

Name: _____ Date: _____

Answer Key: Electrifying Chemical Bonding Quiz for Grade 12

Go beyond electron counting to identify lattice structures and electronegativity trends across cesium iodide and crystalline lattices.

1. Which of the following substances relies on a 'sea of delocalized electrons' to maintain its structural integrity and high thermal conductivity?

Answer: B) Solid Aluminum (Al)

Metallic bonding in substances like aluminum involves a lattice of cations surrounded by a mobile sea of valence electrons, which facilitates both conductivity and malleability.

2. Ionic bonds are generally formed between atoms with significantly different electronegativity values.

Answer: A) True

Ionic bonds typically occur when the electronegativity difference is greater than 1.7, leading to a full transfer of electrons from a metal to a non-metal.

3. In the molecule Phosphorus Trichloride (PCl₃), the bonding between the phosphorus and chlorine atoms is characterized as _____.

Answer: C) Covalent

Because phosphorus and chlorine are both non-metals with relatively similar electronegativities, they share valence electrons to achieve a stable octet.

4. Which characteristic is most typical of a compound held together by ionic bonds, such as Lithium Fluoride?

Answer: C) High brittleness

Ionic solids are brittle because shifting the crystal lattice brings ions of like charges together, causing strong repulsion and shattering.

5. A triple bond involves the sharing of four electrons between two atoms.

Answer: B) False

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A triple bond, such as that found in Nitrogen gas (N₂), involves the sharing of six electrons (three pairs) between two atoms.

6. Which of these molecules contains at least one multiple covalent bond?

Answer: B) Ethene (C₂H₄)

Ethene contains a carbon-carbon double bond, whereas the other options consist solely of single sigma bonds.

7. Atoms engage in chemical bonding primarily to attain a lower potential energy state and a stable _____.

Answer: C) Electron configuration

Bonding allows atoms to reach a stable electron configuration, often mimicking the noble gases (the octet rule).

8. Which of the following is a direct result of the high electrostatic lattice energy in Cesium Chloride?

Answer: A) High melting point

Strong electrostatic attractions between cations and anions in an ionic lattice require significant thermal energy to overcome, resulting in high melting points.

9. Covalent bonds are responsible for the high electrical conductivity found in solid Silver.

Answer: B) False

Metallic bonding, not covalent bonding, allows for the movement of electrons that produces electrical conductivity in silver.

10. The structural arrangement of ions in a repeating pattern within an ionic compound is known as a crystal _____.

Answer: A) Lattice

A crystal lattice is a symmetrical three-dimensional arrangement of atoms or ions inside a solid.