**Inorganic Chemistry Question Bank**

**Atoms, Orbitals, and Quantum Numbers**

1. **What is an atom?**
2. **What are the fundamental particles of an atom?**
3. **Explain the concept of atomic number and mass number.**
4. **What are isotopes?**
5. **Describe the structure of an atom.**
6. **What are quantum numbers? Explain each quantum number.**
7. **What is the Pauli Exclusion Principle?**
8. **What is Hund's Rule?**
9. **Explain the Aufbau Principle.**
10. **What are orbitals?**
11. **Describe the shapes of s, p, and d orbitals.**
12. **What is the significance of electron configuration?**
13. **What are the quantum numbers for the last electron in 3d7**
14. **What is meant by Exchange energy?**
15. **Write the electronic configuration for 18Ar**
16. **What is meant by Lewis structure?**
17. **What are the quantum numbers for the last electron in 4s2**
18. **What is the difference between valence and core electrons**
19. **Calculate shielding effect and effective nuclear charge on the last electron in 28Ni, 14Si**
20. **Arrange the following according to increasing effective nuclear charge and give the reason for your arrangement: 6C, 8O, 10Ne**
21. **Arrange the following according to increasing shielding effect on valence electrons: 4Be, 12Mg, 20Ca**
22. **Arrange the following according to increase in atomic radii and give the reason for your arrangement: Na, Na+, K. (Note: Atomic weights: Na = 10, K = 19)**

**Periodic Table and Periodic Trends**

1. **What is the periodic law?**
2. **Explain the arrangement of elements in the periodic table.**
3. **What are the periodic trends in atomic size, ionization energy, electron affinity, and electronegativity?**
4. **How do these trends vary across a period and down a group?**
5. **What are the different blocks in the periodic table?**
6. **Explain the concept of effective nuclear charge.**
7. **How does effective nuclear charge influence periodic trends?**
8. **What are the properties of alkali metals, alkaline earth metals, halogens, and noble gases?**

**Valence Bond Theory and VSEPR Theory**

1. **What is valence bond theory?**
2. **Explain the concept of orbital overlap.**
3. **What is hybridization?**
4. **Describe the different types of hybridization (sp, sp², sp³, sp³d², sp³d³).**
5. **What is VSEPR theory?**
6. **How can VSEPR theory be used to predict molecular geometry?**
7. **Explain the concept of bond polarity and electronegativity.**
8. **What are dipole moments?**

**Molecular Orbital Theory**

1. **What is molecular orbital theory?**
2. **How are molecular orbitals formed?**
3. **Explain the concepts of bonding and antibonding molecular orbitals.**
4. **What is bond order?**
5. **How does bond order relate to bond strength and bond length?**
6. **What is the difference between sigma and pi bonds?**
7. **How can molecular orbital theory explain the magnetic properties of molecules?**