CHEMISTRY

NCERT - FULL MARKS

CHEMISTRY(TAMIL)

CHEMICAL BONDING

Problem

1. Calculation of lattice enthalpy of $MgBr_2$ from the given data

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Questions A Choose The Correct Answer

1. The crystal lattice of electrovalent compounds is composed of

A. Atoms

B. Molecules

C. Oppositely charged ions

D. Both molecules and ions

Answer:

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2. The compound which contains both ionic and covalent is

A. CH_4

B. H_2

C. KCN

D. KCl

Answer:

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3. In $NaCl, Na^+$ ion has _____ and Cl^- ion has _____ electron configurations

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4. Linear overlap of two atomic p-orbitals leads to _____.

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5. Born-Haber cycle is related with _____.

6. Two atoms of similar electronegativity are expected to form ___ compounds.

7. Repulsion between bond pair-bond pair is than in between lonepairlone pair.

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Questions C Match The Following

1.

1. Electrovalent bonding	a. Benzene
2. Covalent bonding	b. Heitler and London
3. Valence Bond theory	c. Electron transfer
4. Polarised Bond	d. Electron sharing
5. Resonance	e. Fajan.s theory
	f. Aluminium chloride

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Questions D Write In One Or Two Sentence

1. Arrange $NaCl, MgCl_2$ and $AlCl_3$ in the increasing order of covalent character.

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2. Find σ and π bonds in the following :

$CH_3 - CH_3, CH_2 = CH_2, CH \equiv CH$

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3. Which ray has high ionising power? Why?

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4. Draw the structure of $BeCl_2$ in different physical states.

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5. Write the differences between electrovalent and covalent bonds.

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6. Give reason : CCl_4 is insoluble in H_2O while $NaCl$ is soluble

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7. Explain sp^2 hybridisation in BF_3.

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8. Explain the co-ordinate bond formation between $BF_3 \& NH_3$.

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9. What is octet rule? Explain with an example.

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10. What are the different types of bonds?

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11. What is meant by electrovalent bond. Explain the bond formation in $AlBr_3$ and CaO.

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12. Give the electron dot representation for PH_3 and ethane.

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13. Write the Lewis dot structures for the following.

$S, S^{2-}, P, P^{3-}, Na, Na^{+}, Al$ and Al^{3+}.

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14. What are the important features of valence bond theory?

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15. What is meant by EIA?

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16. Define resonance. Give the various resonance structures of CO_2 and CO_3^{2-} ion.

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Questions E Explain Briefly On The Following

1. Discuss the important properties of electrovalent compounds.

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2. Calculate the lattice energy of $NaCl$ using Born-Haber cycle.

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3. Explain the important properties of covalent compounds.

4. Discuss the partial covalent character in ionic compounds using Fajan.s rule.

5. Explain the polarity of covalent bonds in H_2O and HCl.

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6. N_2, CH_4, SO_3, H_2O

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7. Discuss VSEPR model applied for linear, trigonal planar, tetrahedral and octahedral

geometries of molecules.

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8. Explain the formation and difference between a sigma bond and a pibond. Which has more bond strength?

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9. Calculate the lattice enthalpy of $CaCl_2$ given that the enthalpy of :

i) Sublimation of Ca in $121.8\ \text{kJ mol}^{-1}$

ii) Dissociation of Cl_2 to $2Cl$ is $242.8\ \text{kJ mol}^{-1}$

iii) Ionisation of Ca to Ca^{2+} is $2422\ \text{kJ mol}^{-1}$

iv) Electron gain for Cl to Cl^- is - $355\ \text{kJ mol}^{-1}$

v) $\Delta H_f^{(o)}$ overall is $-795\ \text{kJ mol}^{-1}$

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16. sp^3 hybridisation is involved in CH_4, H_2O and NH_3. Why are the bond angles different in three cases?

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30. Explain the polarity of covalent bonds in H_2O and HCl.

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31. Discuss the shapes of following molecules : NH_3, H_2O, CH_4, PCl_5 and SO_2.

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Evaluation

1. In which of the following Compounds does the central atom obey the octet rule?

A. XeF_4

B. $AICI_3$

C. SF_6

D. SCI_2

Answer: D

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2. In the moecule $O_A = C = O_B$ the formal charge on O_A, C and O_B are respectively.

A. $-1, 0, +1$

B. $+1, 0, -1$

C. $-2, 0, +2$

D. $0, 0, 0$

Answer: D

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3. Which of the following is electron deficient?

A. PH_3

B. $(CH_3)_2$

C. BH_3

D. NH_3

Answer: C

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4. Which of the following molecule contain no π bond ?

A. SO_2

B. NO_2

C. CO_2

D. H_2O

Answer: D

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5. The ratio of number of sigma (σ) and π bonds in 2-butynal is

A. $8/3$

B. $5/3$

C. $8/2$

D. $9/2$

Answer: C

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6. Which one of the following is the likely bond angles of sulphur tetrafluoride molecule?

A. $120^\circ, 80^\circ$

B. $109^\circ.28$

C. 90°

D. $89^\circ, 11^\circ$

Answer: D

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7. Assertion : Oxygen molecule is paramagnetic.

Reason : It has two unpaired electron in its bonding molecular orbital

A. both assertion and reason are true and reason is the correct explanation of assertion

B. both assertion and reason are true but reason is not the correct explanation of assertion

C. assertion is true but reason is false

D. Both assertion and reason are false

Answer: C

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8. According to Valence bond theory, a bond between two atoms is formed when

A. fully filled atomic orbitals overlap

B. half filled atomic orbitals overlap

C. non- bonding atomic orbitals overlap

D. empty atomic orbitals overlap

Answer: B

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9. In CIF_3, NF_3 and BF_3 molecules the chlorine, nitrogen and boron atoms are

A. sp^3 hybridised

B. SP^3, sp^3 and sp^2 respectively

C. sp^2 hybridised

D. sp^3d, sp^3 and sp hybridised respectively.

Answer: D

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10. When one s and three p orbitals hybridise,

A. four equvivalent orbitals at 90° to each other will be formed

B. four equivalent orbitals at 109° 28 to each other will be formed.

C. four equivalent orbitals, that are lying the same plane will be formed

D. none of these

Answer: B

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11. Which of these represents the correct order of their increasing bond order.

A. $C_2 < C_2^2 < O_2^2 < O_2$

B. $C_2^2 < C_2^+ < O_2 < O_2^{2-}$

C. $O_2^{2-} < O_2 < C_2^{2-} < C_2^+$

D. $O_2^{2-} < C_2^+ < O_2 < C_2^{2-}$

Answer: C

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12. Hybridisation of central atom in PCI_5 involves the mixing of orbitals.

A. $s, p_x, p_y, d_{x2}, d_{x2-y2}$

B. $s, p_x . p_y, p_{xy} . d_{x2-y2}$

C. $s, p_x, p_y, p_z, d_{x2-y2}$

D. $s, p_x, p_y, d_{xy}, d_{x2-y2}$

Answer: C

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13. The correct order of O-O bond length in hydrogen peroxide, ozone and oxygen is

A. $H_2O_2 > O_3 > O_2$

B. $O_2 > O_3 > H_2O_2$

C. $O_2 > H_2O_2 > O_3$

D. $O_3 > O_2H_2O_2$

Answer: B

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14. Which one of the following is diamagnetic.?

A. O_2

B. O_2^{2-}

C. O_2^+

D. None of these

Answer: B

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15. Bond order of a species is 2.5 and the number of electons in its bonding molecular orbital is formd to be 8 The no. of electons in its antibonding molecular orbital is

A. three

B. four

C. Zero

D. can not be calculated form the given unformation.

Answer: A

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16. Shape and hybridisation of IF_5 are

A. Trigonal bipyramidal, Sp^3d^2

B. Trigonal bipyramidal, Sp^3d

C. Square pyramidal, Sp^3d^2

D. Octahedral, Sp^3, d^2

Answer:

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17. Pick out the incorrect statement from the following

A. Sp^3 hybrid orbitals are equivalent and are at an angle of 109° 28 with eachother

B. dsp^2 hybrid orbitals are equivalent and bond angle between any two of them is 90°

C. All five sp^3d hybrid orbitals are not equivalent out of these five sp^3d hybrid orbitals, three are at an angle of 120°, remainr two are perpendicular to the plane containing the other three

D. none of these

Answer: C

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18. The molecules having same hybridisation, shape and number of lone pairs of electons are

A. SeF_4, XeO_2F_2

B. SF_4, XeF_2

C. $XeOF_4, TeF_4$

D. $SeCI_4, XeF_4$

Answer: A

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19. In which of the following molecules / ions BF_3, NO_2^-, H_2O the central atom is sp^2 hybridised?

A. NH_2^- and H_2O

B. NO_2^- and H_2O

C. BF_3 and NO_2^-

D. BF_3 and NH_2^-

Answer: C

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20. Some of the following properties of two species, NO_3^- and H_3O^+ are described below. which one of them is correct?

A. dissimilar in hybridisation for the central atom with different structure.

B. isostructural with same hybridisation for the Central atom.

C. different hybridiration for the central atom with same structure

D. none of these

Answer: A

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21. The types of hybridiration on the five carbon atom from right to left in the, 2,3 pentadiene.

A. $sp^3, sp^2, sp, sp^2, sp^3$

B. sp^3, sp, sp, sp, sp^3

C. $sp^2, sp, sp^2, sp^2, sp^3$

D. $sp^3, sp^3, sp^2, sp^3, sp^3$

Answer: A

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22. Xe F_2 is isostructural with

A. $SbCI_2$

B. $BaCI_2$

C. TeF_2

D. ICI_2^-

Answer:

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23. The percentage of s-character of the hybrid orbitals in methane, ethane, ethene and ethyne are respectively

A. 25, 25,33.3,50

B. 50,50,33.3,25

C. 50,25,33.3,50

D. 50,25,25,50

Answer: A

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24. Of the following molecules, which have shape similar to carbondixide?

A. $SnCI_2$

B. NO_2

C. C_2H_2

D. All of these

Answer: C

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25. According to VSEPR theory, the repulsion between different parts of electrons obey the order.

A. $l.p - l.p > b.p - b.p > l.p - b.p$

B. $b.p - b.p > b.p - l.p > b.p - b.p$

C. $l.p - l.p > b.p - l.p > b, p - b.p$

D. $b.p - b.p > l.p - l.p > b.p - b.p$

Answer: C

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26. Shape of CIF_3 is

A. Planar triangular

B. Pyramidal

C. 'T' Shaped

D. none of these

Answer: C

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27. Non- Zero dipole moment is shown by

A. CO_2

B. p-dichlorobenzene

C. carbontetrachloride

D. water

Answer: D

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28. Which of the following conditions is not correct for resonating structures?

A. the contributing structure must have the same number of unpaired electrons

B. the contributing structures should have similar energies

C. the resonance hybrid should have higher energy than any of the contributing structure.

D. none of these

Answer: C

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29. Among the following, the compound that contains, ionic, covalent and Co- ordinate linkage is

A. NH_4CI

B. NH_3

C. $NaCI$

D. none of these

Answer: A

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30. CaO and NaCl have the same crystal structure and approximately the same radii. It U is the lattice energy of NaCl, the approximate lattice energy of CaO is

A. U

B. 2U

C. U/2

D. 4U

Answer: D

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