

COMPOUNDS AND REACTIONS from the *Elements of Chemistry Series***True or False**

Directions: *This will help you discover what you know about compounds and reactions before you begin this lesson. Answer the following True or False. Circle T for true and F for false.*

- Matter can never change. T F
- Chemical reactions occur when there is a change in the chemical composition of substances. T F
- In a mixture, substances do not bond. T F
- In an ionic bond, the protons in the nucleus attach themselves to other atoms. T F
- An electropositive element is one that has a tendency to attract electrons. T F
- Molecules are covalent bonds. T F
- A molecular formula precisely describes how many atoms there are in a single molecule. T F
- A molecule of water, H₂O, has two oxygen atoms and one hydrogen atom. T F
- All life processes—like respiration, digestion, and reproduction—are chemical processes. T F
- A battery produces electricity by passing electrons back and forth from the anode to the cathode. T F

Use the Right Word

Directions: *Find the right word from the vocabulary list that completes the following sentences.*

- Fusion is an example of _____ because it is the change in the nucleus of atoms.
- _____ occurs when there is an actual change in the chemical composition of substances.
- An _____ is an atom that has more or less protons than electrons.
- "Atoms tend to gain, lose or share electrons in order to acquire a full set of valence electrons," is called the _____.
- Substances formed when electrons are shared between atoms in covalent bonds are called _____.
- _____ are precise descriptions of the number and type of elements in a single molecule.
- Many molecules have slight negative or positive electrical charges. This is called _____.
- A union of substances into a new molecular structure is called a _____.
- _____ refers to the loss of electrons, while _____ refers to the gain of electrons.
- A device for producing an electrical current by the action of two plates of different metals in an electrolyte is called a _____ battery.

Word Match

Directions: *Connect the word with the proper definition.*

anode	an atom with more or less protons than electrons
cathode	molecules with a slight positive or negative charge
chemical	reaction change in chemical composition of substance
electrochemistry	the gain of electrons
element	where oxidation occurs
ion	where reduction occurs
molecule	an atom with a unique number of protons
oxidation	study of chemical effects of electrical action
polarity	covalent bond
reduction	loss of electrons

Vocabulary Definitions

anode - Where oxidation, or the giving up of electrons, occurs.

atom - The fundamental unit of matter in the universe, made up of a nucleus of protons and neutrons and orbiting electrons

atomic number - The number of an element determined by the number of protons in its nucleus.

atomic mass - The mass of the element.

cathode - Where reduction, or the gain of electrons, occurs.

change of state - Most substances can undergo changes from a gas, to a liquid, to a solid, but still retain their chemical composition.

This is sometimes called physical change.

chemical bonds - When valence electrons of elements are lost, gained, or shared between different atoms to create substances with unique chemical properties.

chemical equations - Descriptions of what happens in a chemical reaction using chemical symbols.

chemical reaction - A change in the chemical composition of a substance.

compounds - When valence electrons of elements are lost gained or shared between different atoms to create substances with unique chemical properties.

covalent bonds - When electrons are shared between atoms, they are called covalent bonds, or molecules.

double replacement - An exchange of elements to form a new compound.

electrochemistry - The study of the chemical effects of electrical action.

electron - Negatively charged particles that orbit the nucleus of atoms.

electronegative elements - Those elements that tend to attract electrons. They are on the right-hand side of the periodic table.

electropositive elements - Those elements that tend to lose electrons. They are on the left-hand side of the periodic table.

element - An atom with a unique number of protons.

energy levels - Electrons orbit the nucleus of atoms with different levels of energy. These energy levels are sometimes called shells or levels. The energy levels correspond to the periods of the periodic table.

fission - When the nucleus of atoms are split apart releasing energy. This is the energy of nuclear bombs and nuclear reactors.

fusion - When two hydrogen atoms fuse under extreme heat, energy is released.

Fusion is the energy of the sun and stars.

groups - Vertical columns of the periodic table.

ions - Atoms with more electrons than protons or fewer electrons than protons are called ions.

ionic bonds - Two or more ions held together by the electrical attractions between them.

Law of Constant Composition - A given compound always contains the same elements in the same proportion by mass.

Lewis Dot drawings - Representations of elements by showing the valence electrons as dots around the nucleus.

matter - Material that makes up objects. Matter cannot be created or destroyed.

mass - The total quantity of an object's matter.

mixtures - When substances are mixed but do not chemically bond.

molecules - When electrons are shared between atoms. Molecules are covalent bonds.

molecular formula - The precise description of the type and number of atoms in a single molecule.

negative ion - An ion that has more electrons than protons.

neutral atom - When an atom has an equal number of protons and electrons, its electrical charges are balanced and the atom has a neutral electrical charge.

neutron - Particles in the nucleus of atoms that have no electrical charge.

nuclear change - A change that occurs in the nucleus of atoms.

octet rule - Atoms tend to gain, lose, or share electrons in order to acquire a full set of valence electrons.

physical change - When a substance undergoes change but retains its chemical composition. This is sometimes called change of state.

polarity - Molecules with slight negative or positive charges.

positive ion - An ion that has fewer electrons than protons.

proton - Positively charged part of the nucleus of atoms.

Quantum Theory - The theory that explains matter and energy at atomic and subatomic levels.

radiation - When the nucleus of an atom decomposes to form a new nucleus, it releases radiation in the process.

reduction - The gain of electrons.

single replacement - When an element replaces another element.

synthesis - A union of substances into a new molecular structure.

valence electrons - The outer ring of electrons of an element.

Volta, Alessandro (1745-1827) - Italian physicist best known as the developer of the voltaic battery, which is named after him.

voltaic cell battery - A device for producing an electric current by the action of two plates of different metals in an electrolyte.