches fire in air at  $30^{\circ}C$  and is stored under water is :

A. *Ca*

B. *Na*

C. White P

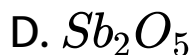
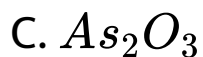
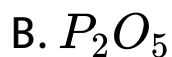
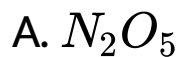
D. *Sr*

**Answer:**



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21. Which of the following is more acidic ?

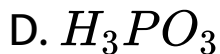
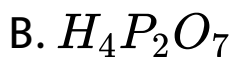
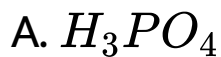


**Answer:**



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22. Which one of the following is Pyrophosphoric acid ?



**Answer:**



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23.  $H_3PO_3$  is:

- A. tribasic acid
- B. a monobasic acid
- C. a dibasic acid
- D. neutral

**Answer:**



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24. Which element is most metallic:

A. *P*

B. *As*

C. *Sb*

D. *Be*

**Answer:**



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**25. Which of the following is least reactive ?**

A. *N*



B. *P*

C. *As*

D. *Bi*

**Answer:**

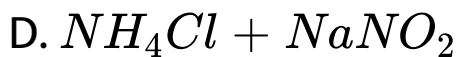


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**26.** Nitrogen is produced by heating :

A.  $HNO_3$

B.  $NH_4Cl$



**Answer:**



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**27.** Phosphide ion has the electronic structure similar to that of:

A. Nitride ion

B. Fluoride ion

C. Chloride ion

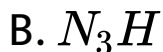
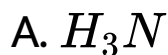
D. Sodium ion

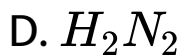
**Answer:**



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**28.** A hydride of nitrogen having lowest oxidation number of N:



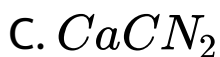
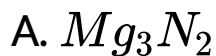


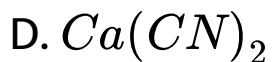
**Answer:**



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**29.** Which does not give ammonia with water?



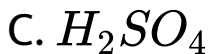
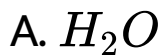


**Answer:**



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**30.** White smoke is formed when ammonia gas meets with:



D.  $HNO_3$

**Answer:**



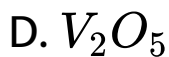
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**31.** The catalyst used in the manufacture of  $HNO_3$  from  $NH_3$  is :

A.  $Ni$

B.  $Fe$

C.  $Pt$



**Answer:**



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**32.**  $PCl_5$  exists but  $NCl_5$  does not because,

A. Nitrogen has no vacant d- orbitals

B.  $NCl_5$  is unstable

C.  $N_2$  is inert

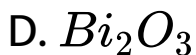
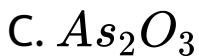
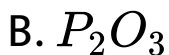
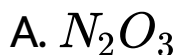
D. None

**Answer:**



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**33.** Which one oxide is most basic



**Answer:**





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34. Liquid ammonia bottles be opened after cooling them in ice for sometime. It is because liquid  $NH_3$ :

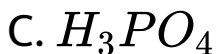
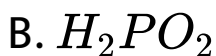
- A. Brings tears to eyes
- B. Has high vapour pressure
- C. Is a corrosive liquid
- D. Is a mild explosive

**Answer:**



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35. Red P on heating with  $HNO_3$  gives :



**Answer:**



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**36.** The basicity of orthophosphoric acid is:

A. 2

B. 3

C. 4

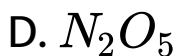
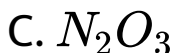
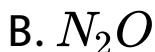
D. 5

**Answer:**



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37. Catalytic oxidation of ammonia by passing a mixture of ammonia and air over heated platinum gauze gives



**Answer:**



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38. Which halide of nitrogen is least basic?

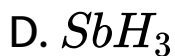


**Answer:**



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39. Non-combustible hydride is:



**Answer:**



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40. Atomicity of phosphorus is:

A. 1

B. 2

C. 3

D. 4

**Answer:**



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41. Structure of ammonia is:

A. trigonal

B. tetrahedral

C. pyramidal

D. trigonal pyramidal

**Answer:**



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42. Gr 15 elements are commonly known as :

A. Halogens

B. Alkali Earth Metals

C. Pnicogens

D. Noble Gases

**Answer:**



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43. Which of the following is tetrabasic acid ?

A. Orthophosphoric acid

B. Orthophosphurous acid

C. Metaphosphoric acid

D. Pyrophosphoric acid

**Answer:**



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44. Which of the following does not form penta chloride ?

A. *P*

B. *As*

C. *Sb*

D. *Bi*

**Answer:**



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**45.** Anomalous behaviour of nitrogen is due to:

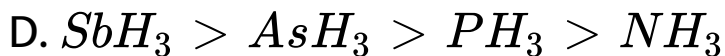
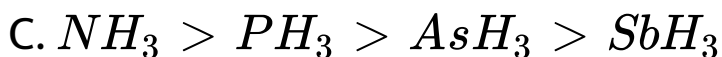
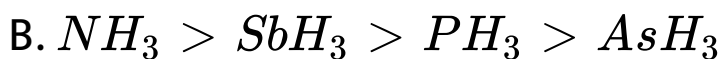
- A. Small size and high electronegativity
- B. Non - availability of d- orbitals in valence shell
- C. Ease of multiple bond formation
- D. All are correct

**Answer:**



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46. The basic character of hydrides of the VB group elements decreases in the order:



**Answer:**



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47. In  $P_4O_{10}$  each 'P' atom is linked with .....

Oxygen atoms

A. 2

B. 3

C. 4

D. 5

**Answer:**



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48. What happens when ammonium chloride is heated with quick lime?



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49. What happens when magnesium nitride is boiled with water ?



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50. Which is the anhydride of  $HNO_3$  ?



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51. Which catalyst is used in the manufacture of ammonia by Haber's process ?



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52. What is the basicity of  $H_3PO_4$  ?



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53. Name the catalyst used in the manufacture of nitric acid by Ostwald process.



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54. Among  $SbH_3$ ,  $PH_3$ ,  $NH_3$  and  $AsH_3$  which is least basic ?



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55. Why  $NCl_5$  is not formed?



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56. Why is  $N_2$  , less reactive at room temperature?



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57. Among  $SbH_3$ ,  $PH_3$  ,  $NH_3$  and  $AsH_3$  which is least acidic?



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58. What happens when  $(NH_4)_2Cr_2O_7$  is heated ?



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59. Which allotrope of phosphorus is more reactive and why?



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60. What is the oxidation number of  $P$  in  $(H_2PO_4)^{1-}$  ?



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61. Why is white phosphorus kept under water ?



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**62.** Which gas is liberated when  $NH_4NO_2$  is heated ?



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**63.** Between nitrogen and phosphorus, which has more catenating property ?



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**64.** Fill in the blanks : With excess of  $Cl_2$  ammonia forms .....



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**65.** Nitrogen does not form pentahalides.  
Why?



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**66.** Fill in the blanks : The formula of acidic nitrogen hydride is .....



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**67.** Fill in the blanks : The P- P-P angle in  $P_4$  molecule is .....



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**68.** Fill in the blanks : ..... Is obtained when white phosphorus is heated with an aqueous solution of  $NaOH$  in an inert atmosphere.



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**69.** Fill in the blanks :  $As_2O_3$  is ..... While  $Sb_2O_3$  is .....



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70. Fill in the blanks : Red phosphorus is ..... reactive than white phosphorus as red phosphorus is and consists of ..... Of  $P_4$  units



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71. Fill in the blanks :  $NH_4NO_2$  on heating gives ..... gas.



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**72.** Fill in the blanks : ..... element of Gr - 15 is the most abundant in earth crust.



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**73.** Fill in the blanks : Aqueous solution of ammonia contains ..... .



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74. Fill in the blanks : The basicity of  $H_3PO_3$  is

.....



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75. Fill in the blanks : The formula of pyrophosphorus acid is .....



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76. Fill in the blanks : In Brown ring test for  $\text{NO}_3^-$  ion,  $\text{Fe}^{2+}$  ion combine with ..... To give a reddish brown coloured complex.



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77. Fill in the blanks :  $\text{NH}_3$  acts as a lewis base due to .....



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**78.** Fill in the blanks : The hydride of Gr 15 element used as refrigerant is .....



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**79.** How does ammonia react with a solution of  $Cu^{2+}$  ?



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**80.** Mention the conditions required to maximise the yield of ammonia.



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**81.** Write the reaction of thermal decomposition of sodium azide.



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82. Why  $PH_3$ , has lower boiling point than  $NH_3$ ?



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83. Why  $NO_2$  dimerise to  $N_2O_4$  ?



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84.  $PCl_5$  exists but  $NCl_5$  does not because,



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**85.** Nitrogen does not form pentahalides.

Why?



**Watch Video Solution**

**86.** Why Bi does not form pentahalide ?



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**87.** Why is  $NH_3$  more basic than  $PH_3$  ?





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**88.** Account for the

Phosphorous shows high tendency for catenation



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**89.** Explain, why stability of +5 oxidation state decreases down the group 15 of the periodic table?





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90. Why is  $H_3PO_3$  dibasic , even though it contains three H-atoms ?



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91. Why does metallic character of Gr 15 elements increases down the group ?



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**92.** On moving down the group, the covalent and ion radii increases with increase in atomic number. Why ?



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**93.** Why does nitrogen exist as a diatomic molecule and is a gas at room temperature ?



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**94.** What happens when aqueous solution of  $NH_3$  reacts with  $AlCl_3$  solution ?



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**95.** What happens when dil  $NH_4OH$  is added to  $AgCl$  precipitate ?



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**96.** What are the favourable conditions for synthesis of  $NH_3$  by Haber's process ?



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**97.** The b.p of hydrides of Group 15 increase regularly as we move from  $PH_3$  to  $BiH_3$  but b.p of  $NH_3$  is higher than those of  $PH_3$  and  $AsH_3$ . Why ?



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98. Explain why the reducing power for the hydrides of Gr-15 increases down the group



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99.  $NF_3$  is stable, but  $NCl_3$ ,  $NBr_3$  and  $NI_3$  are unstable. Why ?



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**100.** What is the action of  $SbCl_3$  and  $NCl_3$  with water ?



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**101.** Why does nitrogen show anomalous behaviour ?



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**102.** What happens when ammonium dichromate is heated ?



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**103.** What is the action of  $N_2$  with calcium carbide ?



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**104.** What happens when  $dilNH_4OH$  is added to  $CrCl_3$  solution ?



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**105.** How is  $NH_3$  converted to urea ?



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**106.** What happens when  $NH_3$  is passed over molten sodium ?



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**107.** What happens when white phosphorus burns in air ?



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**108.** Why is red phosphorous is less than reactive white phosphorous ?



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**109.** Explain, why  $NH_3$  is a complexing agent ?



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**110.** Give one method of preparation of  $NH_3$  in the laboratory. How does  $NH_3$  react with  $CuSO_4$  solution.



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**111.** Give one method of preparation of  $NH_3$  in the laboratory. How does  $NH_3$  react with With less and excess chloride..



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**112.** What are different Oxoacids of phosphorus ?What is the basicity of each one ?



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**113.** How will you prepare phosphorus pentachloride from phosphorus ? Draw its structure ?



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