chemistry = the science of the structure and interactions of matter
chemical element = a substance that cannot be split into a simpler substance by ordinary chemical means
atom = the smallest unit of matter that retains the properties and characteristics of the element
atomic number = the number of protons in the nucleus of an atom
proton = positively charged subatomic particle within the atomic nucleus
neutron = uncharged (neutral) subatomic particle within the atomic nucleus
electron = negatively charged subatomic particle that moves about in a large space surrounding the nucleus
isotope = atom of an element containing a different number of neutrons
compared to another atom of the same element

Some questions to check your comprehension:

Which is smaller, an atom or an electron?

Two isotopes of carbon will have different numbers of which subatomic particle?

You can tell that an atom is a carbon atom if you know the number of which subatomic particles within it?

Does an electron of carbon have properties and characteristics that make it different from an electron of oxygen?

mass number = the total number of subatomic particles in the nucleus of an atom (protons + neutrons)
radioactive isotope = unstable isotope that can undergo spontaneous decay into a more stable form
During decay radioactive isotopes emit radiation of either subatomic particles or packets of energy
In the process of decay a radioactive isotope often transforms into a different element
half life = the time required for half of the radioactive atoms in a sample of a specific isotope
to decay into a more stable form
atomic mass unit (dalton) = the standard unit for measuring the mass of atoms and subatomic particles
A neutron and a proton each have a mass of approximately 1 dalton
ion = an atom that has a positive or negative charge because it has unequal numbers of protons and electrons
An ion is formed when a neutral atom gains or loses one or more electrons
molecule = a combination of atoms that are connected because they share electrons with each other
molecular formula = a way of indicating which elements and how many atoms of each element
are present in a specific molecule
compound = a substance that contains atoms of two or more different elements

Some questions to check your comprehension:

Carbon-12 and carbon-14 are two isotopes that differ from each other in having different numbers of what subatomic particle?

Is $C_6H_{12}O_6$ a compound?

Is O_2 a compound?

A sodium atom and a sodium ion differ in the number of what subatomic particles that they contain?

An atom has 6 protons, 6 neutrons, and 6 electrons: what would be the mass number of this atom?

valence shell = the outermost shell of an atom
octet rule = eight electrons in a valence shell is a more stable arrangement than some other number
chemical bond = the force that holds together the atoms of a molecule or compound
covalent bond = a force that holds together atoms through those atoms sharing electrons
single covalent bond = the chemical bond formed when two atoms share one electron pair (2 electrons)
double covalent bond = the chemical bond formed when two atoms share two pairs of electrons (4 electrons)
triple covalent bond = the chemical bond formed when two atoms share three pairs of electrons (6 electrons)
electronegativity = the power that an atom has to attract electrons to itself
nonpolar covalent bond = a covalent bond in which atoms share the electrons equally
polar covalent bond = a covalent bond in which atoms share the electrons unequally

Some questions to check your comprehension:

Carbon and hydrogen tend to form nonpolar covalent bonds – which means they share electrons… (circle one)

equally unequally

A carbon atom can form a triple covalent bond with another carbon atom - in which case the two carbon atoms are sharing how many electrons between them?

Answer:_____ electrons
(insert number)

ionic bond = a force that holds together positive and negative ions
cation = a positively charged ion (an atom that has less electrons than protons)
anion = a negatively charged ion (an atom that has more electrons than protons)
electrolyte = an ionic compound that breaks apart into positive and negative ions in solution
hydrogen bond = a chemical bond that forms when a hydrogen atom with a partial positive charge attracts the partial negative charge of neighboring electronegative atom, most often oxygen or nitrogen.

Some questions to check your comprehension:

Which of the following are cations? (circle all correct answers)

Na^+ Cl^- Fe^{3+} O^{2-} Mg^{2+} Li^+ S^{2-}

A hydrogen bond can be found… (circle one)

…inside a water molecule …between two water molecules

When NaCl is added to water it separates into Na+ and Cl- which makes NaCl a(n)… (circle one)

hydrogen bonded molecule polar covalent compound electrolyte