CHEMISTRY

NCERT - NCERT CHEMISTRY(ENGLISH)

THE P-BLOCK ELEMENTS

Solved Example

1. PH_3 has lower boiling point that NH_3. Why ?

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2. (a) Write the reaction of the thermal decomposition of sodium azide.

(b) Why does NH_3 act as a Lewis base ?

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4. (a) Why does NO_2 dimerise ?

(b) 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. (a) Why does PCl_3 fume in moisture ?

(b) Are all the five bonds in PCl_5 molecule equivalent ? Justify your answer.

(c) How do you account for the reducing behaviour of H_3PO_2 on the basic of its structure ?

(d) Give the disproportional reaction of H_3PO_3.

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

(b) H_2S is less than acidic than H_2Te. Why ?

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11. (a) Which form of sulphur shows paramagnetic behaviour ?

(b) Compounds of fluorine and oxygen are called fluorides and not oxides. Explain.

(c) Sulphur disappears when boiled with an aqueous solution of sodium sulphite. Why ?

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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. (a) Halogens have maximum negative gain enthalpy in the respective periods of the periodic table. Why?

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

Fluorine exhibits only-1 oxidation state, wherease other hlaogens exhibit $+1, +3, +5, \text{ and } +7$ oxidation states also. explain.

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

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16. (a) Write the balanced chemical equation for the reaction of Cl_2 with hot and concentrated $NaOH$. Is this reaction a

disproportion reaction?

(b) when HCl reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. why?

Deduce the molecular shape of BrF_3 on the basis of $VSEPR$ theory.

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19. (a)Why are the elements of group 18 known as noble gases?

(b)Noble gases have very low boiling points

why?

(c) Does the hydrolysis of XeF_6 lend in a redox reaction?

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

(b)Draw the structure of white phosphorus

and red phosphorus. Which one of these two types of phosphorus, is more reactive and why ?

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9. What happens when

(A)PCl_5 is heated.

(B)PCl_5 is reacted with heavy water.

(C)H_3PO_3 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

(A)PCl_5 is heated.

(B) PCl_5 is reacted with heavy water.

(C) 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:

(i) $C_2H_4 + O_2 \rightarrow$

(ii) $4Al + 3O_2 \rightarrow$

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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 $K_{a_2} < < K_{a_1}$ 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 behavious 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 ICI 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:

$$XeF_6 + H_2O \rightarrow XeO_2F_2 + HF$$

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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 $R_3P = 0$ exist but $R_3N = 0$ 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 phospghorus and red phosphorus.

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48. Why does nitrogen show catenation properties less than prosphorus.

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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 $-141 kJmol^{-1}$ and $+702 kJmol^{-1}$ 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 inspite 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 HCI 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 Lewise 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 enthaply.

(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?

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72. Draw the molecular structures of the following :

(a) Noble gas species which is isostructural with BrO_3^-

(b) Dibasic oxoacid of phosphorus

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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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