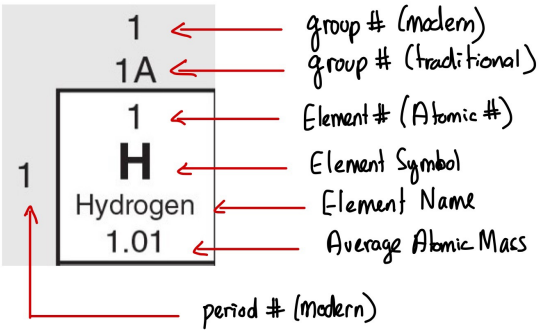
Atomic Elements

An **element** is the most basic form of an atom based on the number of protons (p^+)

The number of p^+ is also known as the **atomic number** of an atom

The **atomic number** is the number of protons (p^+) and electrons (e^-) in atom

The **element** is identified by **element symbol** (H), and **element name** (Hydrogen) as shown in the element



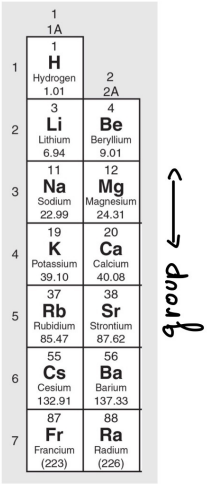
A **periodic square** from a table of elements (*Periodic Table*) showing all the element info

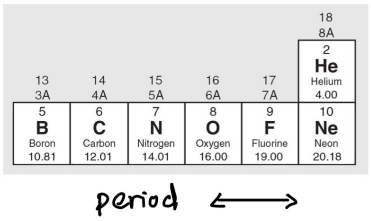
2

Element Arrangement on Periodic Table

Groups are the up and down rows with elements based on the **number of valence electrons** (val. e^-), and are numbered 1 – 18, or 1A – 8A and 1B – 10B

Periods are the left to right rows based on the number of **energy levels**, or the size of the atom, and are numbered 1 – 7.





Groups: up and down (18 groups*, 1-18)

* Traditional: 1A-8A, 1B-10B

Periods: left to right (7 periods, 1-7)

3

Counting Subatomic Particles

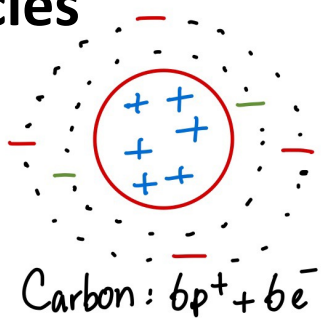
Proton and Electron Relationships

Atoms must remain neutral due to the relationships between electrons (e^-) and protons (p^+)

Carbon: $6p^+$ (+6) and $6e^-$ (-6) = 0

The number of electrons (e^-) or protons (p^+) in an atom is called the **Atomic Number**.

Protons (p^+) = Electrons (e^-) is a **neutral atom**



Neutral Atom $\#p^+ = \#e^-$

Atomic # $= \#p^+ = e^-$

4

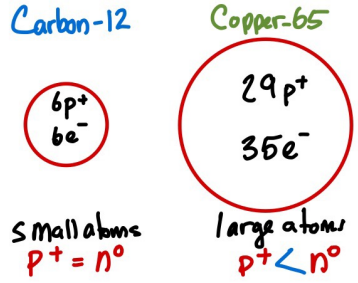
Counting Subatomic Particles

Proton and Neutron Relationships

An atom's nucleus contains both protons (p^+) and neutrons (n^o).

Smaller atoms often have vbeing equal to neutrons (n^o). Larger atoms more neutrons (n^o) than protons (p^+) due to the need to minimize protons (p^+) repulsion

The **Mass Number** is the sum of the protons (p^+) and to neutrons (n^o) in an atom's nucleus



Mass # $= p^+ + n^o$

Atomic Mass = Particles In Nucleus

5

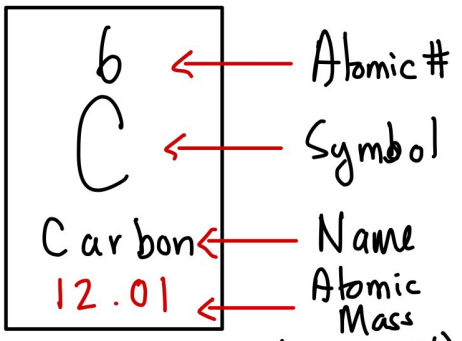
Counting Subatomic Particles

Understanding Periodic Table Squares

The square on the periodic table include the following parts:

- **Atomic Number** (p^+ *and* e^-)
- **Element Symbol**
- **Element Name**
- **Average Atomic Mass**

The **average atomic mass** is the average mass of all forms of an element, the **element isotopes**, and is not the **mass number** ($p^+ + n^o$)



6p⁺, 6e⁻, C, Carbon

n° and mass # not given!

6

Counting Subatomic Particles

Determining Atomic Isotope Parts

Elements may contain multiple **isotopes**, the form of an atom based on the protons (p^+) and neutrons (n^o). The number of neutrons (n^o) and mass number (*mass #*) are not on the periodic table

Isotope Notation

Scandium – 45
Element Mass #

$^{45}_{21}Sc$ ← Mass # ← Element Symbol ← Atomic #

Overall Subatomic Particle Relationships:

Atomic # = p^+ = e^-
= Element Name
= Element Symbol

Mass # = $p^+ + n^\circ$

n° = Mass # – Atomic #

n° not on periodic table

7