Section 4.2 Notes

The Structure of Atoms

How would you recognize an atom if you saw one?

Important Facts about Atoms

1. Atoms are made of ___protons___, ___neutrons___, and ___electrons___.
2. Protons and neutrons are made of ___quarks___.
3. Electron Cloud Model
   1. Dense nucleus containing positive protons and neutral neutrons. Each has a mass of about 1 atomic mass unit (amu).
   2. Negative electrons surround the nucleus in random locations but at particular distances. Very small mass = 1/1836 amu.

Atomic Particle	Mass	Location	Charge
proton	1 amu	nucleus	positive
neutron	1 amu	nucleus	neutral
electron	1/1836 amu	electron cloud	negative

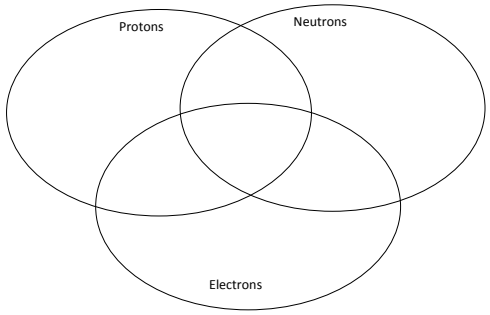
What properties can be used to compare protons, neutrons, and electrons?

Atom Notes

- The mass is determined by the number of __protons__ and __neutrons__. This is called the __mass number (A)__
- The number of __protons__ determines the type of atom or element. This is called the __atomic number (Z)__.
- The same type of atom can have a different mass because of a change in the number of __neutrons__. We call these different atoms __isotopes__.
- What about electrons?

What properties can be used to compare protons, neutrons, and electrons?

Use your atom notes from yesterday and today to complete the Venn diagram.



Protons ONLY

- Positive charge
- Made up of ↑↑↓Quarks
- Atomic # = #p^+

Neutrons ONLY

- Neutral (no) charge
- Made up of ↑↓↓ Quarks

Electrons ONLY

- Negative charge
- 1/1836 amu
- small mass
- Located in the electron cloud

Protons and Electrons

- Have charges
- Charge = #p^+ - #e^-
-

Protons and Neutrons

- Made up of quarks
- 1 amu
- LARGE MASS
- Located in the nucleus
- Mass # = # p^+ + #n^0

Neutrons and Electrons

- ↑ Quark + e^- = ↓ Quark

Protons, Neutrons, and Electrons

- Made up of atoms

What properties can be used to compare protons, neutrons, and electrons?

Atomic Mass

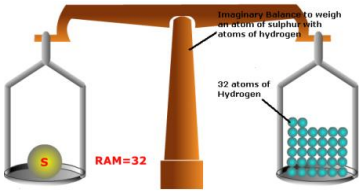
- The nucleus contains most of the mass of an atom
  - Because Protons and Neutrons are much **larger** than electrons
- The electron cloud accounts for most of the **volume** of the atom.

What properties can be used to compare protons, neutrons, and electrons?

Atomic Mass

- The unit of measurement for an atom is the **amu** (atomic mass unit)

The mass of protons & neutrons is almost 2 amu



Relative atomic mass(RAM) of any element
= Mass of one atom of the element/ Mass of one atom of hydrogen

What properties can be used to compare protons, neutrons, and electrons?

How do I find the protons?

- Elements are different because they have different #' s of protons.

Atomic Number = # of protons

How many protons in these examples?

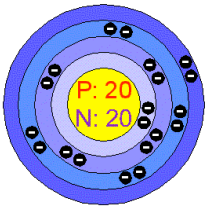
- Oxygen -
- Carbon -
- Sn -

What properties can be used to compare protons, neutrons, and electrons?

How do I find the electrons?

- The number of electrons **usually** is the same as the number of protons.

■If the atom as a whole has a positive or negative charge (ion), then it will have different numbers of electrons.



What properties can be used to compare protons, neutrons, and electrons?

How do I find the neutrons?

Mass # = # protons + # neutrons

So…

 # Neutrons = Mass # - Atomic #

(p + n) - (p)

What properties can be used to compare protons, neutrons, and electrons?

How do I find the neutrons?

How many neutrons are in:

- Lithium - 7
- Sulfur - 32
- K - 39

What properties can be used to compare protons, neutrons, and electrons?

The Mole

- Like a "chemist's" dozen
- 1 mole (mol) = 602 213 670 000 000 000 000 000
- Avogadro's Number: 6.022×10^{23}

What properties can be used to compare protons, neutrons, and electrons?

The Mole

- Molar Mass:
- 1 mole = atomic mass of elements
- 1 mole = molecular mass of compounds