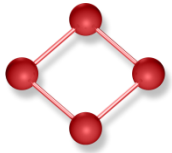
Structure of an Atom

Your paper should look like this

The Atom

KWL

Video



Video notes

Why don't electrons fly away or crash into the nucleus?

Why are neutrons important?

What is amu?

Ions

The Atom

Rutherford's Gold Experiment

Elements & Atoms

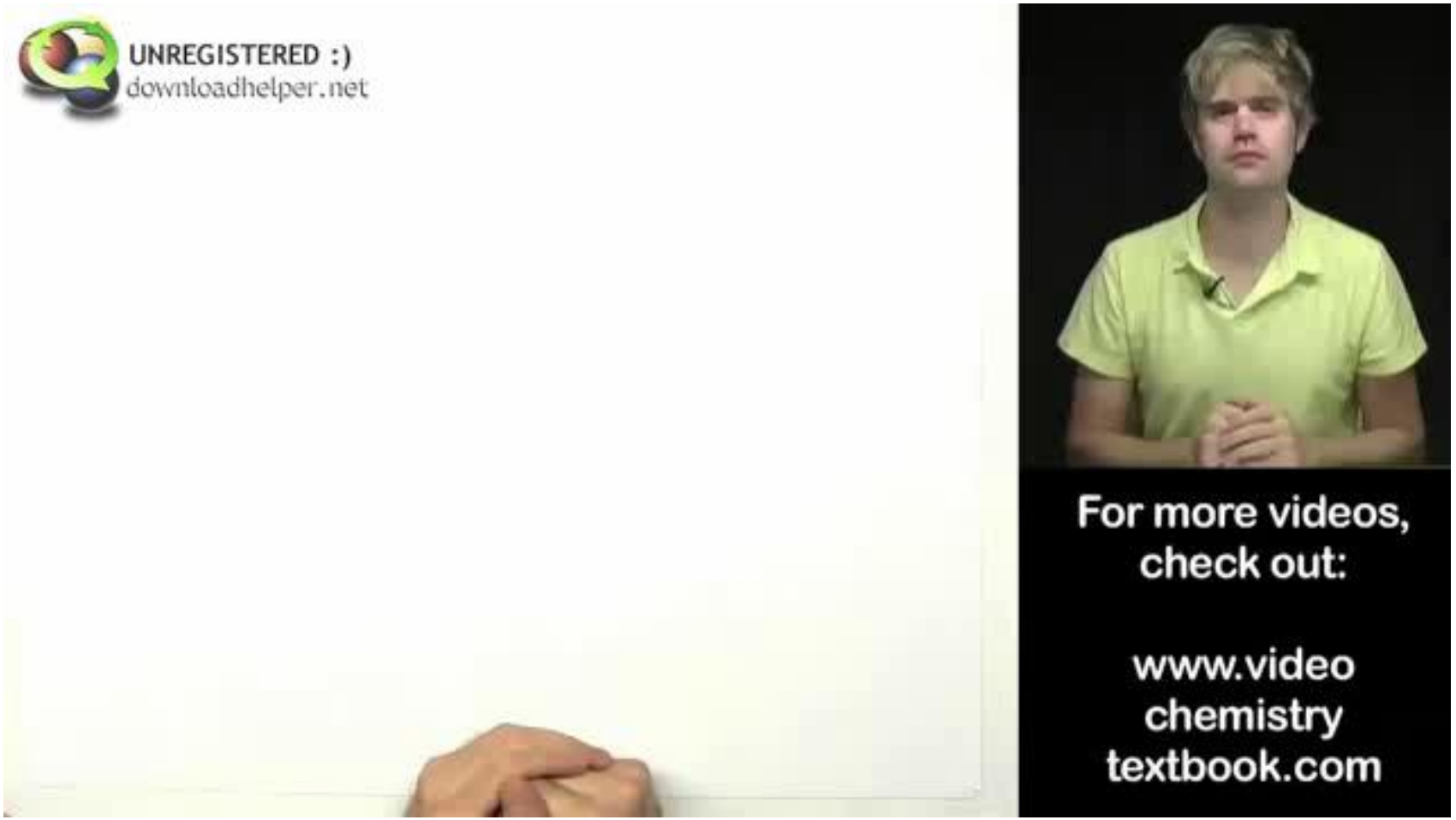
Isotopes

Radioactivity

KWL

- Draw what you think an atom looks like
  - It must contain
    - Protons
    - Neutrons
    - Electrons

Video Notes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Answers to Video Notes

- Why don't electrons fly away or crash into the nucleus?
  (+) charge of proton and (-) charge of electron attract

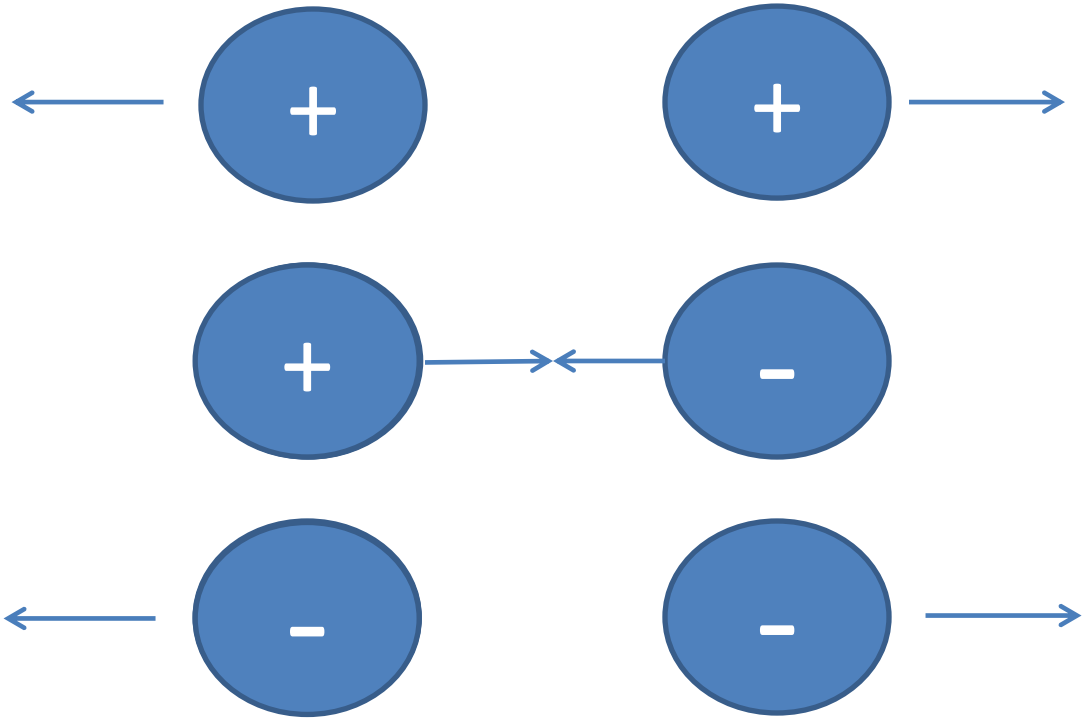
  Electrons spinning so fast around nucleus they cannot crash into it

- Why are neutrons important?
  They hold the nucleus together tightly

- What is amu?
  Measurement of mass. 1 amu = 1 proton
  1 amu = 1 neutron
  Elecrtons so small, mass is inconsequential

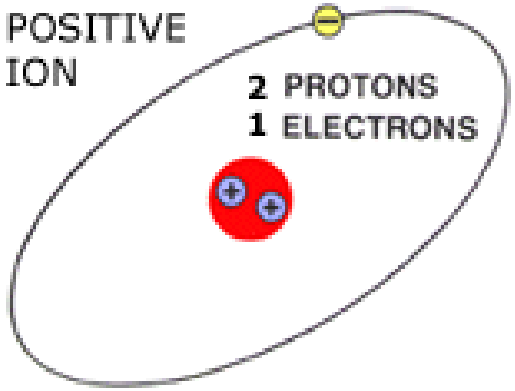
Concept Check

- Will the following particles attract or repel each other?

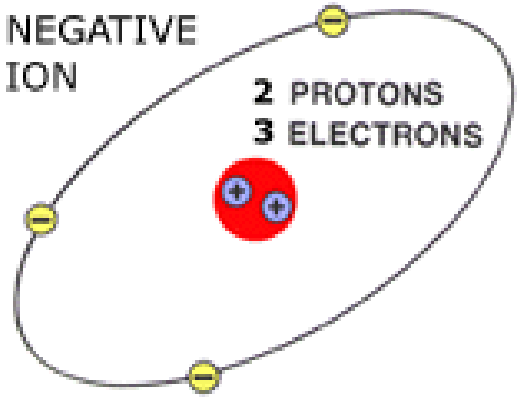


Ions

- Different number of protons than e- & so they have an electric charge
  - Na^{2+} has two more protons
  - O^{2-} has two more electrons

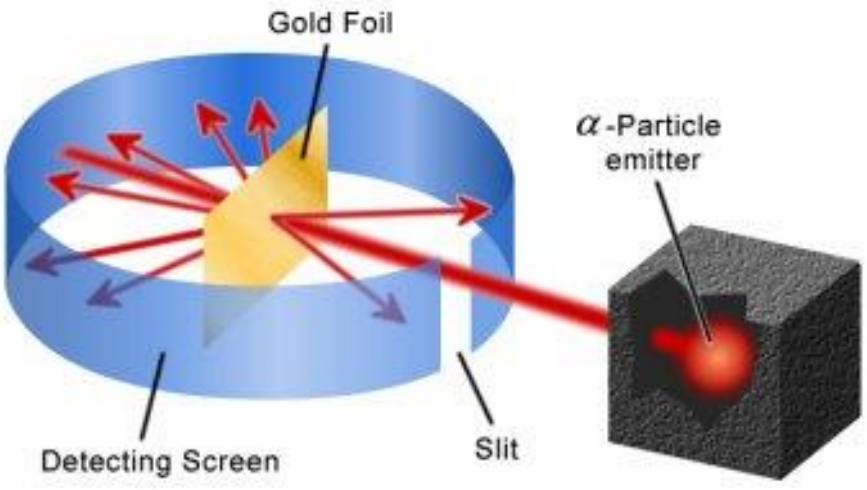


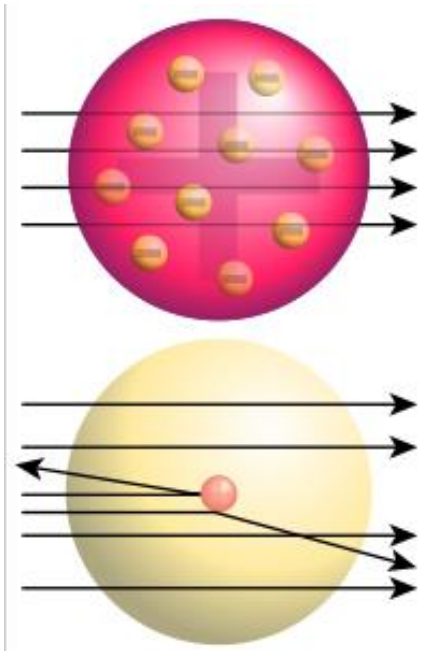
- It is not possible to have fractions as charges



Rutherford's Gold Experiment

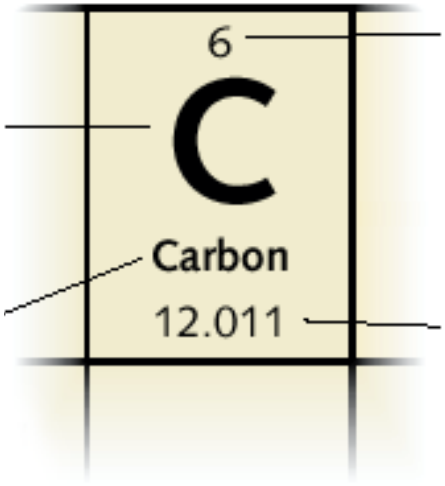
- Led to the discovery of the nucleus
- Shot alpha particles at gold foil
- Found some bounced back – these particles hit the gold atom's nucleus





Atoms & Elements

Symbol
A one- or two-letter abbreviation

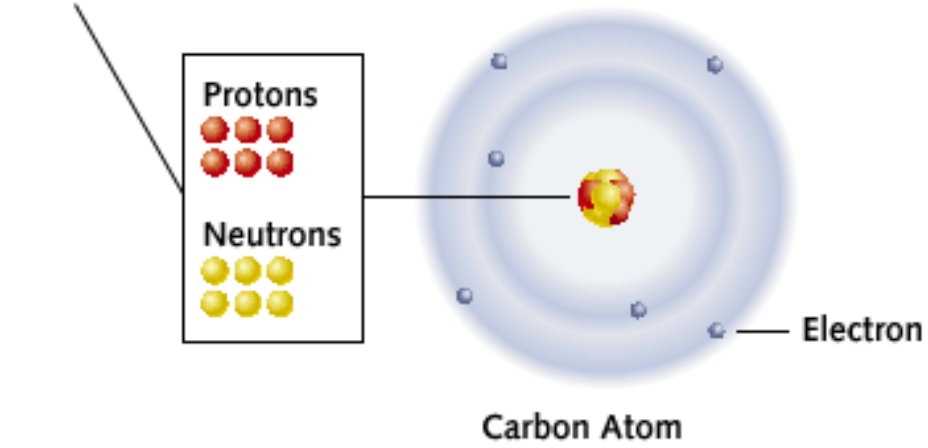


Atomic Number
Equal to the number of protons in the nucleus,

Atomic Mass

Average (protons + neutrons) of all existing isotopes

Mass Number
The sum of the numbers of protons and neutrons in a specific isotope.



Carbon Atom

Exception:
hydrogen does not contain neutrons!

Concept Check

- If the atomic number of oxygen is 8, what is the mass number?

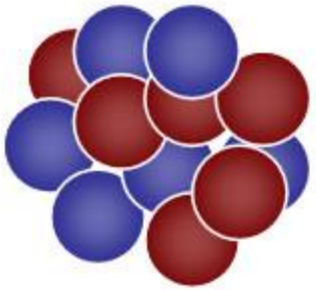
8 Protons + 8 neutrons (electrons too small to count)

8 amu + 8 amu

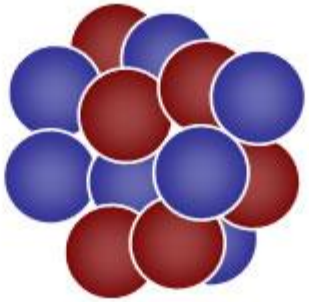
=16 amu!

Isotopes

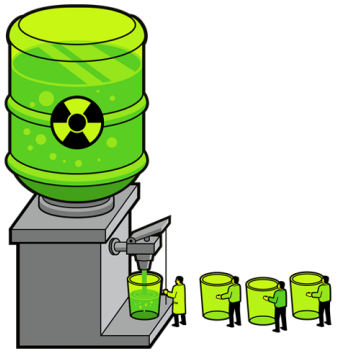
- Atoms of the same element with different numbers of <u>neutrons</u> in the nucleus.
- Ex. Carbon -12 Carbon -13 Carbon -14



STABLE
98.9%
6 protons
6 neutrons



STABLE
1.1%
6 protons
7 neutrons

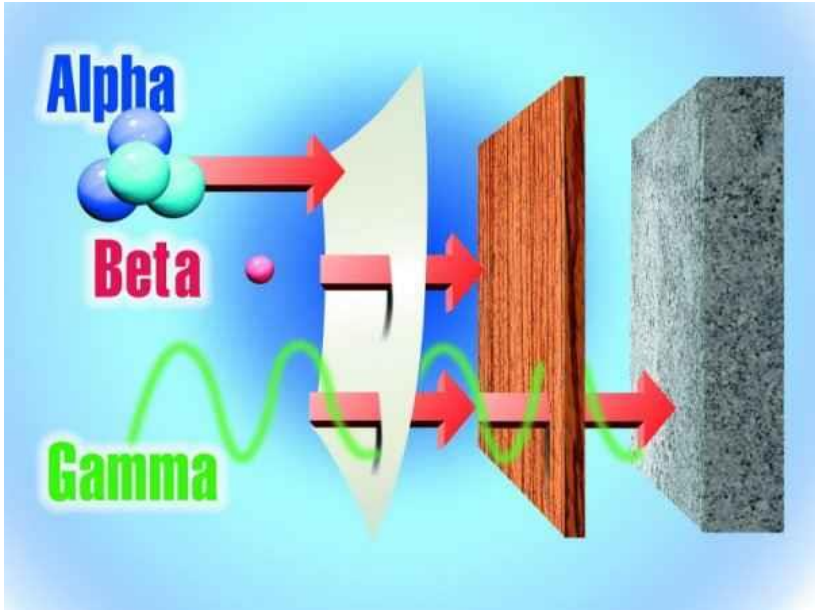


UNSTABLE
<0.1%
6 protons
8 neutrons

Radioactivity

- Stable Element: nucleus stays together
- Unstable/Radioactive Element: a nucleus that spontaneously breaks up, emitting particles and energy to create a more stable isotope

- Three types
  - Alpha decay
  - Beta decay
  - Gamma decay



The Atom Game

- Get in groups of 5-7
- Pick ONE person in each group to go first. They are the ONLY person in the group able to touch the marbles.
- DISQUALIFICATIONS:
  - if another person touches the marbles
  - if a marble falls on the ground

The Atom Game

- THIS IS A RACE.
- I will give you an element. Each designated person in the group must build this element;s atom correctly with the right number of protons, neutrons and electrons.
- When your group thinks they have it right, raise your hand and yell, “ATOMIC BOMB,” and all teams must STOP.
- I will inspect your atom. If it is right, your team gets 10 points. If it is wrong you loose 5 points and the other teams get to continue.

Ready????

Helium!!!!

Boron!

Sodium!

Potassium!

Hydrogen!

Carbon-14!

Lithium-7!