CHEMISTRY

BOOKS - BETTER CHOICE PUBLICATION

THE P-BLOCK ELEMENTS

Question Bank

1. Define inert pair effect.

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2. Unlike In^{+}, Tl^{+} is most stable with respect to disproportionation reaction.

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3. Explain inert pair effect with example.

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4. A mixed oxide of iron and chromium, $FeO.Cr_2O_3$ is fused with sodium carbonate

in the presence of air to form a yellow compound (A). On acidification, the compound (A) forms an orange coloured compound (B) which is a strong oxidising agent. Identify the compounds (A) and (B) .

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5. Bismuth is a strong oxidising agent in the pentavalent state.

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6. Explain why the first elements of a group differ from other elements of its group.

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7. Why does Nitrogen show anomalous behaviour in its group ?

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8. Nitrogen exists as diatomic molecule and phosphorous acts as tetra atomic molecule. Explain.

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

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10. Give reasons for the low reactivity of nitrogen molecule.

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11. Why does NH_3 form hydrogen bond but PH_3 does not?

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12. PH_3 has lower boiling point than NH_3. Why?

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13. Although fluorine is much more electronegative than hydrogen yet the dipole moment of NF3(0.24D) is much lower than that of NH3(1.46D). Explain.

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14. NCl_3 is an endothermic compound while NF_3 is an exothermic compound. explain

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15. Explain some important characteristics of white and yellow phosphorus.

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

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17. Unlike Phosphorus, nitrogen shows little tendency for catenation. Why?

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18. Though nitrogen exhibits + 5 oxidation state, it does not form penta-halide. Given reason.

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19. In the structure of HNO3 molecule, N-O bond (121 pm) is shorter that N-OH bond (140 pm). why?

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20. SF6 molecule is kinetically an inert substance. Explain why?

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21. SF6 is used in high voltage generators and switch gears. Why?

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22. Why does ammonia act as a lewis base?

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23. Explain why both N and Bi do not form pentahalides but Phosphorus does?

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24. Give reason to explain +5 oxidation state is less stable than the +3 state in Bismuth.

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25. Write balanced equation when ammonia is dissolved in water.

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26. Describ chemistry of manufacture of ammonia by Haber's process and discuss conditions for good yield of ammonia.

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27. Addition of chlorine to potassium iodide solution gives it a brown colour but excess of chlorine turns it colourless. Why?

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28. Draw flow chart for Haber's process fore the manufacture of ammonia.

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29. Explain Ostwald process for manufacturing nitric acid. Draw structure of nitric acid and write its uses also.

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30. Illustrate how copper metal can give different products on reaction with HNO_3.

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31. Why does NO_2 dimerise ?

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32. What is the covalence of nitrogen in N_2O_5 ?

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33. Why does nitric oxide become broen when released inn air?

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34. Ionic solids conduct electricity in the molten state but not in the solid state. Explain.

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35. Which gas is evolved when concentrated HCl is added to powdered potassium dichromate. On passing the evolved gas

through acidified KBr solution, the solution turns brown. Write the balanced equations for the reactions involved.

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36. Explain the difference in the structures of white and red phosphorus.

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37. Draw the structure of P_4O_{10}.

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

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39. Explain why orthophosphorus acid, H_3PO_3 is diprotic .

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

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41. Why the basicity of all the acids of phosphorus is different?

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42. Give the structure and basicity of H_3PO_4.

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43. All the five bonds in PCl_5 are not equivalent justify.

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44. Draw the structure of PCl_3.

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45. Why are pentahalides more covalent than trihalides ?

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46. Why does NO_2 dimerise ?

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47. Write two reactions of HNO_3 with non-metals to show the oxidising character.

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48. Explain the acidic character of Perchloric acid compared to sulphuric acid.

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49. Why white phosphorus is more reactive than red phosphorus?

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50. What happens when ammonium nitrate is heated ?

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51. What is laughing gas ?

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52. Account for the following: The +2 oxidation state of lead is more stable than +2 oxidation

state of Tin.

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53. Inert pair effect strongly exists in heavy p-block elements. Comment.

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

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55. write the chemical equatikons when Ammonia reacts with aqueous $FeCl_3$.

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56. Write the chemical equations when Ammonia reacts with aqueous $AlCl_3$.

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57. Write the chemical equations when Ammonia reacts with aqueous $CrCl_3$.

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58. Write the chemical equations when Zinc reacts with dilute HNO_3.

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59. Write the chemical equations when Zinc reacts with dilute HNO_3.

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60. Write the chemical equations when: Zinc reacts with cone. HNO_3

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61. PCl_5 is known but $PI5$ is not known. Why?

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62. $NCl_3 is readily hydrolysed whi \leq$ NF_3` does not. Explain.

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63. NH_3 is a strong base but NF_3 does not show any basic property. Why?

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64. Why nitric acid acts on oxidising agent ? How it oxdises Sulphur to sulphuric acid.

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65. Why nitric acid acts as an oxididing agent? How it oxidises: Ferrous Sulphate to Ferric sulphate acid.

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66. Discuss abnormal behaviour of oxygen.

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67. Why water is a liquid and hydrogen sulphide is a gas?

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68. Sulphur show +4 and +6 oxidation stae in their compounds but oxygen can not show

these oxidation states.

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69. Why SF_6 is known but OF_6 is not known

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70. Explain why H_2O is a liquid butH_2S is a gas at room temperature.

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71. How aerosols are depleting ozone layer?

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72. Why is H_2S less acidic than H_2 Te ?

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73. Why H_2S is acidic wliile H_2O is nentral ?

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74. Why is H_2S less acidic than H_2 Te ?

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75. What is the oxidation state of phosphorus in H_3PO_3 , Ca_3P_2 , Na_3PO_4 and POF_3

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76. Sulphur exhibits greater tendency for catenation than seleniun. Explain why?

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77. 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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78. Oxygen gas is inert at room temperature why?

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79. Give two methods of preparation of dioxygen in laboratory and give its uses ?

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80. Discuss the preparation of ozone by Sieman's Ozoniser.

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81. Write two uses of ozone.

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82. Why does O_3 act as a powerful oxidising agent ?

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83. What is the role of SO_2 in air pollution?

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84. How will ozone oxidise the following : Potassium nitrite to potassium nitrate.

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85. What will be the oxidation number of S in SO_2Cl_2 and of P in Ca_3P_2?

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86. How will ozone oxidise the following : Potassium manganate to potassium per manganate.

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87. How does fluorine and chlorine react with water. Only write chemical reactions.

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88. How does O_3 oxidises the Acidified ferrous sulphate to fertic sulphate .

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89. What is tailing of mercury ?

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90. How ozone reacts with mercury.

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91. Discuss the shape of SF_6

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92. Discuss the shape of SF_4?

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93. SF_6 is known but SCl_6 is not known. Explain.

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94. Sulphur hexafluoride is used as a gaseous electrical insulator. Explain.

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95. SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed. Why ?

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96. Why SF_6 in inert towards hydrolysis ?

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97. Why is SF_6 much less reactive than SF_4 ?

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98. Why SF_6 is known but SH_6 is not known ?

Watch Video Solution

99. Which form of sulphur shows paramagnetic behaviour and why ?

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100. Why does sulphur in vapour state exhibit paramagnetic character ?

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101. Explain that SO_2 can act as an oxidising agent as well as a reducing agent, but SO_3 can act as an oxidising agent only.

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102. Explain that SO_2 can act as an oxidising agent as well as a reducing agent, but SO_3 can act as an oxidising agent only.

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103. SO_2 act as both oxidising and reducing agent but H_2S acts as only reducing agent. Why ?

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104. Comment on nature of two S-O bond formed in SO_2 molecule. Are the two S-O bonds in this molecule equal ?

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105. SO_2 has acidic character. Explain.

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106. Write the reaction of SO_2 with Cl_2

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107. Write the reaction of SO_2 with Cl_2

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108. Give the oxidation of Na_2SO_3 by acidified $KMnO_4$.

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109. Give the formula and structures of different oxo-acids of sulphur ?

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110. Describe the manufacture of H_2SO_4 by contact process?

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111. Explain the manufacture of sulphuric acid by contact process.

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112. Write the conditions for maximum yield of H_2SO_4 by contact process.

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113. Give an example of a reaction in which H_2SO_4 behaves as a strong acid .

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114. Give an example of a reaction in which H_2SO_4 behaves as a dehydrating agent

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115. Give an example of a reaction in which H_2SO_4 behaves as an oxidising agent.

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116. Describe the commerical uses of sulphuric acid.

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117. Mention three areas in which H_2SO_4 plays an important role.

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118. Why conc. H_2SO_4 is viscous and has high boiling point ?

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119. Why is $K_{a_2} << k_{a_1}$ for H_2SO_4 in water?

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120. Why conc. sulphuric acid is always diluted by adding sulphuric acid to water with constant stirring and not water to the acid ?

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121. Write the chemical equation when: Oxalic and reacts with concentrated H_2SO_4.

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122. Write the chemical equation when: Formic acid reacts with concentrated H_2SO_4.

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123. Write the chemical equations when: Sugar reacts with conc. H_2SO_4.

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124. SO_3 has zero dipole moment. Why ?

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125. Why does fluoriue show anomalous behaviour in its group ?

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126. Why are halogens most reactive ?

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127. Explain why Bond dissociation energy of F_2 is less than that of Cl_2 ?

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128. Explain why

F-F bond in fluorine is weaker than Cl-Cl bond in chlorine ?

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129. Explain the following :

HF is a weaker acid than HI.

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130. Explain the following :

Iodine is more soluble in KI solution than in water.

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131. Explain the following :

Fluorine does not show positive oxidation state.

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132. Explain the following :

Iodine forms I_3^- but F_2 does not form F_3^- ion. Why?

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133. Explain: Electron gain enthalpy of chlorine is more negative than fluorine.

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134. Why electron affinity of fluorine is less than that of chlorine ?

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135. Boiling point of HCI is lower than HF . Explain why?

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136. Why are halogens coloured ?

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137. Halogens have maximum negative electron gain enthalpy in the respective

periods of the periodic table. Why ?

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138. Electron gain enthalpy of chlorine is more negative as compared to fluorine.

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139. 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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140. Why is fluorine a very reactive halogen ?

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141. Account for the following: Among the halogens F_2 is the strongest oxidising agent.

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142. Fluorine exhibits only - 1 oxidation state whereas other halogens exhibit positive oxidation states such as +1, +3, +5, +7.

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143. Explain why

Most metal fluoride are ionic in nature than metal chloride.

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144. Explain why

Hydrogen fluoride is a weaker acid than hydrogen chloride in aqueous solution.

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145. Why are halogens strong oxidising agents?

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146. Explain why inspite of nearly the same electronegativity, nitrogen forms hydrogen bonding while chlorine does not.

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147. Write the reactions of F_2 and Cl_2 with water.

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148. Arrange the following in the order of property indicated for each set: F_2, Cl_2, Br_2, I_2 - increasing bond dissociation enthalpy.

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149. Arrange the following in the order of property indicated for each set: $HF, HC1, HBr, HI$ - increasing acid strength.

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150. Write the balanced chemical equation for the reaction of CI_2 with hot and concentrated NaOH. Is this reactiona disporpetination reaction? Justify.

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151. Write the balanced chemical equation for the reaction of CI_2 with hot and concentrated

NaOH. Is this reactiona disporpetination reaction? Justify.

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152. Write the balanced chemical equation for the reaction of CI_2 with hot and concentrated NaOH. Is this reactiona disporpetination reaction? Justify.

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153. Anita coloured $\frac{3}{8}$ of the circle with yellow colour and $\frac{4}{8}$ of the circle with green colour. How much portion of circle did She colour?

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

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155. Give the reason for bleaching action of Cl_2.

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156. Bleaching of flowers by chlorine is permanent while that by sulphur dioxide is temporary. Explain.

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

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158. Write balanced equations for the following: NaCl is heated with sulphuric acid in the presence of MnO_2.

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159. Write balanced equations for the following: Chlorine gas is passed into a solution of Nal in water.

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160. Name the different oxoacids of halogens and draw their structure.

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

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162. Explain why perchloric acid is a strong acid than sulphuric acid.

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163. Arrange $HClO, HBrO$ and HIO in order to decreasing acidic strength giving reasons.

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164. Compare the acidic strength of $HClO_4$, $HClO_3$, $HClO_2$, HClO. Give reasons.

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165. Arrange $HClO_4$, $HClO_3$, $HClO_2$, $HClO$ in order of oxidizing power. Give reasons.

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166. What are interhalogen compounds ? Give example.

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167. What are the interhalogen compounds ?

Why are these more reactive than halogens ?

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168. Why ICI is more reactive than I_2 ?

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169. Why ClF_3 exists, but FCl_3 does not exist

?

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170. Give important properties of magnets.

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171. Discuss the molecular shape of BrF_3 on the basis of VSEPR theory.

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172. Draw the structure of following interhalogen compound.

ClF_3

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173. Draw the structure of following interhalogen compound.

IF_5

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174. Draw the structure of following interhalogen compound.

IF_7

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175. With what neutral molecule is CIO^- isoelectronic? Is that molecule a Lewis base?

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176. What are pseudohalogens ? Give example.

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177. What are freons ?

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178. Why are the elements of Group 18 known as noble gases ?

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179. Why elements of Group 18 are less reactive or inert?

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180. Noble gases have low boiling points. Explain.

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

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182. Why electron gain enthalpies of noble gases are positive ?

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183. Why noble gases have very high values of ionisation enthalpies?

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184. Why is helium placed in p-block elements although its last electron enters in the s-orbital ?

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185. What inspired N. Bartlett,for carrying out the reaction between Xe and PtF_6?

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186. What inspired N. Bartlett,for carrying out the reaction between Xe and PtF_6?

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187. Among noble gases, only Xe is known to form chemical compounds. Why ?

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188. Why do noble gases form compounds with fluorine and oxygen ?

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189. How are Xenon fluorides XeF_2, XeF_4 and XeF_6 prepared ?

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190. Discuss the structure of the XeF_4 on the basis of VSEPR theory.

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191. Discuss the structure of XeF_2 on the basis of VSEPR teory.

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192. How are XeO_3 and $XeOF_4$ prepared?

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193. Discuss the shapes of $XeO_3, XeOF_4, XeOF_2,$ and XeO_2F_2

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194. Discuss the hydrolysis of XeF_3. Does the hydrolysis of XeF_6 lead to a redox reaction ?

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195. Give equation for the following:

$XeF_2 + H_2O \rightarrow$

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196. Give equation for the following:

$XeF_6 + H_2O$

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197. Give equation for the following:

$XeF_2 + PF_5 \rightarrow$

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198. Give equation for the following:

$XeF_6 + NaF \rightarrow$

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199. Give the structure of $XeOF_2$ and state of hybridization of Xe in it.

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200. Why is helium used in diving apparatus?

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201. List the uses of neon and argon gases.

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202. Give uses of argon, helium, neon, xenon and krypton gases.

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203. Give the formula and describe the structure of a noble gas species which is isostructural with: ICI_4^-

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204. Give the formula of the noble gas species which is isostructural with IBr_2^- .

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205. Give the formula of the noble gas species which is isostructural with BrO_3^- .

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