

Matter - everything in the universe that has mass + takes up space.

ALL matter is made up of elements or compounds of elements.

ELEMENTS

↓
the simplest pure substances in our universe

ex) hydrogen (H)
gold (Au)
helium (He)

COMPOUNDS

↓
atoms of different elements that are combined chemically

ex) CO₂ NaCl
H₂O
HCl

The smallest recognizable part of an element is an **ATOM** of that element.

ATOMS

three main particles

PROTONS

\oplus
charge

located in
the nucleus

Neutrons

\oplus
No charge

located in
the nucleus

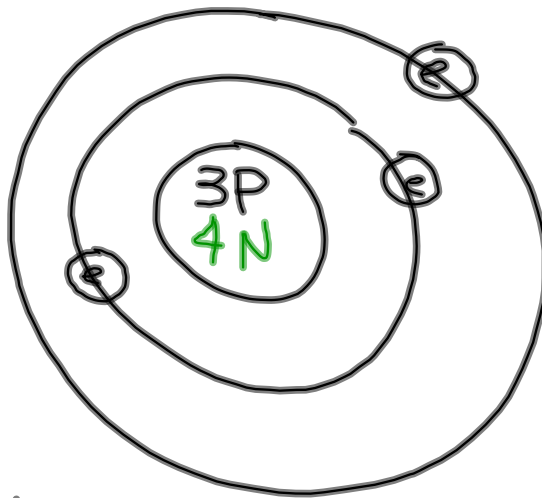
Electrons

\ominus
charge

Moving around
outside the
nucleus in the
electron cloud

ex) Lithium (Li)

3P
4N
3e



* nucleus
has a \oplus
charge - because
that's where the
 \oplus particles are

* the electron
cloud
has a
 \ominus charge
because
that's
where the
 \ominus
charged
particles
are

- In this atom, because
there are the same # of Protons + electrons
the ATOM itself has NO CHARGE.

* All atoms, alone in nature, are
neutral.' (have no charge)

Protons, neutrons, and electrons are fundamental particles.

So... a Proton in an atom of hydrogen is the same as a proton in an atom of silver

-what makes these different elements is the # of protons that the atoms have.

ex) Every atom of hydrogen has 1 Proton

Every atom of silver has 47 protons

- Protons and neutrons are located in the center of the atom (nucleus)
- electrons are moving outside the nucleus in the electron cloud

* the nucleus of an atom accounts for most of the atom's mass. Why?

① There are more particles in the nucleus than there are in the electron cloud.

② P + N are WAY bigger than electrons.

- diameter of a proton
 $\sim 1.7 \times 10^{-15} \text{ m}$

•  17 m

- estimated diameter of an electron
 $\sim 1 \times 10^{-18} \text{ m}$

- mass of an e is roughly
 $\frac{1}{1836}$ the mass of a P

