

Name:

Date:

Class:

Vocabulary List Answer Key

Fill in definitions for each word below. Save this list as a useful resource throughout the project.

Review of Basic Terminology

gas-phase pollutant: A compound comprised of multiple atoms (such as carbon dioxide with 1 carbon and 2 oxygens), existing in the gaseous physical phase.

particulate matter: A microscopic solid or liquid compound that may be natural or human-made. Very small particulate matter may be a conglomerate of gas-phase compounds; larger particulate matter can be dust or pollen.

carbon dioxide (CO₂): A gas-phase pollutant. Composed of 1 carbon atom and 2 oxygen atoms. Generated by the respiration of animals and the combustion or burning of fuels that contain carbon. Abbreviated as CO₂.

nitrogen dioxide (NO₂): A gas-phase compound made of 1 nitrogen atom and 2 oxygen atoms. It is formed during high-temperature combustion from the nitrogen that exists in the air. High temperature combustion also makes NO. Together, NO and NO₂ are considered NO_x (NO + NO₂ = NO_x).

volatile organic compound (VOC): An organic chemical that has a high vapor pressure at ordinary room temperature, such that it volatilizes (enters the gas phase) at room temperature and pressure. An example is formaldehyde (CH₂O, 1 carbon, 2 hydrogens, and 1 oxygen atom). Abbreviated as VOC. VOCs are also gas-phase compounds. VOCs also include products of incomplete combustion (when a carbon-fuel is not completely burned, resulting in only CO₂).

hydrocarbon (HC): A compound that contains only carbon and hydrogen atoms. Another term for VOC.

ozone (O₃): A secondary pollutant formed by NO_x and VOCs in the presence of sunlight. Dangerous to human health at ground level, but high in the stratosphere it protects humans from harmful UV rays. Mnemonic: “good up high, bad nearby.”

carbon monoxide (CO): A compound that is a product of incomplete combustion, and is dangerous to human health. Composed of 1 carbon atom and 1 oxygen atom.

New Terminology

emissions: The release of pollutants produced during a reaction (in the case of air pollutants, into the atmosphere). For example, exhaust gas from motor vehicles.

complete combustion: Combustion in which all of the available carbon is fully oxidized to CO₂, which requires sufficient oxygen and high enough temperatures for efficient burning. Example: A modern vehicle with no visible emissions leaving the tailpipe, because CO₂ is an invisible gas.

incomplete combustion: Combustion in which all available carbon is not completely oxidized and products such as CO, VOCs, and unburned fuel are released. Typically, these emissions chemicals are dangerous to human health. Circumstances that can cause incomplete combustion are lower temperatures and insufficient oxygen. Observed by “rolling coal” aka black smoke billowing from tailpipes.

air-fuel ratio: A ratio of the relative amounts of air and fuel used in the combustion reaction. The ratio affects the reaction’s by-products. For example, not enough air results in a fuel-rich burn, which corresponds to more incomplete combustion. Alternatively, an air-rich burn results in more complete combustion because no shortage of oxygen molecules exists. Also called the air-to-fuel ratio.

fossil fuel: A hydrocarbon material used for fuel that was formed from the natural process of decomposing animal and plant matter. Formed deep under the Earth’s surface under high pressure and high temperature over millions of years. Examples: petroleum, coal, natural gas.

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source apportionment: A type of mathematical analysis on a data set that includes many different pollutants, the result of which provides an idea of how much of each pollutant comes from the different local sources. For example, it might tell you that 70% of CO₂ comes from traffic, while 30% comes from a local power plant.

confounding factor: A variable that correlates with the dependent and independent variable. For example, wind could be a confounding factor when measuring car emissions because it could affect the measurements.

combustion: A high-temperature chemical reaction with hydrocarbon and oxygen as the reactants and heat, carbon dioxide and water as the products.

British thermal unit (BTU): A unit of work. The amount of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit. It is equivalent to 1,055 joules. Abbreviated as BTU.

catalytic converter: An emissions control device for cars that converts toxic gases and pollutants to less harmful pollutants. The device takes CO and unburned hydrocarbons and produces CO₂, and reduce NO_x to less harmful molecules.