

Warm Up: (get a calculator!)

Applying the rules of significant figures, which of the following would be the correct value for the density of a substance which has a mass of 29.87 g and a volume of 4.0 mL?

a) 7.5 g/mL

c) 7 g/mL

b) 7.4675 g/mL

d) 7.00 g/mL

Warm Up

How many significant figures are in the following numbers?

734000

0.0073400

734000.

734.000

00.00734

Warm Up:

There are:

6 blips in 1 grig

5 grigs in 2 blorps

4 blorps in 1 sig

How many blips are in 7.2 sigs?

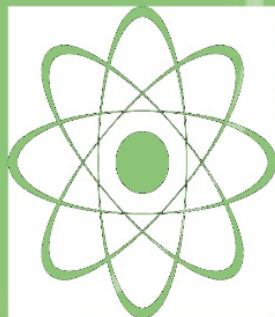
Objectives:

TSWBAT:

List and identify, by properties, the subatomic particles.

Also, distinguish between historic and current atomic models.

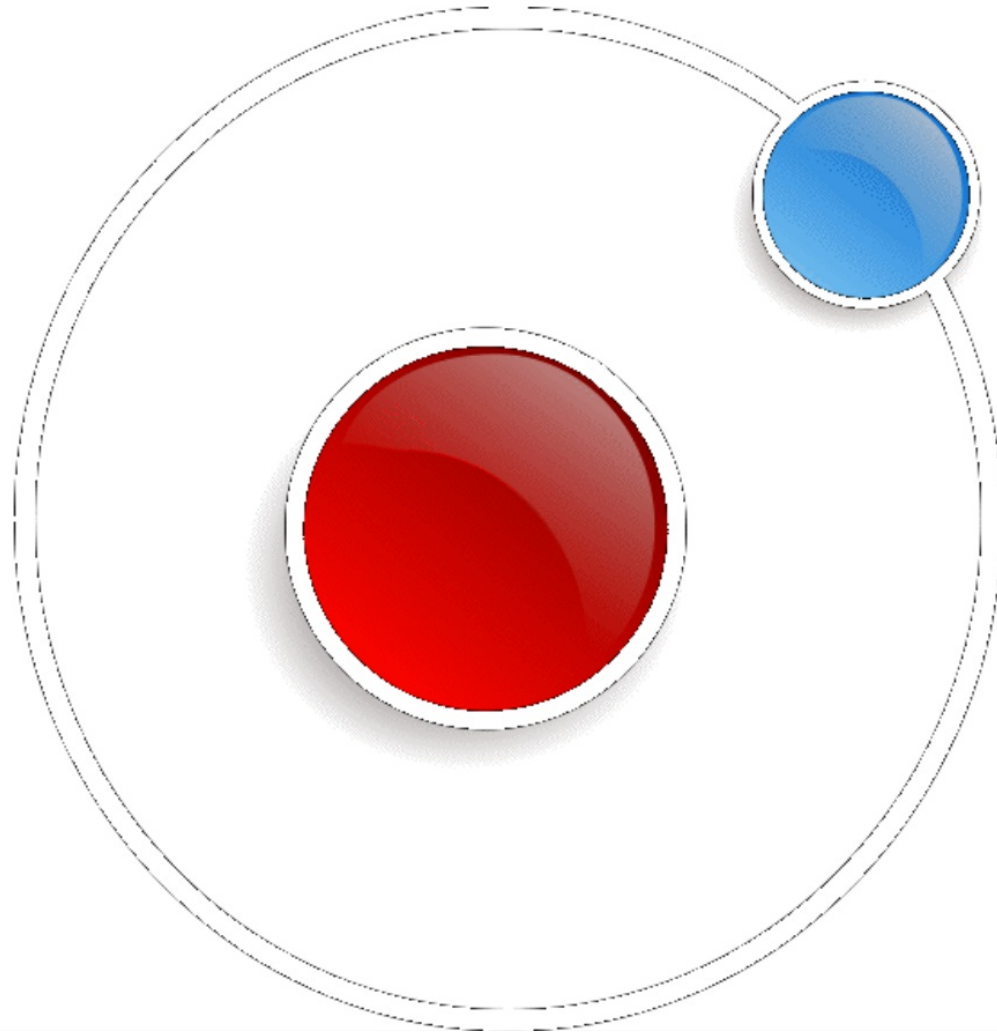
Atomic Structure



This lecture corresponds with Chapter 4 in your textbook.



Atom: from the Greek meaning
"indivisible."





**John Dalton
1766-1844**

**"Father of
Modern Atomic
Theory"**

John Dalton:

1. All elements are composed of tiny, indivisible particles called atoms.
2. Atoms from the same element are identical.
3. Atoms of different elements can mix together (chemically combine) in simple, whole-number ratios to form compounds.
(e.g. one atom of oxygen can combine with two atoms of hydrogen to form water.)
4. Chemical reactions occur when atoms are:
 - separated
 - joined
 - rearranged



True or False?

Atoms can be divided.



Atoms can react by converting to other atoms.

Warm Up (get a calculator!)

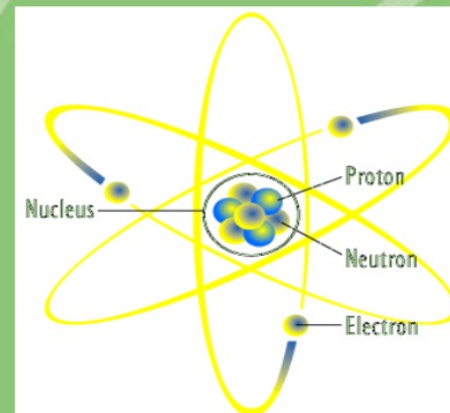
If there are 2 cups in a pint and 2 pints in a quart and 4 quarts in a gallon, how many cups are in 7.7 gallons of milk?

Parts of an atom

Protons - a positively charged particle found in the nucleus.

Neutron- neutral particle found in the nucleus. Has the same mass as a proton.

Electron - negatively charged particle that is found outside the nucleus. Its mass is considered negligible



Proton

Neutron

Electron



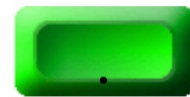
Eugene Goldstein

Discovered protons in 1886





J. J. Thompson



Discovered the electron in 1897.





35
years

Neutrons

James Chadwick

Discovered neutrons (1932)



Thomson examined two ways that a cathode ray can be deflected:

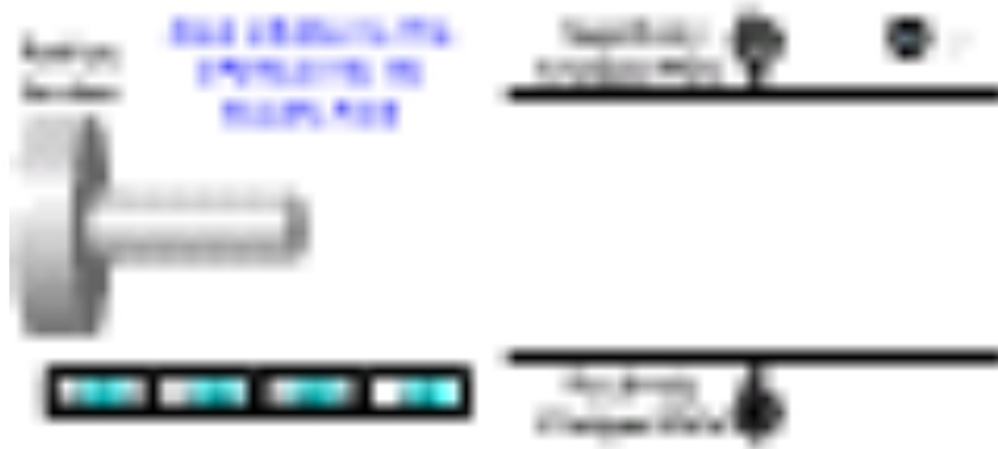
a) by using a magnet, and

b) by using electrically charged plates.

electrons

Inferring: If a cathode ray is attracted to a positively charged plate, what can you infer about the charge of the particles that make up the cathode ray?

Subatomic Particles



Properties of Subatomic Particles

Table 4.1

Properties of Subatomic Particles

Particle	Symbol	Relative charge	Relative mass (mass of proton = 1)	Actual mass (g)
Electron	e^{-}	1-	1/1840	9.11×10^{-28}
Proton	p^{+}	1+	1	1.67×10^{-24}
Neutron	n^0	0	1	1.67×10^{-24}

**What is a good description
or model of a nuclear atom?**

**J.J. Thompson thought the atom
was like a ball filled with positively
charged material, with electrons
evenly distributed throughout. This
turns out to be wrong.**

In 1911, Ernest Rutherford and his colleagues did an experiment that changed how we think about the structure of the atom. It was called the "gold foil experiment."



Discovered
the
NUCLEUS
of the
atom

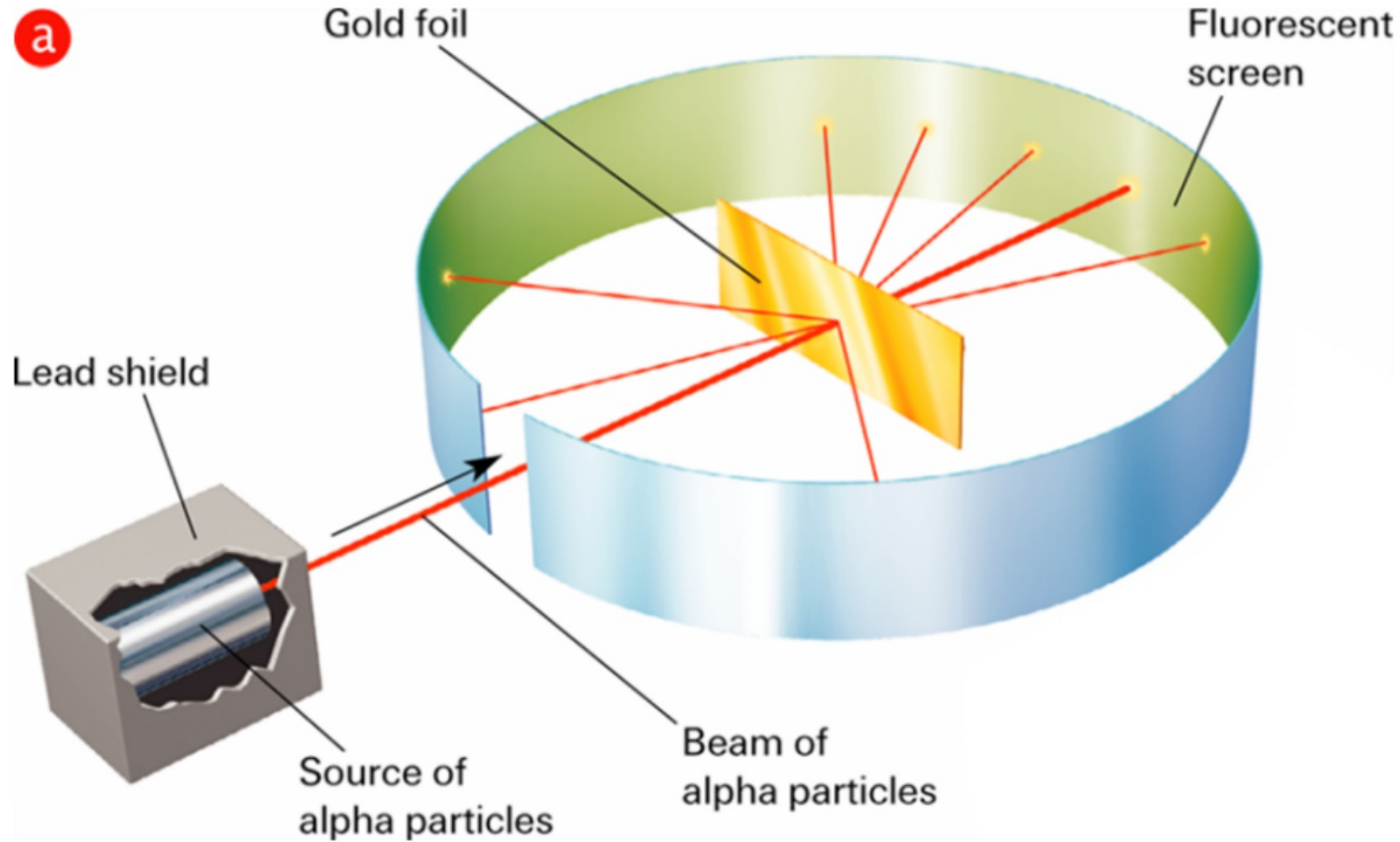
In this experiment they directed a very narrow beam of alpha particles at a very thin piece of gold foil.

Alpha particles are helium nuclei that have been stripped of their electrons so these are positively charged particles.



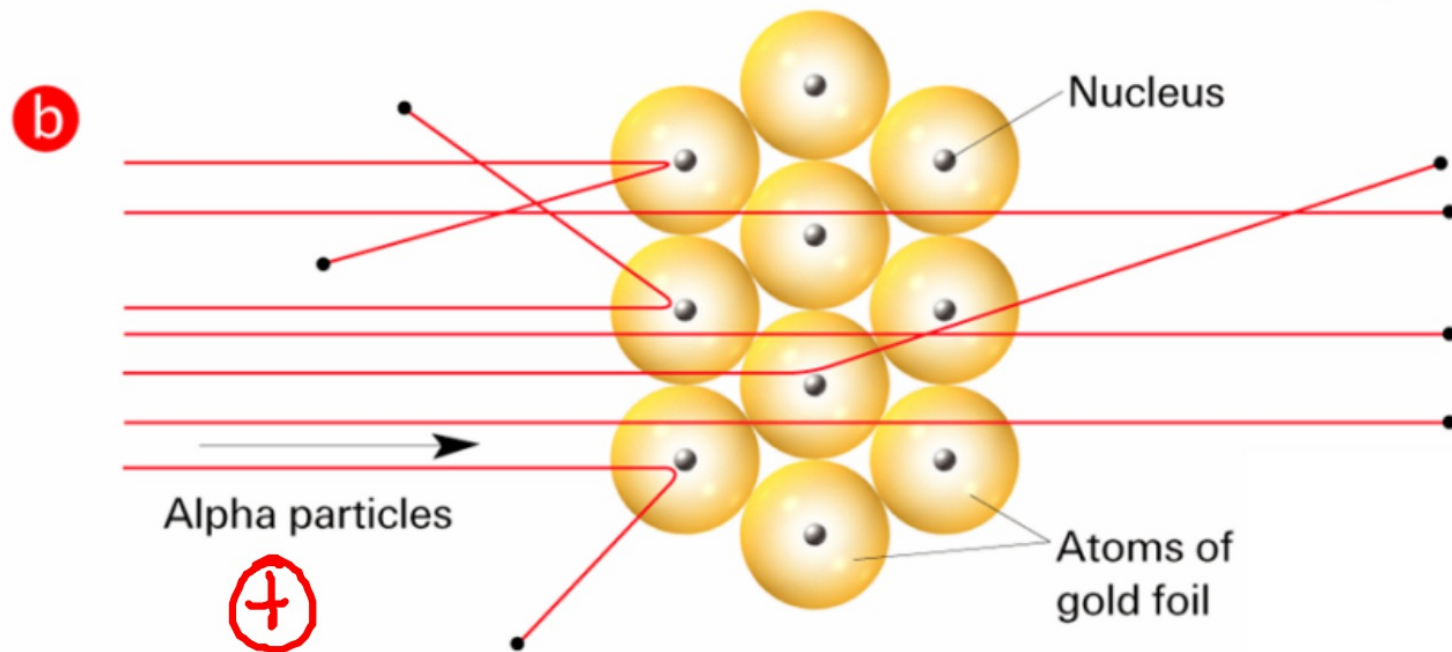
α -particle
 $2+$

The Gold Foil Experiment



Gold Foil Experiment: The View at the Atomic Level

1911



Warm Up (get a calculator!)

27 naps = 1 sleep

6 sleeps = 5 dreams

18 dreams = 3 nightmares

How many naps would lead to
42 nightmares?

The Rutherford Atomic Model

Rutherford concluded that the atom is mostly empty space. All the positive charge and almost all of the mass are concentrated in a small region called the nucleus.

The nucleus is the tiny central core of an atom and is composed of protons and (neutrons.)



In the nuclear atom, the protons and neutrons are located in the nucleus.



The electrons are distributed around the nucleus and **occupy almost all the volume of the atom.**

What does an atom look like?

Can we see individual atoms?

Yes, with the aid of a scanning tunneling microscope.

Iron Atoms Seen Through a Scanning Tunneling Microscope

