



CHEMISTRY

BOOKS - OMEGA PUBLICATION

THE P-BLOCK ELEMENTS

Questions

1. How does nitrogen differ in its chemical behaviour from rest of the elements of its group ?



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2. Discuss the anomalous behaviour of nitrogen.



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



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



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5. Phosphorus (P_4) is more reactive than nitrogen (N_2)



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6. Why nitrogen is less reactive?



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7. Why ammonia is a good complexing agent?



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8. why ammonia has higher boiling point than phosphine ?



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9. Why ammonia is a stronger base than phosphine?



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10. Explain why NH_3 is basic but BiH_3 is only feebly basic.



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



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12. PCl_5 is known but PI_5 is not known. Why?



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

reason.



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14. CCl_4 is not hydrolysed but $SiCl_4$ can be hydrolysed with water. Why ?



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



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16. How is nitrogen prepared in the laboratory? Write the chemical equations



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17. Give the different uses of dinitrogen.



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18. How is ammonia manufactured industrially?



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19. Explain cause of diagonal relationship.



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20. What are the essential conditions for formation of ammonia by Haber's process/?



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21. Why does nitric oxide become brown when released in air?



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22. What is laughing gas ?



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23. What is laughing gas ?



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24. Describe Ostwald's process for the manufacture of nitric acid. Give important uses of nitric acid.



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25. Explain the structure of nitric acid.



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



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27. Write two reactions of HNO_3 with organic compounds



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28. Define allotropy.



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29. What is ammonia highly soluble in water?



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30. Why is yellow phosphorus kept under water ?



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



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32. Give the different methods of preparation of carbon monoxide.



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33. Give reaction of HNO_3 with following non metals

Sulphur



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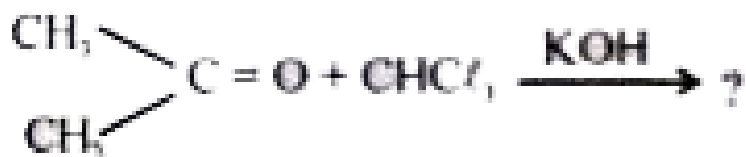
34. Give reaction of HNO_3 with following non metals

Sulphur



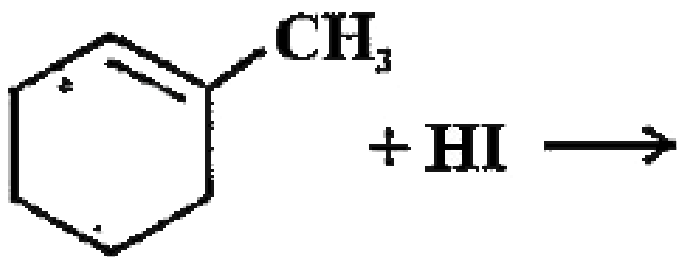
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35. Complete the following reaction :



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36. Complete the following reaction equation :



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37. Give the structure of phosphorus trichloride (PCl_3)



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38. Draw the structure of PCl_3 .



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39. PCl_5 is known but PI_5 is not known. Why?



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



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41. Why all bonds in PCl_5 are not equal?



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42. What is the oxidation state of phosphorous in POF_3 and Ca_3P_2 ?



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43. Define inert pair effect.



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44. How H_3PO_3 is diprotic acid?



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45. Bi (V) is a stronger oxidising agent than Sb (V). Why ?



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46. Which is a stronger reducing agent, SbH_3 or BiH_3 , and why ?



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47. Oxygen gas is inert at room temperature why?



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48. Why oxygen is gas while sulphur is a solid at room temperature ?



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49. (i) why are halogens strong oxidising agents ?

(ii) Why oxygen shows anomalous behaviour from rest of members of its family ?

(iii) Ammonia acts as a good complexing agent. Explain.



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50. The law of multiple proportion is illustrated by the two compounds a) Sulphur

dioxide and Sulphur trioxide :



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51. Sulphur show +4 and +6 oxidation state in their compounds but oxygen can not show these oxidation states.



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52. 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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53. Explain why H_2O is a liquid but H_2S is a gas at room temperature.



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54. Bond angle in $(PH_4)^+$ is higher than that in PH_3 . Why?



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55. Why is H_2S less acidic than H_2Te ?



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56. Which of the two H_2O or H_2S has higher boiling point ? Explain.



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57. Write the order of thermal stability of the hydrides of Group 16 elements.



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58. Why SF_6 is known but OF_6 is not known



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59. OF_6 is not known whereas SF_6 is known.

Explain it.



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60. Discuss the different methods of preparation and properties of dioxygen.



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61. What is the shape of SO_2 molecule ?



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62. SO_2 act as both oxidising and reducing agent but H_2S acts as only reducing agent.

Why ?



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63. 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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64. SO_2 has acidic character. Explain.



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65. How is SO_2 an air pollutant?



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66. The two O-O bond lengths in ozone molecule are identical explain ?



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



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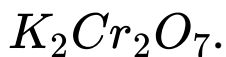
68. Write the reactions of SO_2 with :

$K_2Cr_2O_7$.



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69. Write the reactions of SO_2 with :



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



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71. How does ozone react with KI and lead sulphide ?



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72. How does ozone react with :



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73. How does ozone react with :



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74. How ozone reacts with mercury.



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75. Why ozone is used for purifying air in crowded places such as cinema halls,

underground railway stations, tunnels etc. ?



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



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77. Why does the sun looks red at the time of setting ? Explain on the basis of colloidal properties.



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78. How would you account for the following :
Sulphur has a great tendency for catenation than oxygen.



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79. Give the preparation and properties of sulphur dioxide (SO_2).



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80. what is the contact process for the manufacture of sulphuric acid.



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



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82. 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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83. How charring of sugar happens with conc. sulphuric acid ?



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84. Discuss the structure of sulphuric acid and sulphate ion.



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85. Halogens are highly reactive. Explain.



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86. Why electron affinity of halogens is the highest ?



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



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



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89. Why halogens are coloured gases and they are very reactive ? Comment on it.



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



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91. Why fluorine always exhibits oxidation state of -1 ?



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92. Why are halogens strong oxidising agents?



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93. Which compound of halogens show positive oxidation state and why ?

A. F

B. Cl

C. Br

D. I

Answer:



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



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95. Explain the following :

Iodine is more soluble in KI solution than in water.



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96. Unlike In^+ , Tl^+ is most stable with respect to disproportionation reaction.



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97. Why does F_2 not form polyhalides ?



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98. Boiling point of HCl is lower than HF .

Explain why?



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99. HI is stronger acid than HF. Why ?



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100. Arrange HCl, HI, HBr, HF in increasing order of acidic strength.



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101. HI is the strongest reducing agent than Hf.
Explain.



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102. OF_2 should be called oxygen difluoride and not fluorine oxide. Explain.



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103. Give the preparation of chlorine.



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104. Mention all the oxidation states exhibited by chlorine in its compounds?



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105. Give the structure of various oxoacids of chlorine.



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106. Draw the structure $HCIO_4$.



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



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108. Give the structure of interhalogen compounds on the basis of hybridisation:



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109. Give the structure of interhalogen compounds on the basis of hybridisation:



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110. Calculate the total number of spectral lines in balmer series from $n_1 = 2$ and $n_2 = 5$.



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111. Arrange the following in the decreasing order of their acidic strength and also give reason for it. HF,HBr,HCl



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112. What are interhalogen compounds ? Give example.



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113. What are the interhalogen compounds ?

Why are these more reactive than halogens ?



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114. Why ICl is more reactive than I_2 ?



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115. Draw structure of BrF_3 .



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116. Which neutral molecule is isoelectronic with ClO^- ?



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117. Write two uses of ClO_2 .



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118. Why ClF_3 exists, but FCl_3 does not exist ?



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119. Draw the structure of XeF_2 , and what is the state of hybridisation of Xe in it ?



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120. Calculate the wavelength of an electron moving with a velocity of 2.05 ms^{-1}



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121. Explain why

Most metal fluoride are ionic in nature than metal chloride.



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122. Give the shape of IF_5 .



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123. Draw structure of IF_7 .



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124. Give reasons: SiF_6^{2-} known, out $SiCl_6^{2-}$ is not known.



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



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126. Explain the following :

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



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127. What are pseudohalogens ? Give example.



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128. Explain why transition elements have high melting and boiling points ?



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129. Electron affinity of noble gases is negligible. Explain.





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130. Noble gases have largest radii. Explain.



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131. Why do noble gases exist as monoatomic ?



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132. Why zero group elements are inert ?





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133. Why noble gases are inert or inactive ?



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134. Name the Scientist who prepared the first compound of noble gases.



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



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136. Calculate the total number of spectral lines in Lyman series from $n_1 = 1$ and $n_2 = 4$.



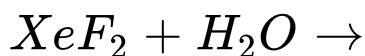
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137. A tennis ball of mass 6.0×10^{-2} kg is moving with a speed of 62 m s^{-1} . Calculate the wavelength associated with this moving tennis ball.



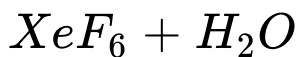
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138. Give equation for the following:



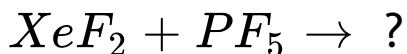
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139. Give equation for the following:



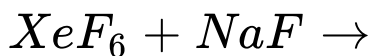
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140. Give equations for the followings:



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141. Give equation for the following:



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



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143. Calculate the mass of a photon of sodium light having wavelength 5894 angstrom and velocity $3 \times 10^8 \text{ ms}^{-1}$.



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144. How would you account for the following :
 SF_6 is kinetically inert.



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145. Two particles A and B are in motion. if the wavelength associated with particle A is $5 \times 10^{-8} \text{m}$. Calculate the wavelength of particle B if its momentum is half of A.



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146. Noble gases are almost inert. Why do they form compounds with fluorine and oxygen only ?



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147. Out of noble gas, only xenon is known to form chemical compound. Explain.



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148. By using VSEPR theory, predict the probable structure of XeF_2 .



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



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150. How are XeO_3 and $XeOF_4$ prepared?



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151. Draw the structure of $XeOF_2$



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



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



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154. Give the formula of the noble gas species which is isostructural with ICl_4^- .



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155. List the uses of neon and argon gases.



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156. Write down the uses of helium



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157. Why is helium used in diving apparatus?



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Multiple Choice Questions

1. Bauxite containing chief impurities of oxides of silicon is called

A. red bauxite

B. white bauxite

C. black bauxite

D. no specific name

Answer: B



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2. Thermite is a mixture of

A. Fe and Al

B. Ferric oxide and aluminium powder

C. barium peroxide and magnesium powder

D. Cu and Al

Answer: B



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3. The first ionisation energy of silicon is lower than that of

A. carbon

B. potassium

C. calcium

D. aluminium

Answer: A



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

A. electronic configuration

B. resonance

C. inert pair effect

D. catenation

Answer: C



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5. Define catenation?

A. formation of cations

B. deposition of cations

C. formation of long chains of similar atoms

D. formation of covalent bonds.

Answer: C



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6. Silicon hydrides are called

A. silanes

B. silicon-nitrogen compound

C. silicides

D. silicates

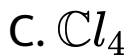
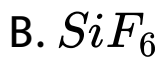
Answer: A



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7. CCl_4 is not hydrolysed but $SiCl_4$ can be hydrolysed with water. Why ?

A. $SiCl_4$



Answer: C



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8. The formula of dry ice is



C. Solid SO_2

D. Solid CO_2

Answer: D



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9. Which of the following is an ore of boron?

A. Dolomite

B. Cinnabar

C. Asbestos

D. Borax

Answer: D



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10. Compounds of Boron with hydrogen are known as

A. Borazoles

B. Borazine

C. Boranes

D. None of the above.

Answer: C



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11. Diborane has

A. Two banana bonds and four terminal bonds

B. Four banana bonds and two terminal bonds

C. Three banana bonds and three terminal bonds

D. None of above.

Answer: A



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12. In B_2H_6 , B-atom is

A. sp^2 hybridised

B. sp^3 hybridised

C. sp-hybridised

D. sp^3d hybridised

Answer: B



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13. Orthoboric acid is

A. H_3BO_3

B. $B(OH)_4$

C. $Na_2B_4O_7$

D. B_2O_3

Answer: A



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14. Boron halides are

A. Arrhenius acids

B. Bronsted acids

C. Lewis acids

D. Not acids but bases

Answer: C



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15. Ammonia is, in general,

A. acidic

B. basic

C. amphoteric

D. all the above.

Answer: B



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16. NH_3 can be prepared by

- A. Dow's process
- B. Haber's process
- C. Ostwald's process
- D. All the above

Answer: B



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17. Boron trioxide can be reduced to boron with

A. C

B. Mg

C. H_2

D. Cu

Answer: B

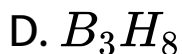
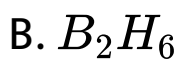
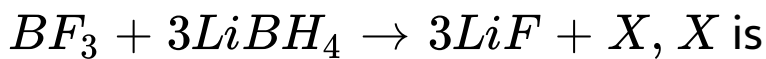


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18.

In

reaction



Answer: B



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19. Graphite is a good conductor of electricity because

- A. there is van der Waals forces between the planes of carbon atoms
- B. there is covalency among carbon atoms
- C. its electrons are delocalised in each layer
- D. the carbon atoms of each plane are sp^2 hybridised.

Answer: C



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20. The laughing gas is

A. Nitrous oxide

B. Nitric oxide

C. Nitrogen trioxide

D. Nitrogen pentaoxide

Answer: A



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21. Which of the following compound is not explosive?



Answer: B



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22. Explain why carbon differs from rest of the family members.

A. larger size and high electronegativity

B. catenation

C. availability of d-orbitals

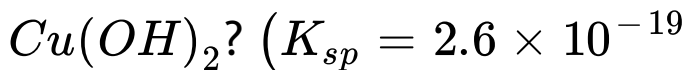
D. low ionization enthalpy

Answer: B



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23. What is the pH of a saturated solution of



A. triacid base

B. tribasic acid

C. diacid base

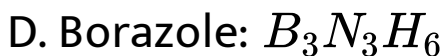
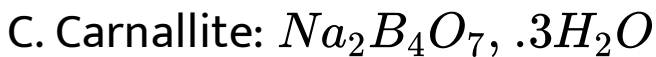
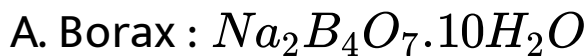
D. monobasic acid

Answer: B



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24. Which is wrongly matched ?



Answer: C



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25. The two O-O bond lengths in ozone molecule are identical explain ?

A. $109^{\circ} 28'$

B. 90°

C. 120°

D. 107°

Answer: D



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26. Which of the following is a Lewis acid ?



Answer: B



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27. In XeF_2 , XeF_4 and XeF_6 the number of lone pairs on Xe is respectively

A. 2, 3, 1

B. 1, 2, 3

C. 4, 1, 2

D. 3, 2, 1

Answer: D



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28. Boron is used as metal borides in nuclear reactor as

- A. fission rods
- B. control rods
- C. coolant
- D. moderator

Answer: B



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29. In diamond, carbon atom is

A. sp hybrid

B. sp^2 hybrid

C. sp^3 hybrid

D. sp^3d hybrid

Answer: C



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30. The purest form of coal is

A. Peat

B. Lignite

C. Bituminous

D. Anthracite

Answer: D



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31. The basicity of phosphorus acid is :

A. two

B. three

C. one

D. zero

Answer: A



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32. The most abundant element in the earth's crust is:

A. Oxygen

B. Aluminium

C. Silicon

D. None of these.

Answer: A



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33. Which of the following element has maximum electron gain enthalpy(negative)? F, Cl, Br, I .

A. F

B. Cl

C. Br

D. I

Answer: B



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34. Which of the following has highest ionisation enthalpy? P , N , As , Sb .

A. P

B. N

C. As

D. Sb

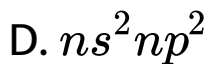
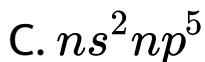
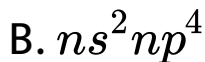
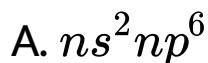
Answer: A



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35. General electronic configuration of element of Group 16

is :



Answer: B



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36. Among the following which is the strongest oxidising agents: Br_2 , I_2 , F_2 , Cl_2 .

A. Br_2

B. I_2

C. Cl_2

D. F_2

Answer: D



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37. Which of the following does not exist?

$XeOF_4$, NeF_2 , XeF_2 , XeF_6 .

A. $XeOF_4$

B. NeF_2

C. XeF_2

D. XeF_6

Answer: B



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38. Ammonia is, in general,

A. acidic

B. basic

C. amphoteric

D. All the above.

Answer: B



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39. What is laughing gas ?

A. nitrous oxide

B. nitric oxide

C. nitrogen trioxide

D. nitrogen pentaoxide

Answer: A



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40. Which of the following compound is explosive?



Answer: B



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41. Hydrogen from HCl can be prepared by

- A. Dow's process
- B. Haber's process
- C. Ostwald's process
- D. All the above.

Answer: B



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42. The bond angle H-N-H in ammonia molecule is

A. $109^{\circ} 28'$

B. 90°

C. 120°

D. 107°

Answer: D



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43. In the structure of ClF_3 , the number of lone pairs of electrons on central Cl atom is :

A. 2, 3, 1

B. 1, 2, 3

C. 4, 1, 2

D. 3, 2, 1

Answer: D



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44. CH_3COCl can be obtained directly by reacting PCl_5 with

A. CaO

B. $CaCO_3$

C. $CaOCl_2$

D. $Ca(OH)_2$

Answer: D



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45. Which of the following is most volatile?

A. HI

B. HBr

C. HCl

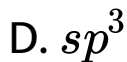
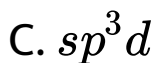
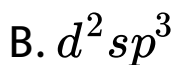
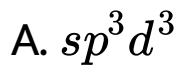
D. HF

Answer: C



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46. The oxidation number of P in $HP_2O_7^-$ ion is



Answer: A



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47. Which acid would you expect to be stronger ?

CH_3COOH or $HCOOH$

A. F-Br

B. F-Cl

C. F-Br

D. Cl - Br.

Answer: A



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48. Maximum covalency of sulphur is :

A. 2

B. 4

C. 6

D. 8

Answer: C



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49. Which of the following element has maximum electron gain enthalpy(negative)? F, Cl, Br, I .

- A. F
- B. Cl
- C. Br
- D. I

Answer: B



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50. Give the structure and basicity of H_3PO_2 .

A. +1

B. +2

C. +3

D. +4

Answer: A



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51. The basicity of phosphorus acid is :

A. Two

B. Three

C. One

D. zero

Answer: A



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