



CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

APPENDIX - INORGANIC VOLUME 1

Exercise

1. What is the basic theme of organisation in the periodic table?



[View Text Solution](#)

2. Which important property did Mendeleev use to classify the elements in his periodic table and did he stick to that?

 [Watch Video Solution](#)

3. What is the basic difference in approach between the Mendeleev's periodic law and the Modern periodic law?

 [Watch Video Solution](#)

4. On the basis of quantum number, which period of the periodic table should have 32 elements.

 [Watch Video Solution](#)

5. In terms of period and group where would you locate the element with $Z = 144$?

 [Watch Video Solution](#)

6. Write the atomic number of the element present in the third period and seventeenth group of the periodic table.

 [Watch Video Solution](#)

7. Which element do you think would have been named by (a) Lawrence Berkeley laboratory and (b) Seaborg's group?

 [Watch Video Solution](#)

8. Why do elements with similar properties occur in the same group?

 [Watch Video Solution](#)

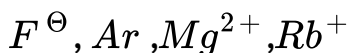
9. What do atomic radius and ionic radius really mean to you?

 [Watch Video Solution](#)

10. How do atomic radii vary (a) down the group and (b) along the period from left to right?

 [Watch Video Solution](#)

11. What do you understand by isoelectronic species? Name a species that will be isoelectronic with each of the following atoms or ions.



 [Watch Video Solution](#)

12. Consider the following species:



a. What is common in them?

b. Arrange them in the order of increasing ionic radii.

 [Watch Video Solution](#)

13. Explain why cations are smaller and anions larger in radii than their parent atoms?

 [Watch Video Solution](#)

14. What is the significance of the terms-'isolated gaseous atom' and 'ground state' while defining the ionisation enthalpy and electron gain enthalpy?

Hint: Requirements for comparison purposes.

 [Watch Video Solution](#)

15. Energy of an electron in the ground state of the hydrogen atom is $-2.18 \times 10^{-18} J$. Calculate the ionisation

enthalpy of atomic hydrogen in terms of kJ mol^{-1} .

Hint: Apply the idea of mole concept to derive the answer.

 [Watch Video Solution](#)

16. Among the second period elements the actual ionisation enthalpies are in the order

$$Li < B < Be < C < O < N < F < Ne.$$

Explain why (a) Be has higher $\Delta_i H$ than B and (b) O has lower $\Delta_i H$ than N and F?

 [Watch Video Solution](#)

17. How would you explain the fact that the first ionisation enthalpy of sodium is lower than that of magnesium but its

second ionisation enthalpy is higher than that of magnesium?

 [Watch Video Solution](#)

18. What are the various factors due to which the ionisation enthalpy of the main group elements tends to decrease down a group?

 [Watch Video Solution](#)

19. The first ionisation enthalpy of group 13 elements are :

Element	Boron	Aluminium	Gallium	Indium	Thallium
Symbol	B	Al	Ga	In	Tl
IE_1 (kJmol^{-1})	801	577	579	558	589

Explain this deviation from the general trend.



[Watch Video Solution](#)

20. Which of the following pairs of elements would have a more negative electron gain enthalpy?

a. *O* or *F*, b. *F* or *Cl*



[Watch Video Solution](#)

21. Would you expect the second electron gain enthalpy of *O* as positive, more negative or less negative than the first?

Justify your answer.



[Watch Video Solution](#)

22. What is the basic difference between the terms electron gain enthalpy and electronegativity?

 [Watch Video Solution](#)

23. How would you react to the statement that the electronegativity of N on Pauling scale is 3.0 in all the nitrogen compounds?

 [Watch Video Solution](#)

24. Describe the theory associated with the radius of an atom as it

a. gains an electron

b. loses an electron



Watch Video Solution

25. Would you expect the first ionisation enthalpies for two isotopes of the same element to be the same or different?

Justify your answer.



Watch Video Solution

26. What are the major differences between metals and non-metals?



Watch Video Solution

27. Use the periodic table to answer the following questions.

- Identify an element with five electrons in the outer subshell.
- Identify an element that would tend to lose two electrons.
- Identify an element that would tend to gain two electrons.
- Identify the group having metal, non-metal, liquid as well as gas at the room temperature.

 [Watch Video Solution](#)

28. The increasing order of reactivity among group 1 elements is $Li < Na < K < Rb < Cs$ whereas that among group 17 elements is $F > Cl > Br > I$. Explain.

 [Watch Video Solution](#)

29. Write the general outer electronic configuration of s - , p - , d - and f - *block* elements.

 [Watch Video Solution](#)

30. Assign the position of the element having outer electronic configuration

a. ns^2np^4 for $n = 3$

b. $(n - 1)d^2ns^2$ for $n = 4$ and

c. $(n - 2)f^7(n - 1)d^1ns^2$ for $n = 6$, in the periodic table.

 [Watch Video Solution](#)

31. The first ($\Delta_i H_1$) and second ($\Delta_i H_2$) ionisation enthalpies (inkJmol^{-1}) and the ($\Delta_{eg} H^\ominus$) electron gain enthalpy (inkJmol^{-1}) of a few elements are given below:

Elements	$(\Delta_i H_1)$	$(\Delta_i H_2)$	$\Delta_{eg} H^\ominus$
<i>I</i>	520	7300	− 60
<i>II</i>	419	3051	− 48
<i>III</i>	1681	3374	− 328
<i>IV</i>	1008	1846	− 295
<i>V</i>	2372	5251	+ 48
<i>VI</i>	738	1451	− 40

Which of the above elements is likely to be

- the least reactive element.
- the most reactive metal.
- the most reactive non-metal.
- the least reactive non-metal.
- the metal which can form a stable binary halide of the formula MX (X=halogen).

f. the metal which can form a predominantly stable covalent halide of the formula MX ($\text{X}=\text{halogen}$).



[Watch Video Solution](#)

32. Predict the formula of the stable binary compounds that would be formed by the combination of the following pairs of elements.

a. Lithium and oxygen

b. Magnesium and nitrogen

c. Aluminium and iodine

d. Silicon and oxygen

e. Phosphorus and fluorine

f. Element 71 and fluorine



[Watch Video Solution](#)

33. In the modern periodic table, the period indicates the value of

a. atomic number

b. atomic mass

c. principal quantum number

d. azimuthal quantum number



Watch Video Solution

34. Which of the following statements related to the modern periodic table is incorrect?

a. The p -block has 6 columns, because a maximum of 6 electrons can occupy all the orbitals in a p -shell.

b. The d -blocks has 8 columns, because a maximum of 8 electrons can occupy all the orbitals in a d -subshell.

c. Each block contains a number of columns equal to the number of electrons that can occupy that subshell.

d. The block indicates value of azimuthal quantum number (l) for the last subshell that received electrons in building up the electronic configuration.

 [Watch Video Solution](#)

35. Anything that influences the valence electrons will affect the chemistry of the element. Which one of the following factors does not affect the valence shell ?

 [Watch Video Solution](#)

36. The size of isoelectronic species F^{\ominus} , Ne , and Na^{\oplus} is affected by

 [Watch Video Solution](#)

37. Which one of the following statements is incorrect in relation to ionisation enthalpy?

 [Watch Video Solution](#)

38. Considering the elements B , Al , Mg and K , the correct order of their metallic character is

 [Watch Video Solution](#)

39. Considering the elements B , C , N , F and Si , the correct order of their non-metallic character is ?

 [Watch Video Solution](#)

40. Considering the elements F, Cl, O and N , the correct order of their chemical reactivity in terms of oxidising property is

a. $F > Cl > O > N$

b. $F > O > Cl > N$

c. $Cl > F > O > N$

d. $O > F > N > Cl$

 [Watch Video Solution](#)

41. Write Lewis dot symbols for atoms of the following elements: Mg , Na , B , O , N , Br .

 [Watch Video Solution](#)

42. Write Lewis symbols for the following atoms and ions:
 S and S^{2-} , Al , and Al^{3+} , H and H^{\ominus}

 [Watch Video Solution](#)

43. Draw the Lewis structures for the following molecules and ions:

H_2S , $SiCl_4$, BeF_2 , CO_3^{2-} , $HCOOH$

 [Watch Video Solution](#)

44. Define octet rule. Write its significance and limitations.

 [Watch Video Solution](#)

45. Write the favourable factors for the formation of ionic bond.

 [Watch Video Solution](#)

46. Discuss the shape of the following molecules using the *VSEPR* model:

$BeCl_2, BCl_3, SiCl_4, AsF_5, H_2S, PH_3$

 [Watch Video Solution](#)

47. Although geometries of NH_3 and H_2O molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss.

 [Watch Video Solution](#)

48. How do you express the bond strength in terms of bond order?

 [Watch Video Solution](#)

49. Define the bond length.

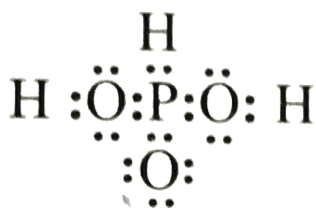
 [Watch Video Solution](#)

50. Explain the structure of CO_3^{2-} ion in terms of resonance

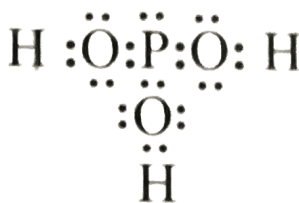
(b) Explain the resonance structures of CO_2 molecule .

 Watch Video Solution

51. H_3PO_3 can be represented by structure (a) and (b) shown below. Can these two structures be taken as the canonical forms of the resonance hybrid representing H_3PO_3 ? If not, give reasons for the same.



(a)



(b)

 Watch Video Solution

52. Write the resonance structures for SO_3 , NO_2 , and NO_3^\ominus .

 [Watch Video Solution](#)

53. Use Lewis symbols to show electron transfer between the following atoms to form cations and anions: (a) K , (b) O and (c) Al and N .

 [Watch Video Solution](#)

54. Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecules is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.

 [Watch Video Solution](#)

55. APPLICATIONS OF DIPOLE MOMENT CONTINUED

 [Watch Video Solution](#)

56. ELECTRONEGATIVITY & ELECTRON GAIN ENTHALPY OF GROUP 17

 [Watch Video Solution](#)

57. Explain with the help of suitable example polar covalent bond.

 [Watch Video Solution](#)

58. Arrange the following in order of decreasing ionic character.

a. ClF_3 , SO_2 , N_2 , K_2O and LiF

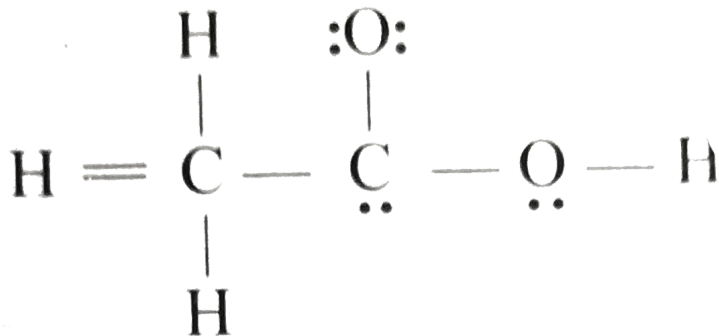
b. $C - H$, $F - H$, $Br - H$, $Na - I$, $K - F$ and $Li - Cl$

c. AlF_3 , $AlCl_3$, $AlBr_3$



Watch Video Solution

59. The skeletal structure of CH_3COOH as shown below is correct, but some of the bonds are shown incorrectly. Write the correct Lewis structure for acetic acid.





Watch Video Solution

60. Apart from tetrahedral geometry, another possible geometry for CH_4 is square planar with the four H atoms at the corners of the square and the C atom at its centre. Explain why CH_4 is not square planar?



Watch Video Solution

61. Explain why BeH_2 molecule has a zero dipole moment although the $Be - H$ bonds are polar?



Watch Video Solution

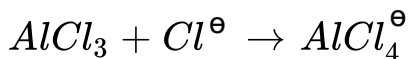
62. Both NF_3 and NH_3 possess tetrahedral geometries but the dipole moment of NF_3 (0.23 Debye) is very low compared with 1.47D for NH_3 . This is because

 [Watch Video Solution](#)

63. What is meant by hybridisation of atomic orbitals? Describe the shape of sp, sp^2, sp^3 hybrid orbitals.

 [Watch Video Solution](#)

64. Describe the change in hybridisation (if any) of the Al atom in the following:

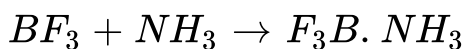


 [Watch Video Solution](#)



Watch Video Solution

65. Is there any change in hybridisation of the B and N atom as a result of the following reaction?



Watch Video Solution

66. Draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C_2H_4 and C_2H_2 molecules.



Watch Video Solution

67. what is the total number of sigma and pi bonds in the following molecules?

a. C_2H_2 , b. C_2H_4

 [Watch Video Solution](#)

68. Considering X axis as the internuclear axis, which out of the following will form a sigma bond

(a) $1s$ and $1s$ (b) $1s$ and $2p_x$

(c) $2p_y$ and $2p_y$ (d) $2p_x$ and $2p_y$

(e) $1s$ and $2s$.`

 [Watch Video Solution](#)

69. Which hybrid orbitals are used by carbon atoms in the following molecules?

(a) $CH_3 - CH_3$, (b) $CH_3 - CH = CH_2$, (c) $CH_3 - CH_2OH$,

(d) $CH_3 - CHO$, (e) $CH_3 - CHO$ (f) CH_3COOH

 [Watch Video Solution](#)

70. What do you understand by bond pairs and lone pairs of electrons? Illustrate by giving one example of each type.

 [Watch Video Solution](#)

71. Distinguish between a sigma and a pi bond.

 [Watch Video Solution](#)

72. Explain the formation of H_2 molecule on the basis of valance bond theory.

 [Watch Video Solution](#)

73. Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals.

 [Watch Video Solution](#)

74. Use molecular orbital theory to explain why the Be_2 molecules do not exist?

 [Watch Video Solution](#)

75. Compare the relative stability of the following species and indicate their magnetic properties:

O_2 , O_2^{\oplus} , O_2^{\ominus} (superoxide), O_2^{-2} (peroxide).

 [Watch Video Solution](#)

76. Write the significance of a plus and a minus sign shown in representing the orbitals.

 [Watch Video Solution](#)

77. Describe the hybridisation in case of PCl_5 . Why are the axial bonds longer as compared to equatorial bonds?

 [Watch Video Solution](#)

78. Define hydrogen bond. Is it weaker or stronger than the van der Waals forces?

 [Watch Video Solution](#)

79. What is meant by the term bond order? Calculate the bond order of N_2, O_2, O_2^\oplus and O_2^\ominus .

 [Watch Video Solution](#)

80. INTRODUCTION OF HYDROGEN & COMPARISON WITH ALKALI METALS

 [Watch Video Solution](#)

81. Write the names of isotopes of hydrogen. What is the mass ratio of these isotopes?

 [Watch Video Solution](#)

82. Why does hydrogen occur in a diatomic form rather than in a monoatomic form under normal conditions?

 [Watch Video Solution](#)

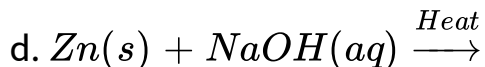
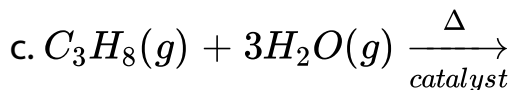
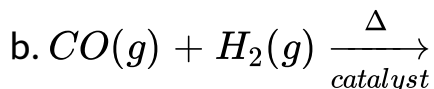
83. How can the production of dihydrogen, obtained from 'Coal gasification', be increased?

 [Watch Video Solution](#)

84. Describe the bulk preparation of dihydrogen by electrolytic method. What is the role of an electrolyte in this process?

 [Watch Video Solution](#)

85. Complete the following reactions:



 [Watch Video Solution](#)

86. Discuss the consequences of high enthalpy of $H - H$ bond in terms of chemical reactivity of dihydrogen.

 [Watch Video Solution](#)

87. What do you understand by (i) electron-deficient, (ii) electron-precise and (iii) electron-rich compounds of hydrogen? Provide justification with suitable examples.

 [Watch Video Solution](#)

88. What characteristics do you expect from an electron-deficient hydride with respect to its structure and chemical reactions?





[Watch Video Solution](#)

89. Do you expect the carbon hydrides of the type (C_nH_{2n+2}) to act as 'Lewis' acid or base? Justify your answer.



[Watch Video Solution](#)

90. What do you understand by the term 'non-stoichiometric hydrides'? Do you expect this type of the hydrides to be formed by alkali metals? Justify your answer.



[View Text Solution](#)

91. How do you expect the metallic hydrides to be useful for hydrogen storage? Explain.

 [Watch Video Solution](#)

92. How does the atomic hydrogen or oxy-hydrogen torch function for cutting and welding purposes? Explain.

 [Watch Video Solution](#)

93. Among NH_3 , H_2O , and HF , which would you expect to have highest magnitude of hydrogen bonding and why?

 [Watch Video Solution](#)

94. Saline hydrides are known to react with water violently producing fire. Can CO_2 a well known fire extinguisher, be used in this case? Explain.

 [Watch Video Solution](#)

95. Arrange the following

a. CaH_2 , BeH_2 and TiH_2 in order of increasing electrical conductance.

b. LiH , NaH and CsH in order of increasing ionic character.

c. $H - H$, $D - D$ and $F - F$ in order of increasing bond dissociation enthalpy.

d. NaH , MgH_2 and H_2O in order of increasing reducing property.

 [View Text Solution](#)

96. Compare the structures of H_2O and H_2O_2 .

 [Watch Video Solution](#)

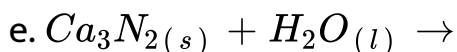
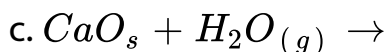
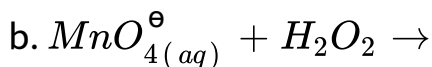
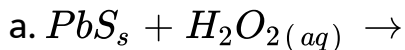
97. What do you understand by the term 'auto-protolysis' of water? What is its significance?

 [Watch Video Solution](#)

98. Consider the reaction of water with F_2 and suggest, in terms of oxidation and reduction, which species are oxidised/reduced.

 [Watch Video Solution](#)

99. Complete the following chemical reactions.



Classify the above into (a) hydrolysis, (b) redox and (c) hydration reactions.

[View Text Solution](#)

100. Permanent Hardness

[Watch Video Solution](#)

101. Write chemical reactions to justify that hydrogen peroxide can function as an oxidising as well as reducing agent.

 [Watch Video Solution](#)

102. Write chemical reactions to justify that hydrogen peroxide can function as an oxidising as well as reducing agent.

 [Watch Video Solution](#)

103. What is meant by 'demineralised water' and how it can be obtained?



[Watch Video Solution](#)

104. Is demineralised or distilled water useful for drinking purpose? If not, how can it be made useful?



[Watch Video Solution](#)

105. Describe the usefulness of water in biosphere and biological systems.



[Watch Video Solution](#)

106. What properties of water make it useful as a solvent? What types of compound can it (i) dissolve and (ii)

hydrolyse?

 [Watch Video Solution](#)

107. Knowing the properties of H_2O and D_2O , do you think that D_2O can be used for drinking purpose?

 [Watch Video Solution](#)

108. What is the difference between hydrolysis and hydration?

 [Watch Video Solution](#)

109. How can saline hydrides remove traces of water from organic compounds?

 [Watch Video Solution](#)

110. What do you expect the nature of hydrides is, it formed by elements of atomic numbers 15, 19, 23 and 44 with dihydrogen? Compare their behaviour towards water.

 [Watch Video Solution](#)

111. Do you expect different products in solution when aluminium (III) chloride and potassium chloride treated

separately with (a) normal water, (b) acidified water and (c) alkaline water? Write equations wherever necessary.

 [Watch Video Solution](#)

112. How does H_2O_2 behave as a bleaching agent?

 [Watch Video Solution](#)

113. What do you understand by the terms:

(a) hydrogen economy reaction, (b) hydrogenation, (c) 'syngas', (d) water gets shift reaction and (e) fuel cell?

 [View Text Solution](#)

114. What are the common physical and chemical features of alkali metals?

 [Watch Video Solution](#)

115. Discuss the general characteristics and gradation in properties of alkaline earth metals.

 [Watch Video Solution](#)

116. Why are alkali metals not found in nature?

 [Watch Video Solution](#)

117. Find out the oxidation state of sodium in Na_2O_2 .

 [Watch Video Solution](#)

118. Explain why is sodium less reactive than potassium.

 [Watch Video Solution](#)

119. Compare the alkali metals and alkaline earth metals with respect to (a) ionisation enthalpy, (b) basicity of oxides and (c) solubility of hydroxides.

 [Watch Video Solution](#)

120. Lithium shows similarities to magnesium in its chemical behaviour because.

 [Watch Video Solution](#)

121. Explain why can alkali and alkaline earth metals not be obtained by chemical reduction methods?

 [Watch Video Solution](#)

122. Why are potassium and caesium, rather lithium used in photoelectric cells?

 [Watch Video Solution](#)

123. When an alkali metal dissolves in liquid ammonia the solution can acquire different colours. Explain the reasons for this type of colour change.

 [Watch Video Solution](#)

124. Beryllium and magnesium do not give colour to flame whereas other alkaline earth metals do so. Why?

 [Watch Video Solution](#)

125. How sodium carbonate is manufactured by the Solvay process ? State the principles involved.

 [Watch Video Solution](#)

126. Why potassium carbonate (K_2CO_3) cannot be prepared by Solvay-ammonia process ?

 [Watch Video Solution](#)

127. Why is Li_2CO_3 decomposed at a lower temperature whereas Na_2CO_3 at higher temperature?

 [Watch Video Solution](#)

128. Starting with sodium chloride how would you proceed to prepare:

(a) sodium metal

(b) sodium hydroxide

(c) sodium peroxide

 [Watch Video Solution](#)

129. What happens when (a) magnesium is burnt in air, (b) quicklime is heated with silica, (c) chlorine reacts with slaked lime and (d) calcium nitrate is heated?

 [Watch Video Solution](#)

130. Describe two important uses of each of the following:

(a) caustic soda, (b) sodium carbonate and (c) quicklime.

 [Watch Video Solution](#)

131. Draw the structure of (a) $BeCl_2$ (vapour) and (b) $BeCl_2$ (solid).

 [Watch Video Solution](#)

132. The hydroxides and carbonates of sodium and potassium are easily soluble in water while the corresponding salts of magnesium and calcium are sparingly soluble in water. Explain.

 [Watch Video Solution](#)

133. Describe the importance of the following: (a) limestone, (b) cement and (c) plaster of Paris.

 [Watch Video Solution](#)

 [Watch Video Solution](#)

134. Why are lithium salts commonly hydrated and those of the other alkali ions usually anhydrous?

 [Watch Video Solution](#)

135. Why is LiF almost insoluble in water whereas $LiCl$ soluble not only in water but also in acetone?

 [Watch Video Solution](#)

136. Explain the significance of sodium, potassium, magnesium and calcium on biological fluids.

 [Watch Video Solution](#)

137. What happens when

- a. Sodium metal is dropped in water?
- b. Sodium metal is heated in free supply of air?
- c. Sodium peroxide dissolves in water?

 [Watch Video Solution](#)

138. Comment on each of the following observation:

- a. The mobilities of the alkali metal ions in aqueous solution are $Li^{\oplus} < Na^{\oplus} < K^{\oplus} < Rb^{\oplus} < Cs^{\oplus}$.
- b. Lithium is the only alkali metal to form a nitride directly.
- c. E^{\ominus} for $M_{aq}^{2+} + 2e^{-} \rightarrow M_{(s)}$ (where M=Ca,Sr or Ba) is nearly constant.

 [Watch Video Solution](#)

139. State as to why

- A solution of Na_2CO_3 is alkaline?
- Alkali metals are prepared by electrolysis of their fused chlorides?
- Sodium is found to be more useful than potassium?

 [View Text Solution](#)

140. Write balanced equations for reactions between

- Na_2O_2 and water
- KO_2 and water
- Na_2O and CO_2

 [Watch Video Solution](#)

141. How would you explain the following observations?

a. BeO is almost insoluble but $BeSO_4$ is soluble in water.

b. BaO is soluble but $BaSO_4$ is insoluble in water.

c. Lil is more soluble than Kl in ethanol.

 [View Text Solution](#)

142. Which of the alkali metal is having least melting point?

A. Na

B. K

C. Rb

D. Cs

Answer:



Watch Video Solution

143. Which one of the following alkali metals gives hydrated salts?

A. *Li*

B. *Na*

C. *K*

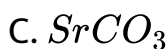
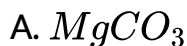
D. *Cs*

Answer:



Watch Video Solution

144. Which one of the alkaline earth metal carbonates is thermally the most stable?



Answer:



[Watch Video Solution](#)

145. Discuss the pattern of variation in the oxidation states of (a) $B \rightarrow TI$ and (b) $C \rightarrow Pb$.



[Watch Video Solution](#)

146. How can you explain higher stability of BCl_3 as compared to $TiCl_3$?

 [Watch Video Solution](#)

147. Why does boron trifluoride behave as a Lewis acid?

 [Watch Video Solution](#)

148. Consider the compounds, BCl_3 and Cl_4 . How will they behave with water? Justify.

 [Watch Video Solution](#)

149. Is boric acid a protic acid? Explain.

 [Watch Video Solution](#)

150. Explain what happens when boric acid is heated.

 [Watch Video Solution](#)

151. Describe the shapes of BF_3 and BH_4^\ominus . Assign the hybridisation of boron in these species.

 [Watch Video Solution](#)

152. Write reaction of justify amphoteric nature of aluminium.

 [Watch Video Solution](#)

153. What are electron-deficient compounds? Are BCl_3 and $SiCl_4$ electron-deficient species? Explain.

 [Watch Video Solution](#)

154. Write the resonance structure of CO_3^{2-} and HCO_3^\ominus .

 [Watch Video Solution](#)

155. What is the state of hybridisation of carbon in (a) CO_3^{2-} , (b) diamond and (c) graphite?

 [Watch Video Solution](#)

156. Rationalise the given statements and give chemical reactions.

- Lead(IV) chloride reacts with Cl_2 to give $PbCl_4$.
- Lead(IV) chloride is highly unstable towards heat.
- Lead is known not to form an iodide, PbI_4 .

 [Watch Video Solution](#)

157. Suggest reasons why the $B-F$ bond length in BF_3 (130 pm) and BF_4^- (143 pm) differ.

 [View Text Solution](#)

158. If $B - Cl$ bond has a dipole moment, explain why BCl_3 molecule has zero dipole moment.

 [Watch Video Solution](#)

159. AlF_3 is insoluble in anhydrous HF but dissolves on addition of NaF . AlF_3 precipitates out of the resulting solution when gaseous BF_3 is bubbled through. Give reasons.





[Watch Video Solution](#)

160. Suggest a reason as to why CO is poisonous.



[Watch Video Solution](#)

161. How is excessive content of CO_2 responsible for global warming?



[Watch Video Solution](#)

162. What happens when

- Borax is heated strongly.
- Boric acid is added to water.

c. Aluminium is treated with dil $NaOH$.

d. BF_3 is reacted with ammonia.



[View Text Solution](#)

163. Explain the following reaction:

a. Silicon is heated with methyl chloride at high temperature in the presence of copper.

b. Silicon dioxide is treated with hydrogen fluoride.

c. CO is heated with ZnO .

d. Hydrated alumina is treated with aqueous $NaOH$ solution.



[View Text Solution](#)

164. Give reasons:

- a. Conc HNO_3 can be transported in aluminium containers.
- b. A mixture of dil $NaOH$ and aluminium pieces is used to open drain. It Brgt
- c. Graphite is used as lubricant.
- d. Diamond is used as an abrasive.
- e. Aluminium alloys are used to make aircraft body.
- f. Aluminium utensils should not be kept in water overnight.
- g. Aluminium wire is used to make transmission cables.

 [View Text Solution](#)

165. Explain why is there a phenomenal decrease in ionisation enthalpy from carbon to silicon?

 [Watch Video Solution](#)

166. How would you explain the lower atomic radii of Ga as compared to Al ?

 [Watch Video Solution](#)

167. ALLOTROPE OF CARBON-INTRO

 [Watch Video Solution](#)

168. a. Classify following oxides as neutral, acidic, basic or amphoteric: CO , B_2O_3 , SiO_2 , CO_2 , Al_2O_3 , PbO_2 , Tl_2O_3 .

b. Write suitable chemical reaction to show their nature.

 [Watch Video Solution](#)

169. In some of the reactions, thallium resembles aluminium whereas in others it resembles with group 1 metals. Support this statement by giving some evidence.



Watch Video Solution

170. The metallic salt (XY) is soluble in water.

(a) When the aqueous soluble of (XY) is treated with $NaOH$ solution, a white precipitate (A) is formed. In excess of $NaOH$ solution, a white precipitate (A) is formed. In excess of $NaOH$ solution, white precipitate (A) dissolves to form a compound (B). When this solution is boiled with solid NH_4Cl , a precipitate of compound (C) is formed.

(b) An aqueous solution on treatment with $BaCl_2$ solution gives a white precipitate (D) which is insoluble in conc HCl .

(c) The metallic salt (XY) forms a double salt (E) with potassium sulphate.

Identify (XY), (A), (B), (C), (D) and (E).

 [Watch Video Solution](#)

171. A certain salt (X) gives the following tests :

(a) Its aqueous solution is alkaline to litmus.

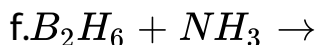
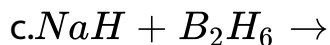
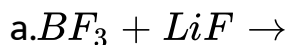
(b) On strong heating. It sweels to give a glassy bead.

(c) When conc H_2SO_4 is added to a hot concentrated solution of (X), white crystals of a weak acid separates out.

Identify (X) and write down the chemical equations for reaction at steps a , b and c .

 [Watch Video Solution](#)

172. Write balanced equations for:



[Watch Video Solution](#)

173. Give one method for industrial preparation and one for laboratory preparation of CO and CO_2 each.



[Watch Video Solution](#)

174. An aqueous solution of borax is

- A. Neutral
- B. Amphoteric
- C. Basic
- D. Acidic

Answer:



[View Text Solution](#)

175. Boric acid is polymeric due to

- A. Its acidic nature
- B. The presence of hydrogen bonding

C. Its monobasic nature

D. Its geometry

Answer:



[Watch Video Solution](#)

176. The types of hybridisation of boron in diborane is

A. sp

B. sp^2

C. sp^3

D. dsp^2

Answer:

 [Watch Video Solution](#)

177. Assertion: Buckminsterfullerene is the purest isomeric form of carbon.

Graphite is thermodynamically most stable allotrope of carbon.

A. Diamond

B. Graphite

C. Fullerene

D. Coal

Answer:

 [Watch Video Solution](#)

178. Elements of group 14

- A. Exhibit oxidation state of +4 only
- B. Exhibit oxidation state of +2 and +4
- C. Form M^{2+} and M^{4+} ions
- D. Form M^{3+} and M^{4+} ions

Answer:

 [Watch Video Solution](#)

179. If the starting material for the manufacture of silicone is $RSiCl_3$, write the structure of the product formed.

 [Watch Video Solution](#)

180. Why trihalides of group 13 elements fume in moist air?

 [Watch Video Solution](#)

181. Why boron forms electron deficient compounds?

 [Watch Video Solution](#)

182. Which element among group 13 has the highest ionisation enthalpy?

 [Watch Video Solution](#)

183. Name the group 13 element which forms most stable compounds in +1 oxidation state.

 [Watch Video Solution](#)

184. Name the most abundant metal in the earth's crust. To which group does it belong?

 [Watch Video Solution](#)

185. Name the elements of group 13 which form amphoteric hydroxides.

 [Watch Video Solution](#)

186. Name the metal which is commonly used as a reducing agent in metallurgical operations.

 [Watch Video Solution](#)

187. What is the valence shell electronic configuration of group 13 elements?

 [Watch Video Solution](#)

188. What is Tincal?

 [Watch Video Solution](#)

189. Name the two metals present in common alum.

 [Watch Video Solution](#)


190. Give the formula of inorganic benzene?

 [Watch Video Solution](#)

191. What is thermite mixture?

 [Watch Video Solution](#)

192. Give the name of compound of aluminium which is used as germicide and coagulant in the purification of water.



 [Watch Video Solution](#)

193. What is the oxidation state of *Ga* in $GaCl_2$?

 [Watch Video Solution](#)

194. Why $[BF_6]^{2-}$ ion does not exist?

 [Watch Video Solution](#)

195. What are the basic units in the structure of orthoboric acid? How are they linked?

 [Watch Video Solution](#)

196. What is silver paint?

 [Watch Video Solution](#)

197. Name the element of group 13 which only forms covalent compounds.

 [Watch Video Solution](#)

198. Why aluminium shows a higher covalency than boron?

 [Watch Video Solution](#)

199. Which oxide of carbon is an anhydride of carbonic acid?





[Watch Video Solution](#)

200. What happens when borax solution is acidified?



[Watch Video Solution](#)

201. With the help of a balanced chemical equation show how $B(OH)_3$ behaves as an acid in water.



[Watch Video Solution](#)

202. What happens when boric acid is heated?



[Watch Video Solution](#)

203. How does electron deficient compound BF_3 achieve electron saturation, i.e. fully occupied outer electronic shells?

 [Watch Video Solution](#)

204. Why the element of second period shows a number of difference in properties from other members of their respective families?

 [Watch Video Solution](#)

205. Why do boron halides form addition compound with ammonia?

 [Watch Video Solution](#)

206. What are boranes?

 [Watch Video Solution](#)

207. To which block of the periodic table group 13 belongs. What is the general outer electronic configuration of this group?

 [Watch Video Solution](#)

208. What is the general valence shell electronic configuration of group 14 elements?

 [Watch Video Solution](#)

209. Out of CCl_4 and $SiCl_4$, which one react with water.

 [Watch Video Solution](#)

210. Explain why silicon shows a higher covalency than carbon.

 [Watch Video Solution](#)

211. Why is diamond a bad conductor of electricity but a good conductor of heat?

 [Watch Video Solution](#)

212. What is the correct structural formula of borax?

 [Watch Video Solution](#)

213. What is dry ice? Why is it so called?

 [Watch Video Solution](#)

214. What is catenation?

 [Watch Video Solution](#)

215. What is water gas? How it is prepared?

 [Watch Video Solution](#)

216. Which of two elements, carbon and silicon form multiple bonds?

 [Watch Video Solution](#)

217. Mention an industrial application of silicones.

 [Watch Video Solution](#)

218. What is the basic building unit of silicones?

 [Watch Video Solution](#)

219. Name three allotropic forms of carbon. Which one is a good conductor of electricity?

 [Watch Video Solution](#)

220. What is the name of recently discovered allotropes of carbon?

 [Watch Video Solution](#)

221. Which isotope of carbon is radioactive?

 [Watch Video Solution](#)

222. The soldiers of Napoleon army while at Alps during freezing winter suffered a serious problem with regard to the tin buttons of their uniform. White metallic tin buttons get converted to grey powder. This transformation is relate to

 [Watch Video Solution](#)

223. Why is not sulphuric acid used for the preparation of CO_2 from marble chips?

 [Watch Video Solution](#)

224. Why is Al_2O_3 amphoteric oxide?

 [Watch Video Solution](#)

 [Watch Video Solution](#)

225. Why is borazole called inorganic benzene?

 [Watch Video Solution](#)

226. Which of the following reactions of Al is known as the thermite reaction?

 [Watch Video Solution](#)

227. The Lewis acid character of boron trihalides decreases as: $BBr_3 > BCl_3 > BF_3$. Explain ?

 [Watch Video Solution](#)

228. Why is BF_3 a Lewis acid?

 [Watch Video Solution](#)

229. How many sigma and pi bonds are present in borazole?

 [Watch Video Solution](#)

230. There are two H -bridge bonds in diborane molecule because there are

 [Watch Video Solution](#)

231. Why aluminium does not react with dil H_2SO_4 ?

 [Watch Video Solution](#)

232. What type of bonding is there in aqueous aluminium chloride?

 [Watch Video Solution](#)

233. What is the purpose of using alum in dyeing of cloth?

 [Watch Video Solution](#)

234. What is the number of hydrogen atoms bridging the boron atoms in diborane?

 [Watch Video Solution](#)

235. Why boron forms electron deficient compounds?

 [Watch Video Solution](#)

236. Name three important amorphous forms of silica.

 [Watch Video Solution](#)

237. Name three important crystalline forms of silica.

 [Watch Video Solution](#)

238. HNO_3 has no action of aluminium, whether it is dilute or concentrated?

 [View Text Solution](#)

239. Name the following boric acids:

a. H_3BO_3 or $B_2O_3 \cdot 3H_2O$

b. HBO_2 or $B_2O_3 \cdot H_2O$

c. $H_2B_4O_7$ or $2B_2O_3 \cdot H_2O$

d. $H_6B_4O_9$ or $2B_2O_3 \cdot 3H_2O$

 [Watch Video Solution](#)

240. Why is CO combustible and CO_2 non-combustible?



 [Watch Video Solution](#)

241. Pure silicon and germanium are

 [Watch Video Solution](#)

242. Why is the melting point of diamond high, in spite of the fact that it is covalent in nature?

 [View Text Solution](#)

243. Why carbon exists as the hardest crystalline solid, though it is a non metal?

 [Watch Video Solution](#)

244. Why is $C - C$ bond length in graphite shorter than in $C - C$ bond length in diamond?

 [Watch Video Solution](#)

245. What is mononuclear metal carbonyl?

 [Watch Video Solution](#)

246. Tin gives sulphates and nitrates, but silicon does not. Why?

 [Watch Video Solution](#)

Exercise Very Short

1. What is the basis of long form of periodic table?

 [Watch Video Solution](#)

2. State Dobereiner law of triads giving examples.

 [Watch Video Solution](#)

3. What is meant by Newlands law of octaves?

 [Watch Video Solution](#)

4. State Mendeleev's periodic law.

 [Watch Video Solution](#)

5. What is meant by periodicity of properties?

 [Watch Video Solution](#)

6. Why do elements with similar properties occur in the same group?

 [Watch Video Solution](#)

7. State Modern periodic law.

 [Watch Video Solution](#)

8. Periodic Law And Intro To Periods And Groups

 [Watch Video Solution](#)

9. How many groups and how many periods are there is long form of periodic table?

 [Watch Video Solution](#)

10. With which quantum number every period in periodic table begins?

 [Watch Video Solution](#)

11. What are s – block elements?

 [Watch Video Solution](#)

12. Give general electronic configuration of s – block elements.

 [Watch Video Solution](#)

13. What are p -block elements? Give their general electronic configuration.

 [Watch Video Solution](#)

14. What are representative elements?

 [Watch Video Solution](#)

15. What are *d*-block elements? Why are they called transition metals?

 [Watch Video Solution](#)

16. Give general electronic configuration of *d*-block elements.

 [Watch Video Solution](#)

17. To which series man-made elements belong?

 [Watch Video Solution](#)

[Watch Video Solution](#)

18. What is meant by lanthanides and actinides?

 [Watch Video Solution](#)

19. Which of lanthanides is man-made element?

 [Watch Video Solution](#)

20. What are inner transition metals? Why are they called rare earth metals?

 [Watch Video Solution](#)

21. Give general electronic configuration of f -block elements.

 [Watch Video Solution](#)

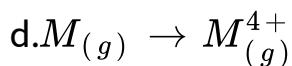
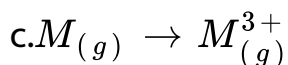
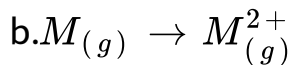
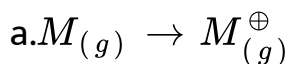
22. Which orbitals are filled with electrons in $3rd$ period?

 [Watch Video Solution](#)

23. Give general electronic configuration of least reactive group. Why are they least reactive?

 [Watch Video Solution](#)

24. Which of the following requires highest energy:



 [Watch Video Solution](#)

25. How do atomic radii vary (a) down the group and (b) along the period from left to right?

 [Watch Video Solution](#)

26. Define (a) ionic radii and (b) covalent radii.



 [Watch Video Solution](#)

27. Why do noble gases have bigger atomic size than halogens?

 [Watch Video Solution](#)

28. Define ionisation energy.

 [Watch Video Solution](#)

29. How does ionisation energy vary (a) down the group and (b) along the period from left to right?

 [Watch Video Solution](#)

30. A and B belong to same group of periodic table. A has higher atomic number than B . Which will have lower ionisation energy and why?

 [Watch Video Solution](#)

31. The problem of position of isotopes in the periodic table was avoided by arranging elements in ascending order of _____.

 [Watch Video Solution](#)

32. Two different elements may have same mass number but not the same _____.

 [Watch Video Solution](#)

 [Watch Video Solution](#)

33. When compared to lithium, it is easier to remove valence electron from K (potassium) because potassium has lower _____.

 [Watch Video Solution](#)

34. Chlorine has _____ electron affinity than fluorine.

 [Watch Video Solution](#)

35. Among (the non-radioactive) halogens the element that has the lowest electron affinity is _____.

 [Watch Video Solution](#)

36. Name the radioactive element of group 17 _____ and group 18 _____.

 [Watch Video Solution](#)

37. Among Li, Na, K, Rb, Cs , the element with the lowest ionisation energy is _____.

 [Watch Video Solution](#)

38. Electron Gain Enthalpy

 [Watch Video Solution](#)

39. Generally electron gain enthalpy _____ on going down a group, and _____ on going across the period from left to right.

 [Watch Video Solution](#)

40. Why is the second electron gain enthalpy negative (i.e. energy is absorbed)?

 [Watch Video Solution](#)

41. Why fluorine has lesser electron gain enthalpy than chlorine?

 [Watch Video Solution](#)

42. Isoelectronic species have the same number of _____.

 [Watch Video Solution](#)

43. Lanthanides and actinides belong to _____ block of the periodic table.

 [Watch Video Solution](#)

44. Generally, the atomic size along a period gradually decreases due to increase in _____.

 [Watch Video Solution](#)

45. The formula for fluoride of carbon is _____.

 [Watch Video Solution](#)

46. The solubility of alkali metal carbonate _____ as one goes down the group.

 [Watch Video Solution](#)

47. The electronic configuration of Re^{3+} is $(Xe)4f^{14}5d^4$, the number of unpaired electrons in this ion is _____.

 [Watch Video Solution](#)

48. Lothar Meyer attempts to classify the elements by plotting graph between _____ and _____.

 [Watch Video Solution](#)

49. Second period ends with _____.

 [Watch Video Solution](#)

50. The first transition series is called _____ transition series.

 [Watch Video Solution](#)

51. Why do alkali metals have lowest ionisation energy?

 [Watch Video Solution](#)

52. Why are lanthanides and actinides placed at the bottom of the periodic table?

 [Watch Video Solution](#)

53. How do the basicity and solubility in water vary from $Be(OH)_2$ to $Ba(OH)_2$?

 [Watch Video Solution](#)

54. Why are cations smaller than neutral atom?

 [Watch Video Solution](#)

55. Why are anions bigger than neutral atom?

 [Watch Video Solution](#)

56. Which is the smallest among Na^{\oplus} , Mg^{2+} , Al^{3+} , and why?

 [Watch Video Solution](#)

57. Which has the largest ionic radius Ca^{2+} , Mg^{2+} , Ba^{2+} ?

 [Watch Video Solution](#)

58. Define (a) metallic radius and (b) van der Waals radius.

 [Watch Video Solution](#)

59. Electronegativity

 [Watch Video Solution](#)

60. How does electronegativity move (a) down the group and (b) across the period from left to right?

 [Watch Video Solution](#)

61. Write general electronic configuration of p -block elements.

 [Watch Video Solution](#)

62. What is the nature of oxides formed by most of p -block elements?

 [Watch Video Solution](#)

63. Identify the atom or ion which has larger radius in each of the following pair:

a. Cl or S

b. Cl^{\ominus} or S^{2-}

c. Na or Mg

d. Mg^{2+} or Al^{3+}



Watch Video Solution

64. Among the elements , Li , K , Ca , Cl and Kr , the element K has the lowest IE and Kr has the highest IE .



Watch Video Solution

65. Which of the following pairs of elements would you expect to have lower first ionisation energy?

a. Cl or F

b. Cl or S

c. K or Ar

d. Kr or Xe

 [Watch Video Solution](#)

66. Why does the first ionisation energy increase as we go from left to right along a given period of periodic table?

 [Watch Video Solution](#)

67. Which out of the N or O has higher electron gain enthalpy?

 [Watch Video Solution](#)

68. Which of the following pair would have larger size?

a. K or K^{\oplus} , b. Br or Br^{\ominus}

c. O^{2-} or F^{\ominus} , d. Li^{\oplus} or Na^{\oplus}

e. P or As , f. Na^{\oplus} or Mg^{2+}

 [Watch Video Solution](#)

69. Atomic number (Z) of elements is 108. Write its electronic configuration and name the group to which does it belong?

 [Watch Video Solution](#)

70. Out of Na and Mg which has higher second ionisation energy?

 Watch Video Solution

Exercise Short

1. The first (IE_1) and second (IE_2) ionisation energies ($kJmol^{-1}$) of a new element designated by roman numerals are shown below:

	(IE_1)	(IE_2)
<i>I</i>	2372	5251
<i>II</i>	520	7300
<i>III</i>	900	1760
<i>IV</i>	1680	3380

Which of these elements is likely to be (a) a reactive metal,

(b) a reactive non-metal, (c) a noble gas and (d) a metal that forms a binary halide of the formula, AX_2 .

 [Watch Video Solution](#)

2. Give four characteristics of s -block elements.

 [Watch Video Solution](#)

3. Give four defects of Mandeleev's periodic table.

 [Watch Video Solution](#)

4. Give two reasons, why the number of elements in the first period is only 2?



[Watch Video Solution](#)

5. On the basis of their electronic configuration, explain why alkali metals are highly reactive?



[Watch Video Solution](#)

6. Give the order in which the melting points of halides of sodium decrease and why?



[Watch Video Solution](#)

7. Why are group 1 elements called alkali metals and group 17 are called halogens?



 [Watch Video Solution](#)

8. Give four characteristics of *d*-block elements.

 [Watch Video Solution](#)

9. Give any two features of Mendeleev's periodic table.

 [Watch Video Solution](#)

10. How do the solubilities of alkaline earth metal sulphate and carbonates vary down the group and why?

 [Watch Video Solution](#)

11. why is melting point of $LiCl$ lower than $NaCl$?

 [Watch Video Solution](#)

12. Arrange the following in increasing order:

a. $BeCO_3, BaCO_3, CaCO_3, MgCO_3$, (thermal stability)

b. $BeCl_2, BaCl_2, SrCl_2, CaCl_2$, (ionic character)

 [Watch Video Solution](#)

13. Which alkali metal carbonate is thermally unstable and why?

 [Watch Video Solution](#)

14. Out of O and S which has higher electron affinity and why?

 [Watch Video Solution](#)

15. What is diagonal relationship? Why does Li resemble with Mg ?

 [Watch Video Solution](#)

16. Give four characteristics of f -block elements. Why are they called inner transition metals?

 [Watch Video Solution](#)

17. Why are electron affinities of noble gases zero? Arrange halogens in increasing order of electron affinity.

 [Watch Video Solution](#)

18. Arrange the species in each group in order of increasing ionisation energy and give reason:

a. K^{\oplus} , Cl^{\ominus} , Ar , b. Na, Mg, Al , c. C, N, O

 [Watch Video Solution](#)

19. What are the factors that affect electron affinity?

 [Watch Video Solution](#)

20. Explain the term (a) screening effect (b) penetration effect and (c) metallic character.

 [Watch Video Solution](#)

21. a. Explain why the second ionisation energy of B is significantly higher than the second ionisation energy of C , even though the first ionisation energy of B is less than C .

b. which has higher 1st ionisation energy B or Be and why?

 [Watch Video Solution](#)

22. a. How does basic character of oxides and hydroxides vary down the group in alkali metals? Why?

b. How does reducing power of elements vary in group 1?

 [Watch Video Solution](#)

23. a. Among Cu^{\oplus} , Cu^{2+} and Cu which is the largest in size and why?

b. Which element in periodic table has the highest IE (ionisation energy)?

c. Which element, Mg or Al , is more metallic and why?

 [Watch Video Solution](#)

24. Give five characteristics of p -block elements.

 [Watch Video Solution](#)

25. Give advantages of long form of periodic table.

 [Watch Video Solution](#)

26. Elements A and B have atomic numbers 11 and 24 respectively. Write their electronic configuration and predict (a) group, (b) period, (c) block to which they belong? Which of them is representative element?

 [Watch Video Solution](#)

27. How do melting and boiling points vary in a (a) period and (b) group in periodic table?

 [Watch Video Solution](#)

28. a. Name the most metallic element in second period and most non-metallic element.

b. The element with (i) largest atomic radius and (ii) smallest atomic radius in third period.

c. The element having general electronic configuration ns^2np^4 in fourth period.



[Watch Video Solution](#)

29. How does electronegativity vary down the group 17 and why? How does it vary from left to right in period? Name an element having highest electronegativity.



[Watch Video Solution](#)

30. Among the elements of second period Li to Ne pick out the element:

a. with the highest first ionisation energy

b. with the highest electronegativity

c. with the largest atomic radius

d. that is most reactive non-metal

e. that is most reactive metal

f. with valency equal to 4.



Watch Video Solution

31. Why $CaCl_2$ and $NaCl$ are bond conductor of electricity in the solid state.



Watch Video Solution

32. Write the Lewis dot symbols and predict the valencies for the following elements:

a. Phosphorous , b. Chlorine

c. Argon

 [Watch Video Solution](#)

33. Out of KCl and CaO , which has higher lattice energy and why?

 [Watch Video Solution](#)

34. Is $MgCl_2$ linear or bent or neither of two? Explain

 [Watch Video Solution](#)

35. $NaBr$ gives pale yellow precipitate with $AgNO_3$ solution but CBr_4 does not. Why?

 [Watch Video Solution](#)

36. Assertion Geometrical isomers are non-inter-convertible by rotation.

Reason Alkenes have restricted rotation about π bond.

 [Watch Video Solution](#)

37. In which cases the octet rule is violated:

$BeBr_2$, NH_3 , $AlBr_3$, PBr_5 , CO_3^{2-} , CO_2 , SO_2 , SF_2 , SF_2 , SF_6

 [Watch Video Solution](#)

38. Give the decreasing order of $C - H$ bond length in ethane, ethene and ethyne and why?

 [Watch Video Solution](#)

39. Which bond is stronger in each of the following cases and why?

a. H_2 , Br_2 , b. O_2 , N_2 , c. F_2 , Cl_2

 [Watch Video Solution](#)

40. Give the decreasing order of dipole moments of HF , HCl , HBr , and HI .

 [Watch Video Solution](#)

41. Distinguish between a sigma and a pi bond.

 [Watch Video Solution](#)

42. Which of the following molecule/molecules have zero dipole moment?

NH_3 , H_2O , CO_2 , CBr_4 , $CHBr_3$, BCl_3 , $BeCl_2$

 [Watch Video Solution](#)

43. Differentiate between VB theory and Lewis concept.

 [Watch Video Solution](#)

44. What orbitals can overlap to form a σ -bond and which orbitals can overlap to form a π -bond?

 [Watch Video Solution](#)

45. Write the important conditions required for the linear combination of atomic orbitals to form molecular orbitals.

 [Watch Video Solution](#)

46. Answer the following:

a. Which electron takes part in bond formation?

b. What types of forces hold the atoms together in an ionic compound?

c. What change in energy takes place when a molecule is formed from its atoms?

d. In terms of IE and $\Delta_{eg}H^\ominus$, what types of atoms combine to form an ionic bond?

d. What types of orbitals can overlap to form a covalent bond.



[Watch Video Solution](#)

47. Out of the following, select the compounds containing ionic, covalent and coordinate bonds.

$CaCl_2$, C_2H_6 , MgO , HCl , NH_4^\oplus , O_3



[Watch Video Solution](#)

48. What are the conditions which must be satisfied for H -bonding to take place in a molecule.

 [Watch Video Solution](#)

49. What happens to the probability of finding an electron in the MO 's after the combination of two AO 's?

 [Watch Video Solution](#)

50. What are SI units of dipole moment?

 [Watch Video Solution](#)

51. Out of CS_2 and OCS which have higher dipole moment and why?

 [Watch Video Solution](#)

52. How do you express the bond strength in terms of bond order?

 [Watch Video Solution](#)

53. Which of the following statements are correct?

1. A σ bond is stronger than a π bond
2. A covalent bond is stronger than a hydrogen bond
3. HF is more polar than HCl

4. There is one electrovalent bond and three covalent bonds in methylene chloride. Select the correct answer using the codes given below

 [Watch Video Solution](#)

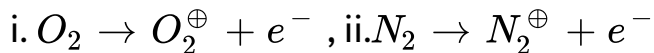
54. x. The hybrid state of carbon atoms in C_{60} molecule is :

 [Watch Video Solution](#)

55. With what neutral molecule is ClO^{\ominus} isoelectronic?

 [Watch Video Solution](#)

56. Give the change in bond order in the following ionisation process?



 [Watch Video Solution](#)

57. The magnetic moment of KO_2 at room temperature is ---
----- BM.

 [Watch Video Solution](#)

58. On the basis of *VSEPR* theory, predict the shapes of the following molecules/ions?

a. AsF_5 , b. $SbCl_3$, c. F_2O , d. H_3O^{\oplus}

e. $HC \equiv CH$, f. NH_4^{\oplus} , g. NH_2^{\ominus} , h. GeF_4



Watch Video Solution

59. Why is HCl predominantly covalent in the gaseous state but ionic in the aqueous solution?



Watch Video Solution

60. Why molbilities of H^{\oplus} ions in ice is greater as compared to liquid water.



Watch Video Solution

61. Ionic bonds are non-directional while covalent bonds are directional.

 [Watch Video Solution](#)

62. Write two resonance structure of N_2O that satisfy the octet rule.

 [Watch Video Solution](#)

63. Whether molecular ion HeH^{\ominus} exist or not? Explain.

 [Watch Video Solution](#)

64. Out of but-1-yne or but-1-ene which has higher dipole moment?

 [Watch Video Solution](#)

65. Write the structures of the following hydrates which contains ionic, covalent, coordinates and $H - bonds$.

a. $CuSO_4 \cdot 5H_2O$, b. $ZnSO_4 \cdot 5H_2O$

c. $FeSO_4 \cdot 7H_2O$.

 [Watch Video Solution](#)

66. What is formed when steam is passed over red hot coke?

 [Watch Video Solution](#)

67. What is the name of the isotope of hydrogen which contains 1 proton and 1 neutron?

 [Watch Video Solution](#)

68. Give the chemical reaction in which dihydrogen acts as an oxidising agent.

 [Watch Video Solution](#)

69. Which element on treatment with caustic soda solution produces H_2 gas?

 [Watch Video Solution](#)

70. What is meant by hardening of oils?

 [Watch Video Solution](#)

71. Which gaseous compound on treatment with dihydrogen produces methanol?

 [Watch Video Solution](#)

72. In order to produce pure dihydrogen gas, which combination is used?

 [View Text Solution](#)

73. Assertion : Nascent hydrogen is more reactive than molecular hydrogen.

Reason : Nascent hydrogen is associated with more energy

 [Watch Video Solution](#)

74. What is the name given to hydrogen if nuclei of both the atoms have same spin?

 [Watch Video Solution](#)

75. what happens if conc H_2SO_4 is used in preparing hydrogen by its reaction with a metal?

 [Watch Video Solution](#)

76. A sample of hard water is allowed to pass through anion exchange resin. Will it produce lather with soap easily?

 [Watch Video Solution](#)

77. What is the mass of one of deuterium oxide?

 [Watch Video Solution](#)

78. What is deionised water?

 [Watch Video Solution](#)

79. Which gas will be produced when heavy water is treated with a mixture of calcium nitride and magnesium nitride?

Give equations.

 [Watch Video Solution](#)

80. What type of substances can easily dissolve in water?

 [Watch Video Solution](#)

81. Give a reaction in which H_2O acts as an oxidising agent.

 [Watch Video Solution](#)

82. What requirement should be fulfilled by potable water (water for drinking purpose)?

 [Watch Video Solution](#)

83. Which is heavier: water or ice?

 [Watch Video Solution](#)

84. What type of bonds are broken when water evaporates?

 [Watch Video Solution](#)

85. The degree of hardness of a given sample of hard water is 40ppm . If the entire hardness is due to MgSO_4 , how much of MgSO_4 is present per kg of water?

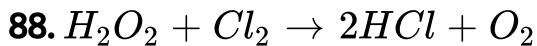
 [Watch Video Solution](#)

86. Why cannot the dilute solution of hydrogen peroxide be concentrated by strong heating?

 [Watch Video Solution](#)

87. Which organic reagent can be used for the manufacture of hydrogen peroxide?

 [Watch Video Solution](#)



In the above reaction, H_2O_2 act as _____.

 [Watch Video Solution](#)

89. Old lead paintings are generally washed with dilute solution of H_2O_2 in order to regain their colour. Why?

 [Watch Video Solution](#)

90. What is the dihedral angle between two H atoms of H_2O_2 ?

 [Watch Video Solution](#)

91. What is the product of the reaction between benzene and H_2O_2 ?

 [Watch Video Solution](#)

92. Which isotope of hydrogen (a) does not contain neutron, (b) contains equal number of protons and neutrons, (c) is radioactive.

 [Watch Video Solution](#)

93. Why is dihydrogen not preferred in weather balloons these days?

 [Watch Video Solution](#)

94. Name two compounds which retard the decomposition of H_2O_2 .

 [Watch Video Solution](#)

95. What do you mean by 15 volume H_2O_2 solution?

 [Watch Video Solution](#)

96. Give an example of a compound in which hydrogen exists in (a) + 1, (b) - 1, (c) zero oxidation state.

 [Watch Video Solution](#)

97. Can marine species live in distilled water?

 [Watch Video Solution](#)

98. Give an example of (i) ionic hydride, (ii) covalent hydride.

 [Watch Video Solution](#)

99. Why oxide ion is called a hard ion?

 [Watch Video Solution](#)

100. How is D_2O_2 prepared?

 [Watch Video Solution](#)

101. Complete the following:



 [Watch Video Solution](#)

102. 10mL of a given solution of H_2O_2 contains 0.91g of H_2O_2 . Express its strength in volume.

 [Watch Video Solution](#)

103. In some toothpastes hydrogen peroxide is used. What is the role of H_2O_2 in them?

 [Watch Video Solution](#)

104. What is Fenton's reagent?

 [Watch Video Solution](#)

105. What is perhydrol? Give its composition and use.

 [Watch Video Solution](#)

106. Explain why calcium ion makes water hard, but sodium ion does not.

 [Watch Video Solution](#)

107. Name the alkali metals which do not combine directly with nitrogen.

 [Watch Video Solution](#)

108. What is the order of reactivity of alkali metals towards hydrogen?

 [Watch Video Solution](#)

109. Arrange the alkali metals in increasing order of their density.

 [Watch Video Solution](#)

110. Which among Na , K , Cs and Li forms most stable hydride?

 [Watch Video Solution](#)

111. Which among Li , Na , K and Cs has density greater than water?

 [Watch Video Solution](#)

112. Arrange K , Ca and Li in order of increasing electrode potential.

 [Watch Video Solution](#)

113. The ionisation enthalpy of Na is less than Ne . Why?

 [Watch Video Solution](#)

114. Arrange alkali metal fluorides and halides in the decreasing order of solubility.

 [View Text Solution](#)

115. Which among Na , Mg , Ba and Ca is the poor reducing agent?

 [Watch Video Solution](#)

116. Arrange alkali metal carbonate in increasing order of solubility.

 [Watch Video Solution](#)

117. Arrange $CaCO_3$, $KHCO_3$ and $NaHCO_3$ in increasing order of solubilities.

 [View Text Solution](#)

118. Why *Be* generally form covalent compounds?

 [Watch Video Solution](#)

119. Barium compounds are poisonous, even then $BaSO_4$ is used in barium meal. Why?

 [Watch Video Solution](#)

120. Which of the two cations Mg^{2+} and Al^{3+} is smaller?

 [Watch Video Solution](#)

121. Why alkaline earth metal oxides are quite stable?

 [Watch Video Solution](#)

122. Why solubility of sulphates decreases from $BeSO_4$ to $BaSO_4$?

 [Watch Video Solution](#)

123. Why solubility of alkaline earth metal hydroxides increases from $Be(OH)_2$ to $Ba(OH)_2$?

 [Watch Video Solution](#)

124. When the alkaline earth metals such as Ca , Sr , Ba are dissolved in liquid ammonia, deep blue coloured solution is obtained. What are the important properties of this solution?

 [Watch Video Solution](#)



[Watch Video Solution](#)

125. Arrange alkaline earth metal fluorides in order of increasing solubility in water.



[Watch Video Solution](#)

126. Arrange alkaline earth metal chlorides in order of increasing solubility in water.



[Watch Video Solution](#)

127. Compare alkaline earth metals with alkali metals w.r.t (a) atomic and ionic size, (b) metallic bonds, (c) melting points and (d) hardness.



[Watch Video Solution](#)

128. Arrange sulphates of group 2 in decreasing order of solubility of water.



[Watch Video Solution](#)

129. Arrange carbonates of group 2 in increasing order of thermal stability.



[Watch Video Solution](#)

130. Arrange hydroxides of group 2 elements in order of increasing basicity.



 [Watch Video Solution](#)

131. Arrange *Be*, *Mg*, *Ca*, *Sr* and *Ba* in increasing order of reactivity.

 [Watch Video Solution](#)

132. What kind of metals can form superoxides?

 [Watch Video Solution](#)

133. Name the alkali metal which can combine directly with *As*, *P*, *S* and halogens.

 [Watch Video Solution](#)

134. Which among Na_2O_2 , Li_2O , K_3N and Li_3N is not known?

 [Watch Video Solution](#)

135. Which among Na , K , Pb and Li has the lowest melting point?

 [Watch Video Solution](#)

136. Name an element which is invariably bivalent and whose oxide is soluble in excess of $NaOH$ and its dipositive ion has a noble gas core.

 [Watch Video Solution](#)

137. Mention the main constituents of Portland cement.

What is the role of gypsum in it?

 [Watch Video Solution](#)

138. Arrange the following in order of the increasing covalent character:

MCl , MBr , MF , MI (where M = alkali metals)

 [Watch Video Solution](#)

139. Which alkali metal and alkaline earth metal are radioactive? Give their atomic numbers also.

 [Watch Video Solution](#)

140. Which alkali metal forms covalent compound?

 [Watch Video Solution](#)

141. Give one important ore of each of sodium and magnesium.

 [Watch Video Solution](#)

142. Give chemical formula of dolomite and carnallite.

 [Watch Video Solution](#)

143. Why the element of second period shows a number of difference in properties from other members of their respective families?

 [Watch Video Solution](#)

144. Name one reagent or one operation to distinguish between:

a. $Be(OH)_2$ and $Ca(OH)_2$

b. $BeSO_4$ and $SrSO_4$

c. K_2CO_3 and $KHCO_3$

 [Watch Video Solution](#)

145. Why sodium cannot be prepared by electrolysis of its aqueous solution?

 [Watch Video Solution](#)

146. What is dead burnt plaster?

 [Watch Video Solution](#)

Chapter 2 Multiple Correct Answer

1. Hydrogen bonding plays a central role in which of the following phenomena?

A. Ice floats in water

- B. Higher Lewis basicity of primary than tertiary amines
in aqueous solutions
- C. Formic acid is more than acetic acid
- D. Dimerisation of acetic acid in benzene

Answer: A::B::D

 [Watch Video Solution](#)

2. When O_2 is adsorbed on a metallic surface, electron transfer occurs from the metal to O_2 . The TRUE statement (s) regarding this adsorption is (are)

- A. O_2 is physisorbed
- B. heat is released

C. occupancy of π_{2p} of O_2 is increased

D. bond length of O_2 is increased

Answer: A::B::C::D

 [Watch Video Solution](#)

Chapter 2 Single Correct Answer

1. Assuming $2s, 2p$ mixing is NOT operative, the paramagnetic species among the following is

A. Be_2

B. B_2

C. C_2

D. N_2

Answer: C



Watch Video Solution

2. The intermolecular interaction that is dependent on the inverse cube of distance between the molecules is

A. ion-ion interaction

B. ion-dipole interaction

C. London force

D. hydrogen bond

Answer: B



Watch Video Solution

3. The ionic radii of N^{3-} , O^{2-} and F^{-} are respectively given by:

A. 1.36, 1.40 and 1.71

B. 1.36, 1.71 and 1.40

C. 1.71, 1.40 and 1.36

D. 1.71, 1.36 and 1.40

Answer: C

 Watch Video Solution

1. Among the triatomic molecules/ions $BeCl_2$, N_3^- , N_2O , NO_2^+ , O_3 , SCl_2 , ICl_2^- , I_3^- and XeF_2 , the total number of linear molecules (s)/ion(s) where the hybridisation of the central atom does not have contribution from the d - orbitals (s) is [atomic number of $S = 16$, $Cl = 17$, $I = 53$ and $Xe = 54$]



[Watch Video Solution](#)

Chapter 3 Multiple Correct Answer

1. Hydrogen peroxide in its reaction with KIO_4 and NH_2OH respectively, is acting as a

A. reducing agent, oxidising agent

B. reducing agent, reducing agent

C. oxidising agent, oxidising agent

D. oxidising agent, reducing agent

Answer: A



Watch Video Solution

Chapter 3 Single Correct Answer

1. From the following statements regarding H_2O_2 , choose the incorrect statements:

A. It can act only as an oxidizing agent

B. It decomposes on exposure to light

C. It has to be stored in plastic or wax lined glass bottles
in dark

D. It has to be kept away from dust

Answer: A

 [Watch Video Solution](#)

Chapter 4 Multiple Correct Answer

1. The pair(s) of reagents that yield paramagnetic species
is/are

A. Na and excess of NH_3

B. K and excess of O_2

C. Cu and dilute HNO_3

D. O_2 and 2-ethylantraquinol

Answer: A::B::C

 [Watch Video Solution](#)

Chapter 5 Single Correct Answer

1. Which one of the following alkaline earth metal sulphates has its hydration enthalpy greater than its lattice enthalpy?

A. $CaSO_4$

B. $BeSO_4$

C. $BaSO_4$

D. $SrSO_4$

Answer: B



Watch Video Solution

Chapter 6 Multiple Correct Answer

1. The correct statement (s) for orthoboric acid is/are

- A. It behaves as a weak acid in water due to self-ionization
- B. Acidity of its aqueous solution increases upon addition of ethylene glycol

C. It has a three-dimensional structure due to hydrogen bonding.

D. It is a weak electrolyte in water

Answer: B::D

 [Watch Video Solution](#)

Chapter 6 Single Correct Answer

1. In the correct of the Hall-Heroult process for the extraction of Al , which of the following statements is false ?

A. CO and CO_2 are produced in this process

- B. Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity
- C. Al^{3+} is reduced at the cathode to form Al
- D. Na_3AlF_6 serves as the electrolyte

Answer: D

 [Watch Video Solution](#)

Chapter 6 Integer

1. Three moles of B_2H_6 are completely reacted with methanol. The number of moles of boron containing product formed is.

 [Watch Video Solution](#)

Chapter 7 Single Correct Answer

1. Under hydrolytic conditions , the compounds used for preparation of liner polymer and for chain termination respectively are .

- A. CH_3SiCl_3 and $Si(CH_3)_4$
- B. $(CH_3)_2SiCl_2$ and $(CH_3)_3SiCl$
- C. $(CH_3)_2SiCl_2$ and CH_3SiCl_3
- D. $SiCl_4$ and $(CH_3)_3SiCl$

Answer: B



[Watch Video Solution](#)

