



Coffee Break Training - Hazardous Materials

Fundamental Chemistry Terms

No. HM-2012-4 November 12, 2012

Learning Objective: The student shall be able to define some fundamental chemistry terms.

Chemistry is the science of matter, energy and reactions. It is essential that first responders who may be exposed to hazardous materials have a fundamental understanding of key terms.

Inorganic chemistry is the study of all compounds except hydrocarbons and their derivatives. Generally speaking, inorganic chemistry involves compounds that do not include carbon. **Organic chemistry** is the study of compounds that are formed predominantly with carbon and hydrogen, although other elements can be in combination. As with inorganic chemistry, there are some limited exceptions to this simplified definition.

Matter is anything that has mass and occupies space. It can exist as a solid, liquid or gas. A **solid** is a state of matter that has a definite shape and a definite volume while a **liquid** is a state of matter that has a definite volume but no definite shape. A **gas** is the state of matter in which the molecules are colliding together but have relatively low density. It has no definite shape, and its density and volume vary with temperature and pressure.

An **element** is a material that cannot be broken down into simpler material by chemical means. Elements are the building blocks of the universe.

A **compound** is two or more elements bound together.

Pure substances are elements or elements that have been joined chemically to form a compound. Some compounds are “binary,” which means they contain only two components. Carbon dioxide (CO₂) is an example that contains only carbon and oxygen.

Mixtures may be mixtures of compounds and elements. Mixtures are combinations of elements that are not joined chemically.

Homogeneous mixtures are relatively uniform in composition. For example, air is a uniform mixture of oxygen, nitrogen and trace elements.

Heterogeneous mixtures may or may not have uniformly dispersed constituents.

For additional information, you can enroll in the National Fire Academy’s (NFA’s) Online self-study course “Foundational Concepts in Chemistry” (Q228) found at <http://www.usfa.fema.gov/nfa/nfaonline/browse/hazmat.shtm>



A knowledge of chemistry is essential to identify the hazards associated with many materials that responders may encounter.

For archived downloads, go to:

www.usfa.fema.gov/nfa/coffee-break/