

Ch 2 - Chemistry Basics - The Chemical Context of Life

Basic Principles of Chemistry

- _____ An acronym which aids us in remembering the elements which contribute nearly all the mass of living matter.
- _____ The smallest unit of an element: composed of protons, neutrons, and electrons.
- _____ Two or more atoms, joined together, form _____.

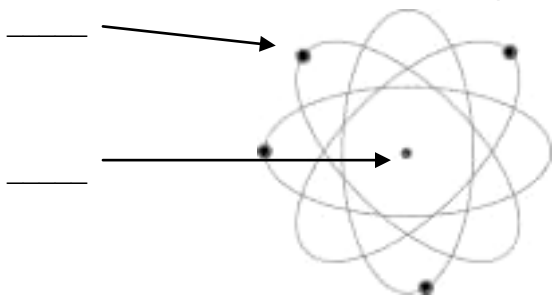


Multiple Matching

P – Proton**N** – Neutron**E** – Electron

Answers consist of **one, two, or even three** subatomic particles (listed above).

- _____ The behavior of this subatomic particle determines *bonding properties*.
- _____ The number of these subatomic particles in the nucleus of an atom determines the *identity* of the atom.
- _____ Contribute to the measurement termed *atomic number*.
- _____ Contribute to the measurement termed *atomic mass*.
- _____ Location is *orbitals* located outside and often a great distance from the nucleus.
- _____ Location *confined to the atomic nucleus*.
- _____ Show a mass of 1 *dalton* each.
- _____ No (electrical) charge.
- _____ The number of subatomic particles of this one type determines the *overall charge* of the atom (ion).
- _____ The variable number of subatomic particles of this type determines the number of *isotopes* of an element.
- _____ The fastest-moving subatomic particle.
- _____ The subatomic particle with a + *charge* and a mass of 1 dalton.
- _____ Gain or loss of this subatomic particle creates *ions*.



Electrons and Energy

What is the relationship between *energy* and the *distance an electron is found away from the nucleus*?

- _____ Are electrons in orbitals usually found *singly* or in *pairs*?
- _____ The pathway of a pair of electrons is known as its _____.
- _____ The *innermost electron shell* can hold no more than _____ (#) electrons.
- _____ The only element with an *unfilled 1s orbital* is _____.
- _____ The second shell can hold *no more than* _____ (#) electrons.
- 1_____ 2_____ 3_____ An element has 14 electrons. How many electrons are there in the first, second, and third shells.
- _____ The outer shell of an atom can hold *no more than* _____ electrons.
- _____ How many unpaired electrons does *hydrogen* show?
- _____ How many unpaired electrons does *carbon* show?

10. _____ The _____ elements have filled outer shells.

There are but two ways that an atom can “fill” its outer shell with electrons (reaching the magic number _____). What are the *two ways*?

1.

2.

During a “chemical reaction”, one begins with substances called _____ and ends with substances termed _____. In the intervening events one, hopefully, does not burn all of the _____ off his _____.

An atom that *gains* electrons becomes a _____ - charged ion.
An atom that *loses* electrons becomes a _____ - charged ion.
Forces that *hold atoms together* in a molecule are called chemical _____.

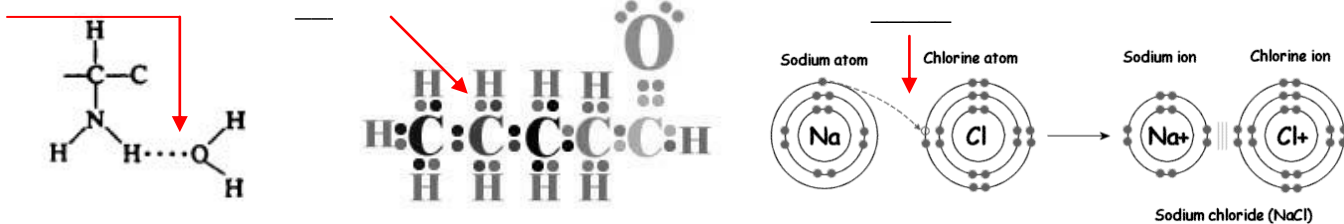


Describe chemical equilibrium –

Bond Type Matching

I – Ionic Bond **C** – Covalent Bond **H** – Hydrogen Bond

- _____ Forms between atoms with a *low electronegativity difference*.
- _____ An attraction that occurs *between molecules* as a result of opposing polarity.
- _____ H₂
- _____ H₂O
- _____ H₂O-----H₂O
- _____ A powerful bond not easily disrupted by water.
- _____ The bonds that are typical of organic molecules.
- _____ A bond type always involving a hydrogen atom.
- _____ A bond that forms between a weak electronegative element and a strong electronegative element.
- _____ The bond type most likely to occur between elements near the outer edges of the periodic table.
- _____ Involves an electron donor and an electron acceptor.
- _____ The bond type that dissociates easily in water (due to water’s polarity).
- _____ The bond type that holds together the two sides of the double helix in DNA.
- _____ The bond type that holds together inorganic salts.



Explain why a gecko can walk on walls?

STRUCTURE AND FUNCTION !!!!! (say it out loud. No really, do it. This is going to come up a myriad of times this year. Say it again. Now doesn't that feel good?)

Why does morphine work?

Why does an enzyme only work with a certain compound (substrate)?

Why does hemoglobin have an affinity for O₂, CO₂, and CO?

What would happen to the functioning of morphine, hemoglobin, or an enzyme if its shape changed?

(now say the bold words at the top again. Now with gusto! Do you think we will talk about this in the next several months? Is the pope catholic?)

SPONCH Element Matching

S – Sulfur **P** – Phosphorus **O** – Oxygen **N** – Nitrogen **C** – Carbon **H** – Hydrogen

- _____ Always found in organic molecules (two answers!)
- _____ Possesses one easy-to-remove electron.
- _____ The "heaviest" of the SPONCH elements.
- _____ Life (on the Planet Earth) is _____-based.
- _____ Four electrons in the outer shell.
- _____ Joins with itself and many other atoms to form an enormous number of different types of molecules.
- _____ Usually forms 3 covalent bonds. Its gaseous form is held together by a triple bond.
- _____ In living systems, only found in the form of phosphate.
- _____ Important in the formation of the linkages which hold together proteins in their 3-D shape.
- _____ Composes 78% of the earth's atmosphere.