

# CHEMISTRY

## NCERT - NCERT CHEMISTRY(TELUGU)

### THE P-BLOCK ELEMENTS

#### Examples

1. Though nitrogen exhibits +5 oxidation state, it does not form pentahalide. Give reason.



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2.  $PH_3$  has lower boiling point than  $NH_3$ .

Why?



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



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



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5. Why does  $NO_2$  dimerise ?



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



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7. Why does  $PCl_3$  fume in moisture ?



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



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



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



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



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12. Which form of sulphur shows paramagnetism ?



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13. What happens when

(i) Concentrated  $H_2SO_4$  is added to calcium

fluoride

(ii)  $SO_3$  is passed through water?



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



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



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**17.** 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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**18.** When HCl reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. Why ?



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**19.** Discuss the molecular shape of  $\text{BrF}_3$  on the basis of VSEPR theory.



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



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21. Noble gases have very low boiling points.

Why ?



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22. Does the hydrolysis of  $\text{XeF}_6$  lead to a redox reaction ?



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**Intext Questions**

1. Why are pentahalides more covalent than trihalides ?



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2. Why is  $\text{BiH}_3$  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  $\text{Cu}^{2+}$  ?



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6. What is the covalence of nitrogen in  $\text{N}_2\text{O}_5$  ?



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7. Bond angle in  $\text{PH}_4^+$  is higher than that in  $\text{PH}_3$ . 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 hydrolytic 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 ?





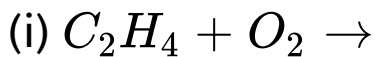
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16. Which of the following does not react with oxygen directly ? Zn, Ti, Pt, Fe.



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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 maximize 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 some poisonous gases which can be prepared from chlorine gas.



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





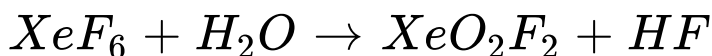
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**32.** Why is helium used in diving apparatus ?



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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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## Exercises

1. Discuss the general characteristics of Group - 15 elements with reference to their electronic configuration, oxidation state, atomic size, ionization enthalpy and electronegativity.



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2. Why does the reactivity of nitrogen differ from phosphorus ?



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3. Discuss the trends in chemical reactivity of group 15 elements



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4.  $NH_3$  forms hydrogen bonds but  $PH_3$  does not - why ?



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5. How is nitrogen prepared in the laboratory ?

Write the chemical equations of the reactions involved.



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6. How is ammonia manufactured by Haber's process ? Explain the reactions of ammonia with



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7. Illustrate how copper metal can give different products on reaction with  $\text{HNO}_3$ .



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8. Give the resonating structures of  $NO_2$  and  $N_2O_5$ .



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9. The HNH angle is higher than  $HPH$ ,  $HAsH$  and  $HSbH$  angles - Why?



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10. Why does  $R_3P = O$  exist but  $R_3B = O$  does not (R = alkyl group) ?



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11. Explain why is  $NH_3$  basic while  $BiH_3$  is only feebly basic.



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



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**13.** Write the difference between the properties of white phosphorus and red phosphorus.



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14. Why does nitrogen show catenation properties less than phosphorus ?



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15. Give the disproportionation reaction of  $H_3PO_3$ .



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



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



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18. Why is dioxygen a gas but sulphur a solid ?



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



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20. Which aerosols deplete ozone?



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21. Describe the manufacture of  $H_2SO_4$  by contact process.



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22. How is  $SO_2$  an air pollutant?



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23. Why are halogens strong oxidising agents?



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24. Explain why fluorine forms only one oxoacid, HOF.



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25. Explain why in spite of nearly the same electronegativity, oxygen forms hydrogen

bonding while chlorine does not.



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**26.** Write two uses of  $ClO_2$ .



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**27.** Why are halogens coloured ?



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



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29. How can you prepare  $Cl_2$  from HCl and HCl from  $Cl_2$  ? Write the reactions.



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



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**31.** What are the oxidation states of phosphorus in the following ?



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**32.** Write balanced equations for the following.



NaCl is heated with Conc. $H_2SO_4$  in the presence of  $MnO_2$ .



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**33.** How are Xenon fluorides  $XeF_2$ ,  $XeF_4$  and  $XeF_6$  obtained ?



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**34.** With which neutral molecule,  $ClO^-$  is isoelectronic ? Is that molecule a Lewis base ?

(Hint : ClF, Yes)



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**35.** How are  $XeO_3$  and  $XeOF_4$  prepared ?



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**36.** Arrange the following in the order of the property indicated for each set.

$F_2, Cl_2, Br_2, I_2$ - increasing bond dissociation enthalpy.



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37. Which of the following does not exist ?

a)  $XeOF_4$  b)  $NeF_2$  c)  $XeF_2$  d)  $XeF_6$



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38. Give the formulae and describe the structures of a noble gas species, isoelectronic with  
with





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



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**40.** List out the uses of Neon.



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