

1. acidity	Chemical characteristic that helps determine how a substance dissolved in water (a solution) will interact with and affect its environment; based on the comparative amounts of hydrogen ions (H ⁺) and hydroxide ions (OH ⁻) contained in a particular volume of the solution. See pH.	13. chlorinated hydrocarbon	Organic compound made up of atoms of carbon, hydrogen, and chlorine. Examples include DDT and PCBs.
2. alpha particle	Positively charged matter, consisting of two neutrons and two protons, which is emitted as radioactivity from the nuclei of some radioisotopes. See also beta particle, gamma rays.	14. chromosome	A grouping of genes and associated proteins in plant and animal cells that carry certain types of genetic information. See genes.
3. atom	Minute unit made of subatomic particles that is the basic building block of all chemical elements and thus all matter; the smallest unit of an element that can exist and still have the unique characteristics of that element. Compare ion, molecule.	15. compound	Combination of atoms, or oppositely charged ions, of two or more elements held together by attractive forces called chemical bonds. Examples are NaCl, CO ₂ , and C ₆ H ₁₂ O ₆ . Compare element
4. atomic number	Number of protons in the nucleus of an atom. Compare mass number.	16. data	Factual information collected by scientists.
5. atomic theory	Idea that all elements are made up of atoms; the most widely accepted scientific theory in chemistry.	17. DDT	Dichlorodiphenyltrichloroethane, a chlorinated hydrocarbon that has been widely used as an insecticide but is now banned in some countries.
6. beta particle	Swiftly moving electron emitted by the nucleus of a radioactive isotope. See also alpha particle, gamma ray.	18. ecological tipping point	Point at which an environmental problem reaches a threshold level, which causes an often irreversible shift in the behavior of a natural system.
7. cell	Smallest living unit of an organism. Each cell is encased in an outer membrane or wall and contains genetic material (DNA) and other parts to perform its life function. Organisms such as bacteria consist of only one cell, but most organisms contain many cells.	19. electromagnetic radiation	Forms of kinetic energy traveling as electromagnetic waves. Examples include radio waves, TV waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays, and gamma rays. Compare ionizing radiation, nonionizing radiation.
8. cell theory	The idea that all living things are composed of cells; the most widely accepted scientific theory in biology.	20. electron (e)	Tiny particle moving around outside the nucleus of an atom. Each electron has one unit of negative charge and almost no mass. Compare neutron, proton.
9. chain reaction	Multiple nuclear fissions, taking place within a certain mass of a fissionable isotope, which release an enormous amount of energy in a short time.	21. element	Chemical, such as hydrogen (H), iron (Fe), sodium (Na), carbon (C), nitrogen (N), or oxygen (O), whose distinctly different atoms serve as the basic building blocks of all matter. Two or more elements combine to form the compounds that make up most of the world's matter. Compare compound.
10. chemical	One of the millions of different elements and compounds found naturally and synthesized by humans. See compound, element	22. energy conservation	Reducing or eliminating the unnecessary waste of energy.
11. chemical change	Interaction between chemicals in which the chemical composition of the elements or compounds involved changes. Compare nuclear change, physical change.		
12. chemical formula	Shorthand way to show the number of atoms (or ions) in the basic structural unit of a compound. Examples include H ₂ O, NaCl, and C ₆ H ₁₂ O ₆ .		

23. energy quality	Ability of a form of energy to do useful work. High-temperature heat and the chemical energy in fossil fuels and nuclear fuels are concentrated high-quality energy. Low-quality energy such as low-temperature heat is dispersed or diluted and cannot do much useful work. See high-quality energy, low-quality energy.	32. heat	Total kinetic energy of all randomly moving atoms, ions, or molecules within a given substance, excluding the overall motion of the whole object. Heat always flows spontaneously from a warmer sample of matter to a colder sample of matter. This is one way to state the second law of thermodynamics. Compare temperature.
24. feedback	Any process that increases (positive feedback) or decreases (negative feedback) a change to a system.	33. high-quality energy	Energy that is concentrated and has great ability to perform useful work. Examples include high-temperature heat and the energy in electricity, coal, oil, gasoline, sunlight, and nuclei of uranium-235. Compare low-quality energy.
25. feedback loop	Occurs when an output of matter, energy, or information is fed back into the system as an input and leads to changes in that system. See positive feedback loop and negative feedback loop.	34. hydrocarbon	Organic compound made of hydrogen and carbon atoms. The simplest hydrocarbon is methane (CH ₄), the major component of natural gas.
26. first law of thermodynamics	Whenever energy is converted from one form to another in a physical or chemical change, no energy is created or destroyed, but energy can be changed from one form to another; you cannot get more energy out of something than you put in; in terms of energy quantity, you cannot get something for nothing. This law does not apply to nuclear changes, in which large amounts of energy can be produced from small amounts of matter. See second law of thermodynamics.	35. inorganic compounds	All compounds not classified as organic compounds. See organic compounds.
27. flows	Rate of flow of matter, energy, or information through a system. Compare input, output. See throughputs.	36. input	Matter, energy, or information entering a system. Compare output, throughput.
28. fossil fuel	Products of partial or complete decomposition of plants and animals; occurs as crude oil, coal, natural gas, or heavy oils as a result of exposure to heat and pressure in the earth's crust over millions of years. See coal, crude oil, natural gas.	37. ion	Atom or group of atoms with one or more positive (+) or negative (?) electrical charges. Examples are Na ⁺ and Cl ⁻ . Compare atom, molecule.
29. frontier science	Preliminary scientific data, hypotheses, and models that have not been widely tested and accepted. Compare reliable science, unreliable science. See tentative science.	38. isotopes	Two or more forms of a chemical element that have the same number of protons but different mass numbers because they have different numbers of neutrons in their nuclei.
30. gene pool	Sum total of all genes found in the individuals of the population of a particular species.	39. junk science	Scientific results or hypotheses presented as reliable science without having undergone the rigors of the peer review process. Compare reliable science, tentative science. See unreliable science.
31. genes	Coded units of information about specific traits that are passed from parents to offspring during reproduction. They consist of segments of DNA molecules found in chromosomes.	40. kinetic energy	Energy that matter has because of its mass and speed, or velocity. Compare potential energy.
		41. law of conservation of energy	Whenever energy is converted from one form to another in a physical or chemical change, no energy is created or destroyed, but energy can be changed from one form to another; you cannot get more energy out of something than you put in; in terms of energy quantity, you cannot get something for nothing. This law does not apply to nuclear changes, in which large amounts of energy can be produced from small amounts of matter. See second law of thermodynamics. See first law of thermodynamics.

42. law of conservation of matter	In any physical or chemical change, matter is neither created nor destroyed but merely changed from one form to another; in physical and chemical changes, existing atoms are rearranged into different spatial patterns (physical changes) or different combinations (chemical changes).	52. nuclear change	Process in which nuclei of certain isotopes spontaneously change, or are forced to change, into one or more different isotopes. The three principal types of nuclear change are natural radioactivity, nuclear fission, and nuclear fusion. Compare chemical change, physical change.
43. law of nature	Description of what scientists find happening in nature repeatedly in the same way, without known exception. See first law of thermodynamics, law of conservation of matter, second law of thermodynamics. Compare scientific data, scientific hypothesis, scientific methods, scientific model, scientific theory. See scientific law.	53. nuclear fission	Nuclear change in which the nuclei of certain isotopes with large mass numbers (such as uranium-235 and plutonium-239) are split apart into lighter nuclei when struck by a neutron. This process releases more neutrons and a large amount of energy. Compare nuclear fusion.
44. low-quality energy	Energy that is dispersed and has little ability to do useful work. An example is low-temperature heat. Compare high-quality energy.	54. nuclear fusion	Nuclear change in which two nuclei of isotopes of elements with a low mass number (such as hydrogen-2 and hydrogen-3) are forced together at extremely high temperatures until they fuse to form a heavier nucleus (such as helium-4). This process releases a large amount of energy. Compare nuclear fission.
45. mass number	Sum of the number of neutrons (n) and the number of protons (p) in the nucleus of an atom. It gives the approximate mass of that atom. Compare atomic number.	55. nucleus	Extremely tiny center of an atom, making up most of the atom's mass. It contains one or more positively charged protons and one or more neutrons with no electrical charge (except for a hydrogen-1 atom, which has one proton and no neutrons in its nucleus).
46. matter	Anything that has mass (the amount of material in an object) and takes up space. On the earth, where gravity is present, we weigh an object to determine its mass.	56. organic compounds	Compounds containing carbon atoms combined with each other and with atoms of one or more other elements such as hydrogen, oxygen, nitrogen, sulfur, phosphorus, chlorine, and fluorine. All other compounds are called inorganic compounds.
47. model	Approximate representation or simulation of a system being studied.	57. output	Matter, energy, or information leaving a system. Compare input, throughput.
48. molecule	Combination of two or more atoms of the same chemical element (such as O ₂) or different chemical elements (such as H ₂ O) held together by chemical bonds. Compare atom, ion.	58. peer review	Process of scientists reporting details of the methods and models they used, the results of their experiments, and the reasoning behind their hypotheses for other scientists working in the same field (their peers) to examine and criticize.
49. negative feedback loop	Feedback loop that causes a system to change in the opposite direction from which it is moving. Compare positive feedback loop.	59. pH	Numeric value that indicates the relative acidity or alkalinity of a substance on a scale of 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7; basic or alkaline solutions have pH values greater than 7.
50. neutron (n)	Elementary particle in the nuclei of all atoms (except hydrogen-1). It has a relative mass of 1 and no electric charge. Compare electron, proton.		
51. nonrenewable energy	Energy from resources that can be depleted and are not replenished by natural processes within a human time scale. Examples are energy produced by the burning of oil, coal, and natural gas, and nuclear energy released when the nuclei of heavy elements such as uranium are split apart (nuclear fission) or when the nuclei of light atoms such as hydrogen are forced together (nuclear fusion). Compare renewable energy.		

60. physical change	Process that alters one or more physical properties of an element or a compound without changing its chemical composition. Examples include changing the size and shape of a sample of matter (crushing ice and cutting aluminum foil) and changing a sample of matter from one physical state to another (boiling and freezing water). Compare chemical change, nuclear change.	70. scientific theory	A well-tested and widely accepted scientific hypothesis. Compare scientific data, scientific hypothesis, scientific law, scientific methods, scientific model.
61. positive feedback loop	Feedback loop that causes a system to change further in the same direction. Compare negative feedback loop.	71. second law of thermodynamics	Whenever energy is converted from one form to another in a physical or chemical change, we end up with lower-quality or less usable energy than we started with. In any conversion of heat energy to useful work, some of the initial energy input is always degraded to lower-quality, more dispersed, less useful energy?usually low-temperature heat that flows into the environment; you cannot break even in terms of energy quality. See first law of thermodynamics.
62. potential energy	Energy stored in an object because of its position or the position of its parts. Compare kinetic energy.	72. statistics	Mathematical tools used to collect, organize, and interpret numerical data.
63. probability	Mathematical statement about how likely it is that something will happen.	73. subatomic particles	Extremely small particles?electrons, protons, and neutrons?that make up the internal structure of atoms.
64. reliable science	Concepts and ideas that are widely accepted by experts in a particular field of the natural or social sciences. Compare tentative science, unreliable science.	74. synergistic interaction	Interaction of two or more factors or processes so that the combined effect is greater than the sum of their separate effects.
65. renewable energy	Energy that comes from resources that are replenished by natural processes continually or in a relatively short time. Examples are solar energy (sunlight), wind, moving water, heat from the earth's interior (geothermal energy), firewood from trees, tides, and waves. Compare nonrenewable energy.	75. system	Set of components that function and interact in some regular and theoretically predictable manner.
66. science	Attempts to discover order in nature and use that knowledge to make predictions about what is likely to happen in nature. See reliable science, scientific data, scientific hypothesis, scientific law, scientific methods, scientific model, scientific theory, tentative science, unreliable science.	76. tentative science	Preliminary scientific data, hypotheses, and models that have not been widely tested and accepted. Compare reliable science, unreliable science.
67. scientific hypothesis	An educated guess that attempts to explain a scientific law or certain scientific observations. Compare scientific data, scientific law, scientific methods, scientific model, scientific theory.	77. thermal energy	The energy generated and measured by heat. See heat.
68. scientific law	Description of what scientists find happening in nature repeatedly in the same way, without known exception. See first law of thermodynamics, law of conservation of matter, second law of thermodynamics. Compare scientific data, scientific hypothesis, scientific methods, scientific model, scientific theory.	78. throughput	Rate of flow of matter, energy, or information through a system. Compare input, output.
69. scientific methods	The ways scientists gather data and formulate and test scientific hypotheses, models, theories, and laws. See scientific data, scientific hypothesis, scientific law, scientific model, scientific theory.	79. time delay	In a complex system, the period of time between the input of a feedback stimulus and the system's response to it. See tipping point.
		80. tipping point	Threshold level at which an environmental problem causes a fundamental and irreversible shift in the behavior of a system. See climate tipping point, ecological tipping point.
		81. trait	Characteristic passed on from parents to offspring during reproduction in an animal or plant.

82. unreliable science	Scientific results or hypotheses presented as reliable science without having undergone the rigors of the peer review process. Compare reliable science, tentative science.
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