

# CHEMISTRY

## NCERT - NCERT CHEMISTRY(HINGLISH)

### THE P-BLOCK ELEMENTS

#### Solved Example

1.  $PH_3$  has lower boiling point than  $NH_3$ . Why ?



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2. Write the reaction of the thermal decomposition of sodium azide.



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3. Why does  $NH_3$  act as a Lewis base ?



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4. Why does  $NO_2$  dimerise ?



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5. In what way can it be proved that  $PH_3$  is basic in nature ?



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6. Why  $PCl_3$  fumes in moisture?



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7. Are all the five bonds in  $PCl_5$  molecule equivalent ? Justify your answer.



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8. How do you account for the reducing behaviour of  $H_3PO_2$  on the basis of its structure ?



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9. Elements of group 16 generally show lower value of first ionisation enthalpy as compared to the corresponding periods of group 15. Why ?



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10.  $H_2S$  is less than acidic than  $H_2Te$ . Why ?



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11. Which form of sulphur shows paramagnetic behaviour ?



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12. What happens when

(i) Concentrated  $H_2SO_4$  is added to calcium fluoride.

(ii)  $SO_3$  is passed through water ?



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**13.** Halogens have maximum negative gain enthalpy in the respective periods of the periodic table. Why?



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**14.** Although electron gain enthalpy of fluorine is less negative as compared to chlorine, fluorine is a stronger oxidising agent than chlorine . Why?



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**15.** Fluorine exhibits only-1 oxidation state, whereas other halogens exhibit +1, + 3, + 5, and + 7 oxidation states also. explain.



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**16.** Write the balanced chemical equation for the reaction of  $Cl_2$  with hot and concentrated  $NaOH$ . Is this reaction a disproportionation reaction? Justify







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17. When  $HCl$  reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. why?



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18. Discuss the molecular shape of  $BrF_3$  on the basis of  $VSEPR$  theory.



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**19.** Why are the elements of group 18 known as noble gases?



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**20.** Noble gases have very low boiling points why?



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21. Does the hydrolysis of  $XeF_6$  leads to a redox reaction?



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## Exercise

1. Why are pentahalides of  $P$ ,  $As$ ,  $Sb$  and  $Bi$  are more covalent than trihalides?



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2. Why is  $BiH_3$  the strongest reducing agent amongst all the hydrides of group 15 elements?



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3. Why is  $N_2$  less reactive at room temperature ?



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4. Mention the conditions required to maximise the yield of ammonia.



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



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6. What is the covalence of nitrogen in  $N_2O_5$ ?



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7. Bond angle in  $PH_4^+$  is higher than that in  $PH_3$ . Why?



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8. What happens when white phosphorus is heated with concentrated  $NaOH$  solution in an inert atmosphere of  $CO_2$ ?



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9. What happens when  $PCl_5$  is heated?



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10. Write a balanced equation for the reaction of  $PCl_5$  in heavy water.



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11. What is the basicity of  $H_3PO_4$  ?





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12. What happens when  $H_3PO_3$  is heated.



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13. List the important sources of sulphur.



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14. Write the order of thermal stability of the hydrides of group 16 elements.



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15. Why is  $H_2O$  a liquid and  $H_2S$  a gas?



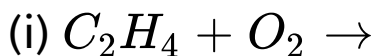
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16. Which of the following does not react with oxygen directly?  $Zn$ ,  $Ti$ ,  $Pt$ ,  $Fe$ .



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17. Complete the following reactions:



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18. Why does  $O_3$  act as a powerful oxidising agent?



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19. How is  $O_3$  estimated quantitatively ?



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20. What happens when sulphur dioxide is passed through an aqueous solution of Fe(III) salt?



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21. Comment on the nature of two S–O bonds formed in  $SO_2$  molecule. Are the two S–O bonds in this molecule equal ?



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22. How is the presence of  $SO_2$  detected?



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23. Mention three areas in which  $H_2SO_4$  plays an important role.



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24. Write the conditions to maximise the yield of  $H_2SO_4$  by contact process.



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25. Why is  $K_{a2} < K_{a1}$  for  $H_2SO_4$  in water ?



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26. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidising power of  $F_2$  and  $Cl_2$



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27. Give two examples to show the anomalous behaviour of fluorine.





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28. Sea is the greatest source of some halogens. Comment.



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29. Give the reason for bleaching action of  $Cl_2$ .



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**30.** Name two poisonous gases which can be prepared from chlorine gas.



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**31.** Why is ICl more reactive than  $I_2$ ?



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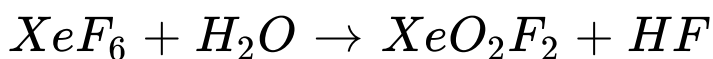
**32.** Why is helium used in diving apparatus?



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**33.** Balance the following equation:



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**34.** Why has it been difficult to study the chemistry of radon?



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**35.** Discuss the general characteristics of Group 15 elements with reference to their electronic configuration, oxidation state, atomic size, ionisation enthalpy and electronegativity.



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**36.** Why does the reactivity of nitrogen differ from phosphorus?



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**37.** Discuss the trends in chemical reactivity of group 15 elements.



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**38.** Why does  $NH_3$  form hydrogen bond but  $PH_3$  does not?



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**39.** How is nitrogen prepared in the laboratory? Write the chemical equations of the reactions involved.



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**40.** How is ammonia manufactured industrially?



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**41.** Illustrate how copper metal can give different product on reaction with  $HNO_3$ .



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**42.** Give the resonating structures of  $NO_2$  and  $N_2O_5$ .



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**43.** The HNH angle value is higher than HPH, HAsH and HSbH angles. Why?



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**44.** Why does  $R_3P = O$  exist but  $R_3N = O$  does not ( $R =$  alkyl group)?



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**45.** Explain why  $NH_3$  is basic while  $BiH_3$  is only feebly basic ?



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**46.** Nitrogen exists as diatomic molecule and phosphorus as  $P_4$ . Why ?



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**47.** Write main differences between the properties of white phosphorus and red phosphorus.



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**48.** Why does nitrogen show catenation properties less than phosphorus.



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49. Give the disproportionation reaction of  $H_3PO_3$ .



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50. Can  $PCl_5$  act as an oxidising as well as a reducing agent? Justify.



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**51.** Justify the placement of O, S, Se, Te and Po in the same group of the periodic table in terms of electronic configuration, oxidation state and hydride formation.



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**52.** Why is dioxygen a gas but sulphur a solid?



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53. Knowing the electron gain enthalpy values for  $O \rightarrow O^{\ominus}$  and  $O \rightarrow O^{2-}$  as  $-141kJmol^{-1}$  and  $+702kJmol^{-1}$  respectively, how can you account for the formation of a large number of oxides having  $O^{2-}$  species and not  $O^{\ominus}$  ?



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54. Which aerosols deplete ozone?



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**55.** Describe the manufacture of  $H_2SO_4$  by contact process?



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**56.** How is  $SO_2$  an air pollutant?



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**57.** Why are halogens strong oxidising agents ?



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**58.** Explain why fluorine forms only one oxoacid, HOF.



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59. Explain why in spite of nearly the same electronegativity, nitrogen forms hydrogen bonding while chlorine does not.



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60. Write two uses of  $ClO_2$ .



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61. Why are halogens coloured?



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62. Write the reactions of  $F_2$  and  $Cl_2$  with water.



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63. How can you prepare  $Cl_2$  from HCl and HCl from  $Cl_2$ ? Write reactions only.



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64. What inspired N. Bartlett for carrying out reaction between Xe and  $PtF_6$ ?



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65. What are the oxidation states of phosphorus in the following:

(i)  $H_3PO_3$  , (ii)  $PCl_3$  , (iii)  $Ca_3P_2$

(iv)  $Na_3PO_4$  , (v)  $POF_3$



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**66.** Write balanced equation for the following:

(i).  $NaCl$  is heated with sulphuric acid in the presence of  $MnO_2$ .

(ii). Chlorine gas is passed into a solution of  $NaI$  in water.



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**67.** How are xenon fluorides  $XeF_2$ ,  $XeF_4$  and  $XeF_6$  obtained?



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68. With what neutral molecule is  $ClO^{\ominus}$  isoelectronic Is that molecule a Lewis Base?



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69. How are  $XeO_3$  and  $XeOF_4$  prepared?



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70. Arrange the following in the order of property indicated for each set:

(i).  $F_2, Cl_2, Br_2, I_2$  — increasing bond dissociation enthalpy.

(ii).  $HF, HCl, HBr, HI$  — increasing acid strength.

(iii).  $NH_3, PH_3, AsH_3, SbH_3, BiH_3$  — increasing base strength.

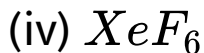
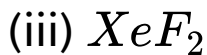


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71. Which one of the following does not exist?

(i)  $XeOF_4$

(ii)  $NeF_2$



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**72.** Give the formula and describe the structure of a noble gas species which is isostructural with:



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**73.** Why do noble gases have comparatively large atomic sizes?



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**74.** List the uses of neon and argon gases.



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