BUDDHA SERIES

(Unit Wise Solved Question & Answers)

Course – B.Sc Biology 1st Year 1st Semester

College – Buddha Degree College

(DDU Code-859)

Department: Science

Subject: Chemistry

Faculty Name: Ms Neetika Swarnkar

UNIT-1

1. Which quantum number determines the shape of an orbital?
A) Principal quantum number (n)
B) Magnetic quantum number (m)
C) Azimuthal quantum number (l)
D) Spin quantum number (s)
Answer: C

2. The maximum number of electrons that can occupy the 'p' subshell is:
A) 2
B) 4
C) 6
D) 10
Answer: C

3. What is the shape of an s orbital?
A) Dumbbell
B) Spherical
C) Double dumbbell
D) Planar
Answer: B

4. The 'd' orbitals have how many orientations?
A) 2
B) 3
C) 5
D) 7
Answer: C

5. Pauli's Exclusion Principle states that:
A) No electron can have zero spin
B) No two electrons in the same atom can have the same set of four quantum numbers
C) Electrons fill lowest energy orbitals first
D) Electrons prefer to remain unpaired
Answer: B

6. Hund's Rule of maximum multiplicity explains:
A) Electron pairing in orbitals
B) Filling order of subshells
C) Maximum unpaired electrons in degenerate orbitals
D) Shape of orbitals
Answer: C

7. Aufbau Principle governs:
A) Direction of magnetic field
B) Energy of orbitals
C) Order of electron filling
D) Orbital shapes
Answer: C

8. Which of the following is the correct order of orbital energy in a multi-electron atom?
A) 3s < 3p < 3d
B) 3s < 3d < 3p
C) 3d < 3s < 3p
D) 3p < 3s < 3d
Answer: A

9. With increasing atomic number, the energy of orbitals:
A) Remains constant
B) Increases irregularly
C) Decreases linearly
D) Follows a predictable order
Answer: D

10. The number of nodal planes in a p orbital is:
A) 0
B) 1
C) 2
D) 3
Answer: B

Bonding Theories and Hybridization

11. Valence Bond Theory explains:
A) Bond length
B) Orbital overlap and bonding
C) Shape of molecules
D) Molecular mass
Answer: B

12. One major limitation of VBT is:
A) It cannot explain hybridization
B) It fails to explain paramagnetism of O_2
C) It does not follow Pauli's principle
D) It violates the octet rule
Answer: B

13. The shape of methane (CH_4) is best explained by:
A) Ionic bonding
B) VSEPR theory
C) sp^3 hybridization
D) Dipole moment
Answer: C

14. Bent's rule states:
A) Lone pairs repel more than bond pairs
B) Hybrid orbitals with more s-character bond with more electronegative atoms
C) Double bonds repel more than single bonds
D) The central atom always follows the octet rule
Answer: B

15. In VSEPR theory, the shape of NH_3 is:
A) Linear
B) Tetrahedral
C) Trigonal pyramidal
D) Planar
Answer: C

16. Which of the following molecules has a linear shape?
A) CO_2
B) H_2O
C) BF_3
D) NH_3
Answer: A

17. Which of the following does **not** involve hybridization?
A) $BeCl_2$
B) CH_4
C) Cl_2
D) SF_6
Answer: C

18. The bond order of O_2 as per Molecular Orbital Theory is:
A) 1
B) 2
C) 3
D) 1.5
Answer: B

19. According to MOT, which of the following is **paramagnetic**?
A) N_2
B) O_2
C) CO

D) F_2
Answer: B

20. What is the bond order of N_2^+?
A) 3
B) 2.5
C) 2
D) 1.5
Answer: B

Dipole Moment and Weak Forces

21. Dipole moment arises due to:
A) Unequal sharing of electrons
B) Equal sharing of electrons
C) Nuclear fusion
D) Symmetrical geometry
Answer: A

22. Which molecule has **zero** dipole moment?
A) HCl
B) NH_3
C) CO_2
D) H_2O
Answer: C

23. Hydrogen bonding is strongest in:
A) HCl
B) HF
C) CH_4
D) CO_2
Answer: B

24. Van der Waals forces include:
A) Hydrogen bonds only
B) Dipole-dipole and dispersion forces
C) Ionic bonds
D) Covalent bonds
Answer: B

25. Which of the following compounds exhibits **intermolecular** hydrogen bonding?
A) CH_4
B) H_2O

C) CCl_4
D) CO_2
Answer: B

UNIT-2

Periodic Properties and Atomic Structure

1. Effective nuclear charge increases across a period because:
A) Shielding effect increases
B) Nuclear charge increases faster than shielding
C) Atomic size increases
D) Number of shells increases
Answer: B

2. The shielding effect is caused by:
A) Outer electrons shielding inner electrons
B) Inner electrons repelling outer electrons
C) Neutrons in the nucleus
D) Electrons accelerating in orbitals
Answer: B

3. Slater's rules are used to calculate:
A) Atomic mass
B) Atomic radius
C) Effective nuclear charge
D) Electronegativity
Answer: C

4. Which group of elements shows the **largest atomic radii**?
A) Group 1 (alkali metals)
B) Group 17 (halogens)
C) Group 18 (noble gases)
D) Group 2 (alkaline earth metals)
Answer: A

5. Atomic radius generally **decreases** across a period due to:
A) Increase in number of shells
B) Increase in shielding
C) Increase in effective nuclear charge
D) Decrease in electron affinity
Answer: C

6. Ionic radius of anions is _____ than their parent atoms.
A) Equal
B) Larger
C) Smaller
D) Unaffected
Answer: B

7. Electronegativity is defined as:
A) Tendency to lose electrons
B) Energy released when gaining electrons
C) Tendency to attract shared electron pair
D) Shielding effect of inner electrons
Answer: C

8. Which of the following elements is the **most electronegative**?
A) Oxygen
B) Fluorine
C) Chlorine
D) Nitrogen
Answer: B

9. The Pauling scale of electronegativity is based on:
A) Ionization energy
B) Bond energy differences
C) Atomic radius
D) Electron affinity
Answer: B

10. Ionization enthalpy generally _____ down a group.
A) Increases
B) Decreases
C) Remains constant
D) First increases then decreases
Answer: B

11. Second ionization enthalpy is greater than the first because:
A) Electrons are added
B) Energy is absorbed
C) Electron is removed from a positively charged ion
D) Shielding increases
Answer: C

12. Which element has the **highest** first ionization enthalpy?
A) H
B) Li
C) He
D) Ne
Answer: C

13. Electron gain enthalpy becomes more negative across a period due to:
A) Increase in atomic size
B) Increase in shielding
C) Increase in effective nuclear charge

D) Decrease in nuclear attraction
Answer: C

14. Which of the following has the most **negative** electron gain enthalpy?
A) F
B) Cl
C) Br
D) I
Answer: B

Gaseous State and Kinetic Theory

15. Which is **not** a postulate of kinetic molecular theory?
A) Gases consist of particles in random motion
B) Intermolecular forces are strong
C) Collisions are perfectly elastic
D) Volume of gas molecules is negligible
Answer: B

16. Ideal gases deviate from ideal behavior at:
A) High temperature and low pressure
B) Low temperature and high pressure
C) High temperature and high pressure
D) Low temperature and low pressure
Answer: B

17. The van der Waals equation is:
A) PV=nRT
B) $(P+a/V2)(V-b)=RT$

C) P=nRT/V
D) P=kT
Answer: B

18. In van der Waals equation, constant 'a' accounts for:
A) Volume of gas molecules
B) Intermolecular attractions
C) Gas density
D) Temperature corrections
Answer: B

19. The constant 'b' in van der Waals equation corrects for:
A) Pressure deviation

B) Attractive forces
C) Volume of gas molecules
D) Kinetic energy
Answer: C

20. The behavior of real gases **approaches ideal** when:
A) a and b are large
B) Intermolecular forces are strong
C) Pressure is high
D) Temperature is high and pressure is low
Answer: D

Critical Phenomena and Real Gases

21. The critical temperature is the temperature:
A) Above which a gas cannot be liquefied
B) At which all gases behave ideally
C) Below which a gas solidifies
D) At which volume becomes infinite
Answer: A

22. Which of the following gases has the **highest** critical temperature?
A) H_2
B) O_2
C) CO_2
D) He
Answer: C

23. On a PV isotherm, the flat portion represents:
A) Ideal gas behavior
B) Real gas expansion
C) Phase transition (liquid + gas)
D) Critical point
Answer: C

24. The law of corresponding states implies:
A) All gases behave identically under identical conditions
B) All real gases can be compared using reduced variables
C) Ideal gases do not deviate
D) Volume is directly proportional to temperature
Answer: B

25. Reduced equation of state uses which variables?
A) Absolute pressure and volume
B) Critical pressure, volume, and temperature
C) Ideal gas constants
D) Molar volume and temperature only
Answer: B