Name _____

Bonding Wonders: Everyday Substances and Chemical Bonds

Short Answer Key

1. Covalent bonds in methane involve the sharing of electrons between one carbon atom and four hydrogen atoms. Each hydrogen atom shares one electron with the carbon atom, resulting in a stable molecule with four covalent bonds.
2. Table salt (sodium chloride, NaCl) is held together by ionic bonds. Sodium (Na) loses an electron to become a positively charged ion (Na+), while chlorine (Cl) gains an electron to become a negatively charged ion (Cl-). The strong attraction between oppositely charged ions creates the ionic bond that holds NaCl together.
3. Metallic bonds involve a "sea" of delocalized electrons surrounding positively charged metal ions. When an electric field is applied, these free electrons can move throughout the metal lattice, allowing the conduction of electric current. This electron mobility is responsible for the excellent electrical conductivity of metals like copper.
4. Van der Waals forces are relatively weak intermolecular forces that exist between all molecules, even in non-polar substances. They result from temporary fluctuations in electron distribution, creating temporary positive and negative regions within molecules. These forces are important for holding non-polar molecules together and influencing properties like boiling and melting points.
5. Hydrogen bonds in water are responsible for several unique properties. They give water its high surface tension, capillary action, and the ability to absorb a significant amount of heat. These properties are essential for life on Earth, as they affect the behavior of water in ecosystems, biological systems, and various natural processes.