Question Bank

{Chapter 4: Chemical bonding and Molecular structure & Chapter 6: Thermodynamics

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Chapter 4: Chemical bonding and Molecular structure

Objective Type Questions

1. Nitrogen molecule is an example of..... (a) Single covalent bond b) Double covalent bond (c) Triple covalent bond (d) Single co-ordinate bond
2. The tendency of atoms to acquire eight electrons in their valence shell is…….. (a) Octet rule (b) Duplet rule (c) Triplet rule (d) all of these
3. The water is ….. (a) electrovalent compound (b) covalent compound (c) coordinate compound (d) ionic compound
4. Hydrogen bonding formed in o-nitrophenol is (a) intramolecular (b) intermolecular hydrogen (c) inter and intramolecular (d) none of these
5. Which of the following contains hydrogen bonding? (a) NaCl (b) MgO (c) water (d) oxygen

Very Short and Short Answer Type Questions

6. Define a chemical bond
7. Give the main feature of Lewis' approach of chemical bonding.
8. Write electron dot Lewis's structure of Na, Ca, B, Br, Xe, As, Ge, N^{3-}
9. Give the octet rule in short.
10. Define an ionic bonding.
11. Which one of the following has the highest bond order? N^{2+}, N^{2-} or N_2
12. Define bond order
13. What type of bond is formed when atoms have a high difference of electronegativity
14. Define dipole moment.
15. Give the mathematical expression of the dipole moment.
16. Why dipole moment of CO_2, BF_3, CCl_4 is it zero
17. Why is BF_3 non-polar
18. Write the resonating structure of O_3 molecule

19. What is a sigma bond
20. What is pi – bond
21. How many s- and π - bonds are there in a molecule of C_2H_4 Ethene.
22. Define hybridization.
23. State the hybrid orbitals associated with B in BCl_3 and C in C_2H_4
24. What type of hybridization takes place in (i) P in PCl_5 (ii) S in SF_6
25. Define bonding molecular orbital.
26. Define anti-bonding molecular orbital
27. Explain diagrammatically the formation of molecular orbital by LCAO of O_2 or N_2
28. Which one O_2^{2-} and O_2^{-} may exhibit paramagnetic
29. Define bond order.
30. Define hydrogen bonding
31. What are the types of H- bonding? Which of them is stronger
32. NH_3 Has higher boiling point than PH_3.Give reason
33. Give the main feature of Kossel's explanation of chemical bonding.
34. Write the significance of octet rule
35. Write the Lewis structure for CO molecule.
36. Mention the factors that influence the formation of an Ionic bond.
37. State and explain Fajan's rule
38. Give reason why H_2^{+} ions are more stable than H_2^{-} though they have the same bond Order.
39. How would the bond lengths vary in the following species: C_2^{2-} , C_2, C^{2-}
40. Why NH_3 has high dipole moment than NF_3 though both are pyramidal
41. Dipole moment of BeF_2 is zero. Give a reason.
42. Give the main features of VSEPR Theory.
43. What are the different types of Overlapping of orbitals
44. What is zero overlap
45. The features of hybridization.
46. Describe the shape of SP_3, SP_2 and SP hybrid orbitals.
47. He_2 does not exist. Explain in terms of LCAO.
48. Dipole moment is a scalar or a vector quantity
49. Explain Hybridisation of CH_4, H_2O and NH_3
50. Define Bonde Length. How it is Calculated

Chapter 6: Thermodynamics

Objective Type Questions

1. For the process to occur under adiabatic conditions, the correct condition is:
   (a) $\Delta T = 0$ (b) $\Delta p = 0$ (c) $q = 0$ (d) $w = 0$
2. The enthalpies of all elements in their standard states are
   (a) unity (b) zero (c) < 0 (d) different for each element

3. Isothermal curves are obtained by drawing – (a) P against V (b) P against T
(c) PV against R (d) PV against V

4. The work done per mole in an isothermal process is …….

5. If liquids A and B form an ideal solution

(a) the entropy of mixing is zero (b) the free energy of mixing is zero

(c) the free energy as well as the entropy of mixing are zero

(d) the enthalpy of mixing is zero

Very Short and Short Answer Type Questions

6. Under what conditions the heat evolved or absorbed is equal to the internal energy change
7. Explain intensive and extensive properties of a system with examples.
8. What are the applications of Hess's Law of constant heat summation
9. For a reaction both ΔH and ΔS are negative. Under what conditions does the reaction occur spontaneously
10. How will you get to the relationship $q_p = q_v + \Delta n_g RT$
11. Calculate the work done when 2 moles of an ideal gas expand reversibly and isothermally from a volume of 500 ml to a volume of 2 L at 25°C and normal pressure.
12. State and explain Standard enthalpy of formation.
13. State and explain Standard enthalpy of combustion
14. Define Enthalpy of atomization
15. Define Enthalpy of solution
16. State and explain Lattice enthalpy
17. Give a relation between entropy change and heat absorbed or evolved for a reversible reaction occurring at temperature T.
18. What is the condition for spontaneity in terms of free energy change
19. How are internal energy change, free energy change and entropy change are related to one another
20. What is Gibbs Helmholtz equation
21. What is a spontaneous change? Give one example.
22. State and explain Second law of thermodynamics with equation
23. Define Third law of thermodynamics with equation
24. q and w are not state functions but q + w is state function. Why
25. State first law of thermodynamics. Write it mathematical expression.
26. Briefly explain the term 'enthalpy'. How does if differ from internal energy
27. Explain the calculations for determination of heat of combustion by bomb calorimeter
28. What is Entropy. Give its units. What is its significance of Entropy change.