

## Atomic terms

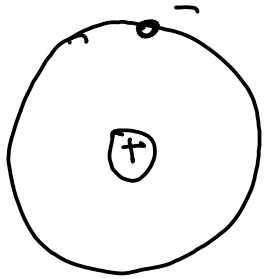
- ATOMIC NUMBER: The number of protons in the atomic nucleus. Each ELEMENT has the SAME NUMBER OF PROTONS in every nucleus. In neutral atoms, the number of ELECTRONS is also equal to the atomic number.

Example: Helium has an atomic number of 2. Every helium atom has two protons in its nucleus.

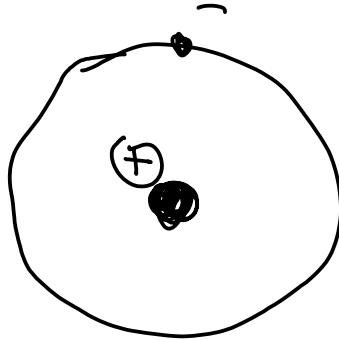
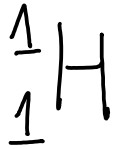
- MASS NUMBER: The number of protons PLUS the number of neutrons in the atomic nucleus, Atoms of the same element may have DIFFERENT mass numbers.

- ISOTOPES: are atoms of the same element with different mass numbers. In other words, they have the same number of protons but different numbers of neutrons.

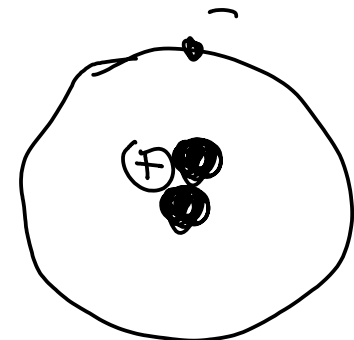
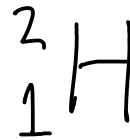
## A few isotopes



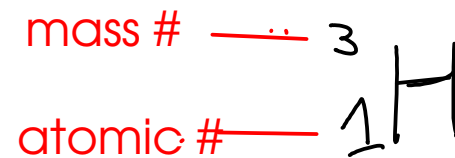
Hydrogen-1



Hydrogen-2  
"Deuterium"



Hydrogen-3  
"Tritium"



### Isotopes

- Have identical CHEMICAL properties
- Differ in MASS
- May differ in stability. Elements may have some isotopes that are RADIOACTIVE

## Atomic weight

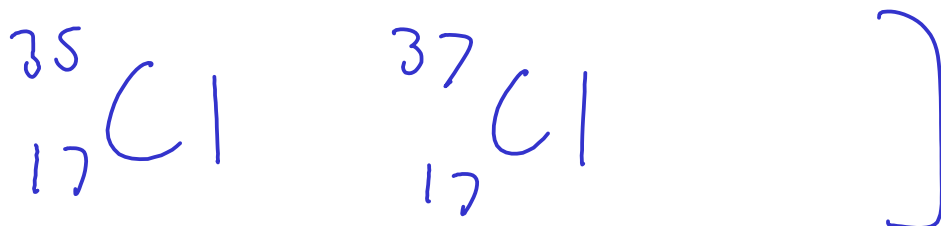
- The AVERAGE MASS of all naturally occurring isotopes of an element.

Example: Hydrogen has an atomic weight of 1.008 "atomic mass units"  
(Naturally-occurring hydrogen is almost all Hydrogen-1!)



(Natural carbon is mostly carbon-12)

atomic weight of C:  
12.01 amu



(Natural chlorine is mostly chlorine-35)

atomic weight of Cl:  
35.45 amu

## Periodic Table

- Mendeleev (1869):
  - When atoms are arranged in order of their atomic weight, some of their chemical and physical properties repeat at regular intervals (periods)
  - Some of the physical and chemical properties of atoms could be calculated based on atomic weight

- Mendeleev was able to predict the properties of previously unknown elements using his "periodic law"

### Modern periodic table

- organized based on ATOMIC NUMBER rather than ATOMIC WEIGHT. This eliminated some problems (elements out of order) with Mendeleev's original arrangement