Atoms and Bonding

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Elements and Atoms

Why are elements sometimes called the building blocks of matter?

- Elements are often called the building blocks of matter because all matter is composed of one element or a combination of two or more elements.

Elements and Atoms

How did atomic theory develop and change?

- Atomic theory grew as a series of models that developed from experimental evidence. As more evidence was collected, the theory and models were revised.

Atoms, Bonding, and the Periodic Table

How is the reactivity of elements related to valence electrons in atoms?

- The number of valence electrons in an atom of an element determines many properties of that element, including the ways in which the atom can bond with other atoms.

Atoms, Bonding, and the Periodic Table

What does the periodic table tell you about atoms and the properties of elements?

- As the number of protons (atomic number) increases, the number of electrons also increases. As a result, the properties of the elements change in a regular way across a period.

Ionic Bonds

What are ions, and how do they form bonds?

- When an atom loses an electron, it loses a negative charge and becomes a positive ion.
- When an atom gains an electron, it gains a negative charge and becomes a negative ion.

Ionic Bonds

How are the formulas and names of ionic compounds written?

- When ionic compounds form, the ions come together in a way that balances out the charges on the ions.
- The chemical formula for the compound reflects this balance.
- For an ionic compound, the name of the positive ion comes first, followed by the name of the negative ion.

Ionic Bonds

What are the properties of ionic compounds?

- In general, ionic compounds are hard, brittle crystals that have high melting points.
- When dissolved in water or melted, they conduct electricity.

Covalent Bonds

What holds covalently bonded atoms together?

- The force that holds atoms together in a covalent bond is the attraction of each atom’s nucleus for the shared pair of electrons.

Covalent Bonds

What are the properties of molecular compounds?

- Compared to ionic compounds, molecular compounds generally have lower melting points and boiling points, and they do not conduct electricity when dissolved in water.

Covalent Bonds

How does unequal sharing of electrons occur, and how does it affect molecules?

- Atoms of some elements pull more strongly on shared electrons than do atoms of other elements. As a result, the electrons are pulled more toward one atom, causing the bonded atoms to have slight electrical charges.

Bonding in Metals

How are metal atoms bonded in solid metal?

- A metal crystal consists of positively charged metal ions embedded in a “sea” of valence electrons.

Bonding in Metals

How does metallic bonding result in useful properties of metals?

- The “sea of electrons” model of solid metals explains their ability to conduct heat and electricity, the ease with which they can be made to change shape, and their luster.