1. **Question 1:** Explain the difference between a covalent bond and an ionic bond.

2. **Question 2:** What is electronegativity, and how does it influence the type of bond formed between two atoms?

3. **Question 3:** Describe the general trend of atomic radii across a period in the periodic table. Why does this trend occur?

4. **Question 4:** What are valence electrons, and why are they important in chemical bonding?

5. **Question 5:** Define ionization energy. How does ionization energy generally change down a group in the periodic table?

6. **Question 6:** Explain the concept of isoelectronic species. Give an example of two isoelectronic ions.

7. **Question 7:** What is a polar covalent bond? Give an example of a molecule containing a polar covalent bond.

8. **Question 8:** Describe the "sea of electrons" model for metallic bonding.

9. **Question 9:** How does electron affinity relate to ionization energy?

10. **Question 10:** Explain how to determine the electron configuration of a cation formed from a transition metal.

Question Number	Answer
1	A covalent bond involves the sharing of electrons between atoms, while an ionic bond involves the transfer of electrons from one atom to another, resulting in the formation of ions that are held together by electrostatic forces.
2	Electronegativity is the ability of an atom to attract electrons in a chemical bond. A large difference in electronegativity between two atoms leads to the formation of a polar covalent or ionic bond, while a small difference leads to a nonpolar covalent bond.
3	Atomic radii generally decrease across a period from left to right. This is because the number of protons in the nucleus increases, leading to a stronger attraction between the nucleus and the electrons, which pulls the electrons closer to the nucleus.
4	Valence electrons are the electrons in the outermost shell of an atom. They are important in chemical bonding because they are the electrons that participate in the formation of chemical bonds.
5	Ionization energy is the minimum energy required to remove an electron from a gaseous atom in its ground state. Ionization energy generally decreases down a group in the periodic table because the outermost electrons are farther from the nucleus and are therefore easier to remove.
6	Isoelectronic species are atoms, ions, or molecules that have the same number of electrons. For example, Na+ and Ne are isoelectronic.
7	A polar covalent bond is a covalent bond in which the electrons are not shared equally between the two atoms. This results in a partial positive charge on one atom and a partial negative charge on the other atom. An example is the bond in H-Cl.
8	In the "sea of electrons" model, the valence electrons of metal atoms are delocalized and can move freely throughout the metal. These electrons are attracted to the positively charged metal ions, which holds the metal together.
9	Electron affinity is the energy change that occurs when an electron is added to a gaseous atom. Ionization energy is the energy required to remove an electron from a gaseous atom. They are related in that both describe the energy associated with gaining or losing electrons, and their trends are generally the same.
10	When a cation is formed from a transition metal, electrons are always removed first from the ns orbital and then from the (n – 1)d orbitals.