



CHEMISTRY

BOOKS - R G PUBLICATION

THE p-BLOCK ELEMENTS

Exercise

1. Write the chemical equations for the following processes: Chlorine is passed

through hot and concentrated solution of sodium hydroxide.



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2. Write the chemical equations for the following processes: orthophosphorous acid is heated.



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3. Mention two uses of H_2SO_4 .



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4. Answer the following: Why H_2O is a liquid whereas H_2S is gas at room temperature?



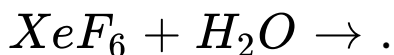
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5. Arrange the hydrides of group 16 in increasing order of acid strength



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6. Complete the following equation:



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7. Give reasons: The bond dissociation energy of F_2 is less than that of Cl_2 .



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8. Given reasons: concentrated nitric acid renders aluminium passive.



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9. Given reasons: draw the structure of $XeOF_4$.



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10. Write the disproportionation reaction of



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11. Answer the following: Ozone acts as a powerful oxidizing agent. Give reason.



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12. Answer the following: Complete the



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13. Answer the following: Which reaction was used by Bartlett to prepare the first noble gas compound?



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14. Answer the following: KHF_2 is known but $KHCl_2$ is not known. Give reason.



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15. Answer the following: Bismuth is a strong oxidizing agent in the pentavalent (O.N. = 5). Give reason.



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16. Arrange the following in increasing order of acid strength: HCl, HI, HBr, HF.



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17. Name the noble gas that forms majority of the known noble gas compounds.



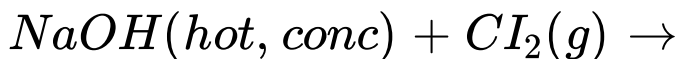
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18. What is the basicity of H_3PO_4 ?



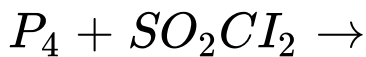
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19. Complete the following reactions:



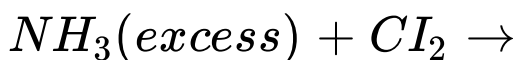
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20. Complete the following reactions:



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21. Complete the following reactions:



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22. Why is N_2 less reactive at room temperature?



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23. Give the structural formula of H_3PO_2





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



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25. Explain why NO_2 dimerises.



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26. Answer the following: Why H_2O is a liquid whereas H_2S is gas at room temperature?



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27. What happens when potassium chlorate is heated with manganese dioxide?



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28. What is Oleum?



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



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30. Why the noble gases have very low boiling points?



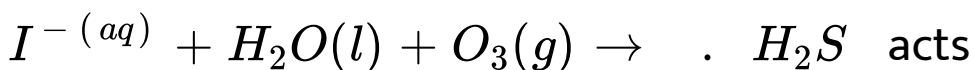
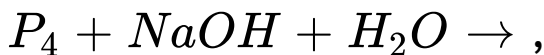
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31. Explain the bleaching action of Cl_2 .



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32. Complete the following chemical reaction equations.



H_2S acts only as reducing agent while SO_2 acts as an oxidising as well as reducing agent. Why?



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33. Complete the following chemical reaction equations: $F_2(g) + H_2O(l) \rightarrow ?$



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34. Complete the following chemical reaction equations: $Ca_3P_2(s) + H_2O(l) \rightarrow ?$



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35. Complete the following chemical reaction equations: $P_4 + NaOH + H_2O \rightarrow ?$



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36. Draw the structure of the following molecules and mention their shapes:

Sulfuric Acid



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37. Copper does not dissolve in HCl while it does dissolve in HNO_3



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38. Copper does not dissolve in HCl while it does dissolve in HNO_3



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39. Define inter halogen compounds?



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40. Write the balanced chemical equation for the reaction between sulphur di oxide and chlo-rine in presence of charcoal as catalyst.



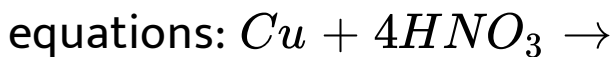
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41. Complete the followign chemcial equations: $2XeF_2 + 2H_2O \rightarrow$



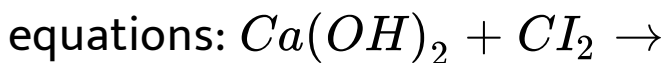
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42. Complete the followign chemcial



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43. Complete the followign chemcial



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44. Nitrogen exists as diatomic molecule and phosphorous as P_4 .



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45. Name a aerosol that depletes ozone.



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46. Account for the following: Halogen are coloured.



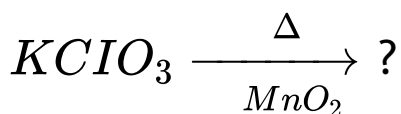
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47. Why the noble gases have very low boiling points?



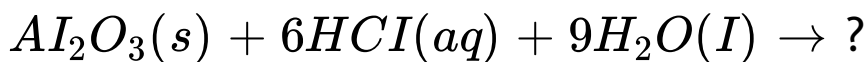
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48. Complete the following chemical equation:



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49. Complete the following chemical equation:



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50. Mention one use each of Argon and Helium gases.



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51. Give reasons for the following: Nitrogen exhibits +5 oxidation state. But it does not form pentahalide.



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52. Give reasons for the following: Sulphur vapour is paramagnetic.



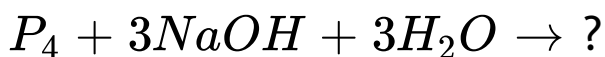
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53. Give reasons for the following: Moist chlorine is powerful bleaching agent.



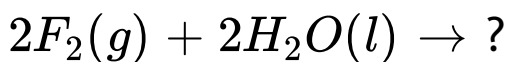
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54. Complete the following reactions:



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55. Complete the following reactions:



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56. Describe the manufacture of ammonia by Haber's process with favourable conditions.



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57. Draw the structure of the following molecules and mention their shapes: XeF_4



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58. Draw the structures of the following molecules: H_3PO_3



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59. Name the catalyst used for conversion of SO_2 to SO_3 in the contact process. How is oleum formed from SO_3 in this process?



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



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61. When HCl reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. Explain, Why?



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62. What are interhalogen compounds? Give a method of preparation of any interhalogen compound.



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63. Give reasons for the following: Bleaching by chlorine is permanent, while that by sulphur dioxide is temporary.



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64. Give reasons for the following: NH_3 acts as a Lewis base.



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65. Give reasons for the following: NO_2 dimerises.



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66. Give reasons for the following: In the reaction between HCl and powdered iron, ferric chloride is not formed.



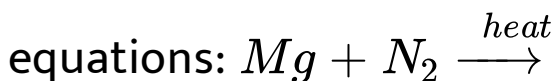
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67. Give a laboratory method of preparation of dinitrogen.



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68. Complete the following chemical



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69. Complete the following chemical equations: $Ba(N_3)_2 \rightarrow \dots + \dots$



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70. Complete the following chemical equations: $(NH_4)_2Cr_2O_7 \xrightarrow{\text{heat}} \dots + \dots$
 H_2O



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71. Why HNO_2 behaves as oxidising as well as reducing agent?



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72. Give chemical equations for the following processes: Decomposition of ozone at 523 K.



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73. Give chemical equations for the following processes: Ozone oxidises lead sulphide to lead sulphate.



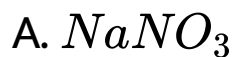
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74. Give chemical equations for the following processes: Ozone reacts with aqueous solution of potassium iodide to liberate iodine.



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75. The formula of Indian Salt petre is

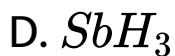
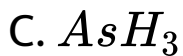


Answer:



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76. The most stable hydride is



Answer:



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77. Maximum covalency of nitrogen is.

A. 3

B. 4

C. 5

D. 7

Answer:



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78. On heating ammonium dichromate, the gas evolved is



Answer:



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79. Nitrogen is relatively inactive element because.

A. Its atom has a stable electronic configuration

B. It has low atomic radius

C. Its electronegativity is fairly high

D. Dissociation energy of its molecule is fairly high

Answer:



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80. The laughing gas

- A. Nitrous oxide
- B. Nitric oxide
- C. Nitrogen trioxide
- D. Nitrogen pentoxide

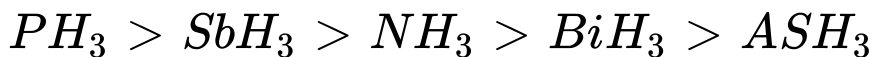
Answer:



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81. Which is the correct order of basicity

A.



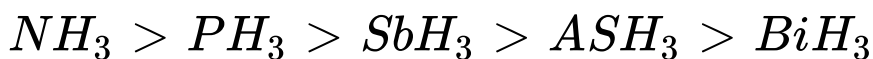
B.



C.



D.

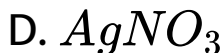
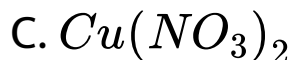
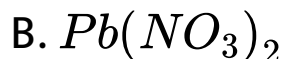


Answer:



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82. By which of the following NO_2 gas cannot be obtained on heating?

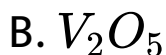


Answer:

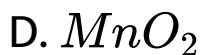


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83. One of the catalysts used in the production of NH_3 is



C. Nitrogen trioxide

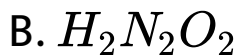
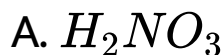


Answer:



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84. The formula of hyponitrous acid is



Answer:

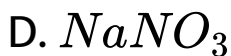


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85. The starting material for the preparation of HNO_3 acid.



C. air



Answer:



86. Brown ring test is used to detect the acid radical.



Answer:



87. The polymeric phosphorus is

A. White phosphorus

B. Red phosphours

C. Black Phosphorus

D. None of the above

Answer:



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88. One mole of Calcium phosphide on reaction with excess of water gives

A. One mole of PH_3

B. Two moles of H_3PO_4

C. Two moles of PH_3

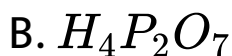
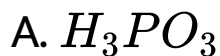
D. One mole of P_2O_5

Answer:



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89. When phosphorus acid is heated with bromine in a sealed tube it produces



Answer:



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90. The formula of ozone is O_3 , it is

A. An allotrope of oxygen

B. Compound of oxygen

C. Isotope of oxygen

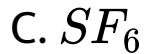
D. None of the above

Answer:



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91. The most stable hydride is



Answer:



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92. Of the following which one is a true peroxide?
ide?

A. PbO

B. Na_2O

C. BaO_2

D. CaO

Answer:



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93. Ozone is prepared by passing silent electric discharge through oxygen. In this reaction.

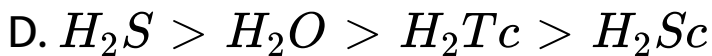
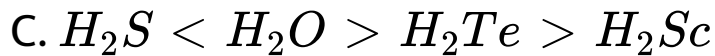
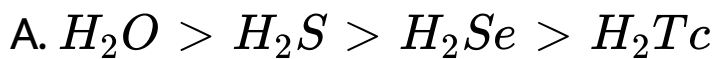
- A. Energy is given out
- B. Energy is absorbed
- C. Oxygen is dissociated into atoms
- D. Oxygen is loaded with energy

Answer:



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94. Group 16 elements form hydrides of the type MH_2 . Their correct stability order is (M- O, S, Se, Te).

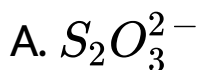


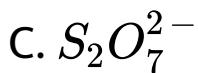
Answer:



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95. There is O-O bond in.



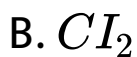


Answer:



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96. An anti-chlor agent is



C. HOCl

D. SO_2

Answer:

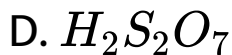
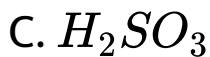


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97. The final product obtained during the manufacture of H_2SO_4 by contact process is.

A. H_2SO_4

B. H_2SO_4



Answer:



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98. Condition for maximum yield of SO_2 gas from oxidation of SO_3 gas is.

A. High temperature and high pressure

B. Low temperature and high pressure

C. Optimum pressure and temperature

D. Pressure of about 2 bar & temperature

Answer:



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99. Oxidising action increase in the following order in halogen family

A. $\text{Cl} < \text{Br} < \text{I} > \text{F}$

B. $\text{Cl} < \text{I} < \text{Br} > \text{F}$

C. $I < F < Cl < Br$

D. $I < Br < Cl < F$

Answer:



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100. Which of the following pairs is not correct

A. A halogen which is liquid at room temperature-Bromine

B. The most electro negative element-

Fluorine

C. The most reactive halogen-Fluorine

D. The strongest oxidizing halogen-Io-dine

Answer:



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101. Fluorine reacts with water to give

A. HF and O₂

B. HF and OF_2

C. HF & O_3

D. HF, O_2 & O_3

Answer:



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102. The highest boiling point liquid is

A. HF

B. HCl

C. HBr

D. HI

Answer:



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103. Oxide of fluorine is called

A. Fluorine Oxide

B. Oxygen Fluoride

C. Di Fluoro oxygen

D. None of the above

Answer:



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104. Why the stability of higher oxidation state of the 14th group elements decrease down the group?



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105. BiH_3 is the strongest reducing agent of group 15 elements. Why?



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



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107. What happens when Barium azide is heated?



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108. A deep blue colour is formed when $CuSO_4$ solution is treated with ammonia solution. What property of ammonia is associated with it. Why deep coloured solution is formed?



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109. Which forms of oxides of nitrogen are para-magnetic?



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110. Aluminium is not dissolved in concentrated HNO_3 solution. Why?



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111. In the brown ring test (for identification of NO_3^-). Write the formula of the brown compound?



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112. Why white phosphorus is less stable than red phosphorus?



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113. Name the gas which is used as smoke screen?



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114. Bond angle in PH_4^+ is higher than that is PH_3 .



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115. In PCl_5 the two axial bonds are longer than equatorial bonds why?



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116. Write the formula of epsom salt.



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117. Thermal stability of H_2S is more than that of H_2Te . Why?



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118. What is amphoteric oxide? Give one example.



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119. What is the transition temperature of conversion of *Alpha*-sulphur into β sulphur and vice versa? Write the common formula of these forms?





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120. Which form of sulphur shows paramagnetic behavior?



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121. Write one chemical test for SO_2 gas.



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122. Negative electron gain enthalpy of fluorine atom is less than that of chlorine atom. Why?



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123. Write two uses of ClO_2 .



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124. Explain why HI is the strongest reducing agent among the halogens?



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125. Explain the bleaching action of Cl_2 .



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126. What is aqua regia?



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127. Why interhalogens are more reactive than halogens?



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128. Write the formula of the first noble gas compound.



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129. In the solid phase of phosphorus penta chlo-ride the structure of cation part is & anion part is.



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130. Why fluorine formes only one oxacid HOF?



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131. Write the structure of ICl_4^-



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132. In which one of the two structures NO_2^+ and NO_2^- the bond angle has a higher value?



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133. Give one chemical reaction to show that all the bonds in PCl_5 molecules are not equivalent?



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134. Ammonia is a good complexing agent.

Why?



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135. SF_6 is used as a gaseous electrical insulator, explain.



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136. Why are elements of 16 group called Chalcogen?



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137. Concentrated nitric acid turns yellow on exposure to sunlight, why?



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138. ClF_3 exists but ClI_3 does not why?



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139. Answer the following: why is helium-oxygen mixture preferred over air for respiration during deep sea diving?



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140. Give one use of ClF_3



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141. Why the N-O bond in NO_2^- is short or than the N-O bond in NO_3^- ?



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142. Both O_2 and F_2 stabilize high oxidation states but the ability of oxygen to stabilize the higher oxidation state exceeds that of fluorine why?



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143. What will happen when: Water solution of phosphine is exposed to light?



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144. What will happen when: Alumina reacts with aqueous solution of sodium hydroxide?



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145. What will happen when: Aque regia reacts with platinum?



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146. "Though size increases rapidly from N to P of group 15th elements but from As to Bi there is small rise in the size of the elements." Comment.



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147. Why does $R_3P = 0$ exist but $R_3N = 0$ does not?



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148. Discuss the acidic characters of oxides of nitrogen and phosphorus.



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149. How pure N_2 gas is prepared in laboratory? Write the necessary equation for the reaction.



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150. Discuss the optimum conditions for the manufacture of ammonia.



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151. How ammonia helps in the detection of metal ions is solution?



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152. What will happen when lead nitrate is strongly heated? Write the necessary reaction.



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153. How nitric acid is prepared by Ostwald method? Write the necessary reactions?



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154. Write two characteristics each from white phosphorus and red phosphorus. How one form can be converted to another?



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155. Write the reaction for the laboratory preparation of phosphine. How phosphine is purified?



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156. What is Holme's signals? Write its use



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157. Bond angle in PH_4^+ is higher than that is PH_3 .



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158. What is the hydridization of phosphorus atom in PCI_3 ?





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159. Give the disproportionation reaction of H_3PO_3 .



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160. Discuss the stability of various oxidation states of element of chalcogen family.



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161. How oxides are classified? Give one example of each oxide.



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162. High concentration of ozone is highly explosive. Why?



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163. Knowing the electron gain enthalpy values for $O \rightarrow O^-$ and $O \rightarrow O^{2-}$ as -141

and 702 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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164. Discuss the role of chemical factors which deplete ozone layer.



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165. Why does O_3 act as a powerful oxidizing agent? How is O_3 estimated quantitatively?



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166. Write two differences between rhombic sulphur and monoclinic sulphur.



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167. Comment on the nature of S-O bonds formed in SO_2 molecule. Are these bond lengths equal in the molecule?



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168. How is SO_2 an air pollutant?



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169. Describe the conditions of maximum yield of SO_3 by contact process in the manufacture of H_2SO_4 .



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170. Write the formula of carnallite and fluoroapptite.



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171. Account for the following: Halogen are coloured.



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172. Why fluorine shows only one oxidation state of (-1)?



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173. Discuss the various factors which affect the decreasing oxidising ability of the halogens in aqueous soln.



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174. How Cl_2 is prepared without heating?
How it is prepared electrolytically.



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175. How gold ornaments are cleaned by aqua regia? Write the reactions involved in it.



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176. Draw the structures of chloric acid & perchloric acid. Which is more acidic and why?



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177. Why the noble gases have very low boiling points?



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178. Why xenon forms compound?



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179. Arrange the following in the order of property indicated:

NH_3 , PH_3 , AsH_3 , SbH_3 , BiH_3



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180. What is the hybridization of Iodine in IF_7 ? Draw Its structure & name it.



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181. List two uses each from neon & argon gases.



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182. What happens when: Magnesium reacts with N_2 & than hydrolysed.



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183. What happens when: Ammonium chloride reacts with slaked lime.



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184. What happens when: Ferric chloride reacts with NH_4OH



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185. What happens when: Silver chloride reacts with aq NH_3



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186. What happens when: Zinc reacts with concentrated HNO_3



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187. What happens when: Iodine reacts with dil HNO_3



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188. What happens when white Phosphorous is heated with NaOH solution in an inert atmosphere of CO_2 ?



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189. What happens when: Mercuric chloride reacts with PH_3



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190. What happens when: PCI_5 is heated strongly?



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191. What happens when: Hydrogen peroxide decomposed in presence of catalyst?



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192. What will happen when: Alumina reacts with aqueous solution of sodium hydroxide?



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193. What happens when: Lead Sulphide reacts with O_3 .



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194. What happens when: Sucrose is treated with concentrated H_2SO_4 .



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195. What happens when: Ammonia reacts with excess Cl_2 gas.



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196. What happens when: Slacked lime reacts with Cl_2 gas.



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197. Sodium sulphite reacts with HCl.



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198. Write the chemical equations for the following processes: Chlorine is passed

through hot and concentrated solution of sodium hydroxide.



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199. Account for the following: PCl_5 behaves as an ionic compound in solid state.



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200. Account for the following: Dioxygen is a gas but sulphur is a solid.



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201. Account for the following: Nobel gases have large positive values of electron gain enthalpy.



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202. Account for the following: Fluorine forms the largest number of interhalogen compounds amongst the halo-gens.



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203. Account for the following: Chlorine water loses its yellow colour on standing.



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204. Account for the following: $BrCl_3$ is more stable than $BrCl_5$.



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205. Account for the following: Fluorine does not form oxoacids.



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206. Account for the following: PCl_3 acts as an oxidizing agent.



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207. Explain the following: Electron gain enthalpy for oxygen is less negative than that

for sulphur.



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208. Answer the following: Bismuth is a strong oxidizing agent in the pentavalent (O.N. = 5).

Give reason.



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209. Explain the following: The HNH bond angle is higher than HPH, HAsH and HSbH

bond angles



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210. Explain why: Water shows unusual behaviour among the hydrides of groups 16th elements.



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211. How will you account for the following:

NCl_3 is readily hydrolysed while NF_3 is not.



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212. How will you account for the following:
Bleaching of flowers by chlorine is permanent while that by sulphur dioxide is temporary?



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213. Explain why NO_2 dimerises.



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214. Explain: $BiCl_3$ is more stable than $BiCl_5$



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215. In going down the group in nitrogen family classify the elements into different categories.



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216. Arrange $HClO_4$, $HClO_3$, $HClO_2$ and $HClO$ in increasing orders of their Acidic strength and oxidising power.



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217. Write the balanced chemical equation for the reaction of Cl_2 with hot and conc $NaOH$ solution. Justify that this reaction is a disproportionation reaction.



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218. Explain the following: SF_6 is kinetically inert.



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219. How will you account for the following:
 NF_3 is an exothermic compound while NCl_3 is an endothermic compound.



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220. Explain the following: HCl is stronger acid than HF.



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221. Arrange the following groups of substances in the order of the property indicated against each group:
 NH_3 , PH_3 , AsH_3 , SbH_3 - increasing order of boiling points.



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222. Arrange the following groups of substances in the order of the property indicated against each group: O,S,Se,Te - increasing order of electron gain enthalpy.



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223. Arrange the following groups of substances in the order of the property indicated against each group: F_2 , Cl_2 , Br_2 , I_2 - increasing order of bond dissociation energy.



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