Name: _____ **Date:** _____

Answer Key: Molecular Architecture: A 6th Grade Quest into Atomic Velcro

Go beyond static diagrams to construct complex molecular profiles and predict bond behaviors through chemical reasoning and structural synthesis.

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1. Imagine you are an engineer designing a new heat-resistant ceramic. Which type of bond would you prioritize for its high melting point and crystal lattice structure?

Answer: B) Ionic bonding

Ionic bonds, like those in Lithium Bromide, create strong electrostatic attractions in a 3D lattice, resulting in materials that can withstand extreme heat.

2. A mystery substance found in a meteor is highly conductive and can be hammered into thin sheets. This suggests the presence of a _____.

Answer: C) Metallic bond

Metallic bonds feature a 'sea of electrons' that allows atoms to slide past each other (malleability) and carry an electrical charge.

3. In a covalent bond between two Phosphorus atoms, the electrons are shared equally because the atoms have the same pull on the electrons.

Answer: A) True

When two identical atoms bond, their electronegativity is equal, creating a non-polar covalent bond where sharing is perfectly symmetrical.

4. Why does a molecule like Ammonia (NH_3) stay together differently than a salt crystal?

Answer: A) Ammonia atoms share electrons to fill their outer shells.

Ammonia is a covalent compound; Nitrogen and Hydrogen share valence electrons to achieve stable, full outer electron shells.

5. If an atom of Potassium (K) meets an atom of Iodine (I), the Potassium will _____ an electron to achieve a stable octet.

Answer: B) Transfer

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Potassium is a metal and Iodine is a non-metal; the most efficient path to stability is for the metal to transfer its valence electron to the non-metal.

6. In the molecule Carbon Tetrachloride (CCl_4), one Carbon atom bonds with four Chlorine atoms. This is an example of what structural concept?

Answer: C) Covalent Bonding

Since Carbon and Chlorine are both non-metals, they share electron pairs to reach stability, forming four distinct covalent bonds.

7. An ionic bond usually occurs between two elements found on the far left side of the Periodic Table.

Answer: B) False

Ionic bonds typically form between a metal (left side) and a non-metal (right side), not between two metals.

8. The tendency of an atom to attract a shared pair of electrons toward itself is called _____.

Answer: B) Electronegativity

Electronegativity determines how 'greedy' an atom is for shared electrons, which dictates if a covalent bond is polar or non-polar.

9. Evaluate this scenario: A substance dissolves in water and the resulting solution conducts electricity. What was the most likely bond type in the original solid?

Answer: C) Ionic

Ionic compounds break into individual charged ions when dissolved in water, allowing the liquid to carry an electrical current.

10. A triple covalent bond involve sharing six total electrons between two atoms.

Answer: A) True

Each bond represents one pair (2 electrons). Therefore, a triple bond (like in Nitrogen gas, N_2) represents three pairs, totaling six electrons.