Q 32b – End of chapter HW. (Chang)

$68.3\,cm^3 \longrightarrow m^3$

$100\,cm = 1\,m$

$$68.3\,cm^3 \left|\frac{1\,m}{100\,cm}\right|\left|\frac{1\,m}{100\,cm}\right|\left|\frac{1\,m}{100\,cm}\right| = 6.83\times10^{-5}\,m^3$$

Q39. Al: $d = 2.70\,g/cm^3 = ?\ \frac{kg}{m^3}$

$1000\,g = 1\,kg$ (exact)

$100\,cm = 1\,m$

$$2.70\,\frac{g}{cm^3}\left|\frac{1\,kg}{1000\,g}\right|\left(\frac{100\,cm}{1\,m}\right)^3 = 2700\ \frac{kg}{m^3}$$

3 s.f. ∞ s.f. 3 s.f.

2700 (2 s.f.) 2700. (4 s.f.) // $2.70\times10^3\ kg/m^3$ (3 s.f.) ($2700\ kg/m^3$)

Conversions

$3.52\ in/min \longrightarrow cm/s$

$1\,in = 2.54\,cm$ (exact)
$60\,s = 1\,min$ (exact) } ∞ s.f.

$$3.52\,\frac{in}{min}\left|\frac{1\,min}{60\,s}\right|\left|\frac{2.54\,cm}{1\,in}\right| = 0.149\ \frac{cm}{s}$$

(3 s.f.)

TRICKY conversions...

- involve SI prefixes...

ex: $208\,mg/dL \longrightarrow ?\ \mu g/mL$

$mg = 10^{-3}\,g$ $\quad \mu g = 10^{-6}\,g$

$dL = 10^{-1}\,L$ $\quad mL = 10^{-3}\,L$

$$208\,\frac{mg}{dL}\left|\frac{10^{-3}\,g}{mg}\right|\left|\frac{\mu g}{10^{-6}\,g}\right|\left|\frac{dL}{10^{-1}\,L}\right|\left|\frac{10^{-3}\,L}{mL}\right| = \frac{\mu g}{mL}$$

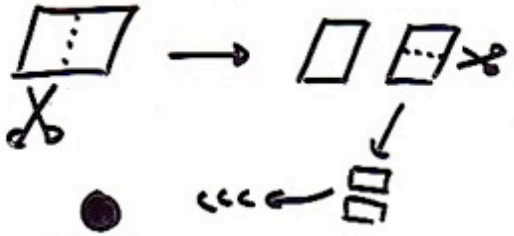
$mg \to g \to \mu g$ $\quad dL \to L \to mL$

$208 \times \frac{10^{-3} \times 10^{-5}}{10^{-6} \times 10^{-1}} = 208 \times 10^{1}$

$= 2080\ \mu g/mL$ (3 s.f.)

Ch2 Atoms, Molecules, + Ions

OLD Q:



ATOM — ATOMOS (uncuttable) (greek)

500 BC
- Democritus.

1800 AD - John Dalton
- Atomic Theory.

Matter:  ← atoms!

1808 Dalton

Matter: made of atoms ●

- atoms of a given element are identical!
- different to atoms of other elements!

GOLD

LEAD

Compounds
- atoms of diff't elements in a fixed simple, whole # ratio!

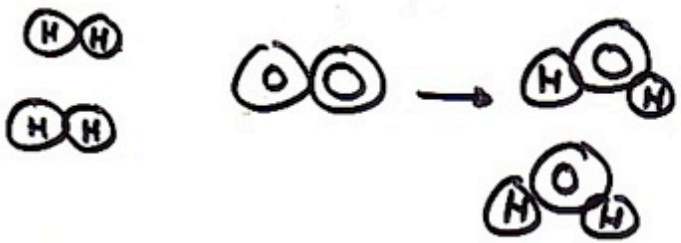
ex:  2'o' : 1 'c'

Chemical rxns

↑ Reaction(s)

- shuffling of atoms!

ex: Hydrogen + Oxygen → Water



Atoms

- 3 subatomic particles.

(1) Electron: e^-
negatively charged
mass = 9.11×10^{-28} g

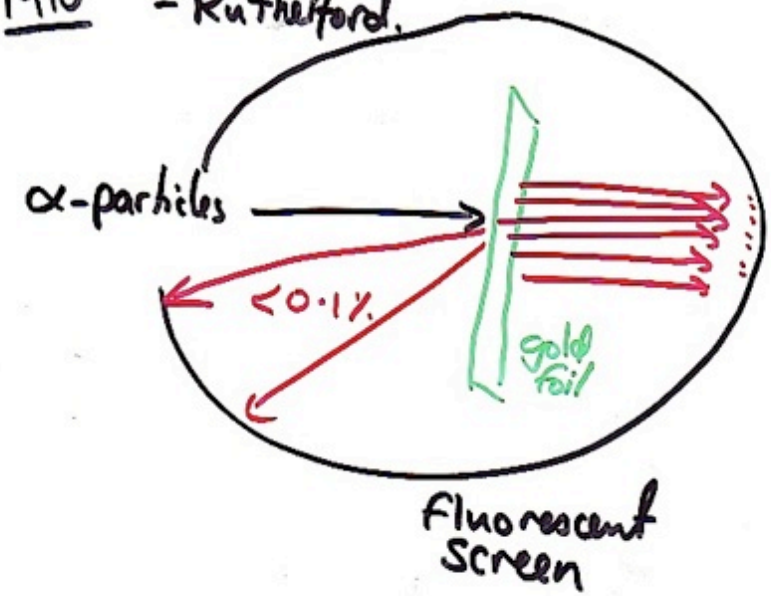
(2) Proton: p^+
positively charged
mass = 1.67×10^{-24} g

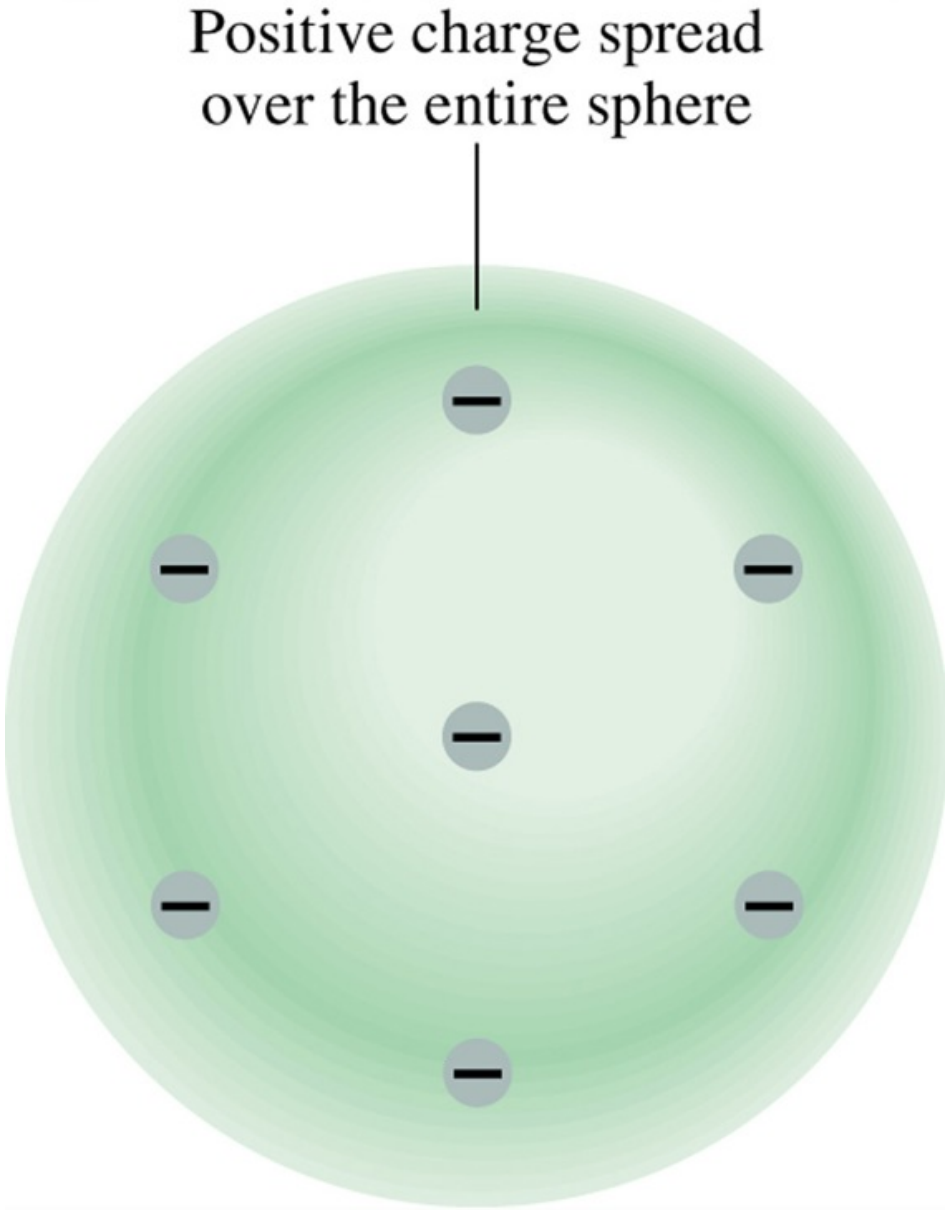
(3) Neutron: n^0 (n)
neutrally charged.
mass = 1.67×10^{-24} g

Structure of atoms

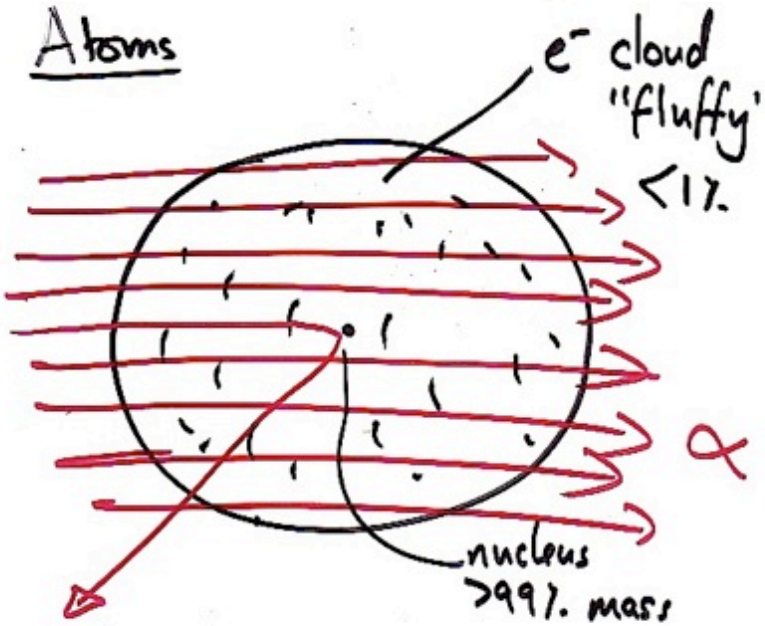
Plum-pudding model.

1910 - Rutherford.



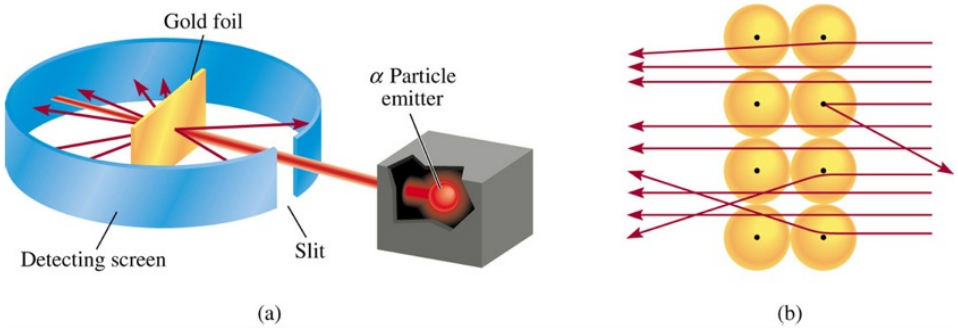


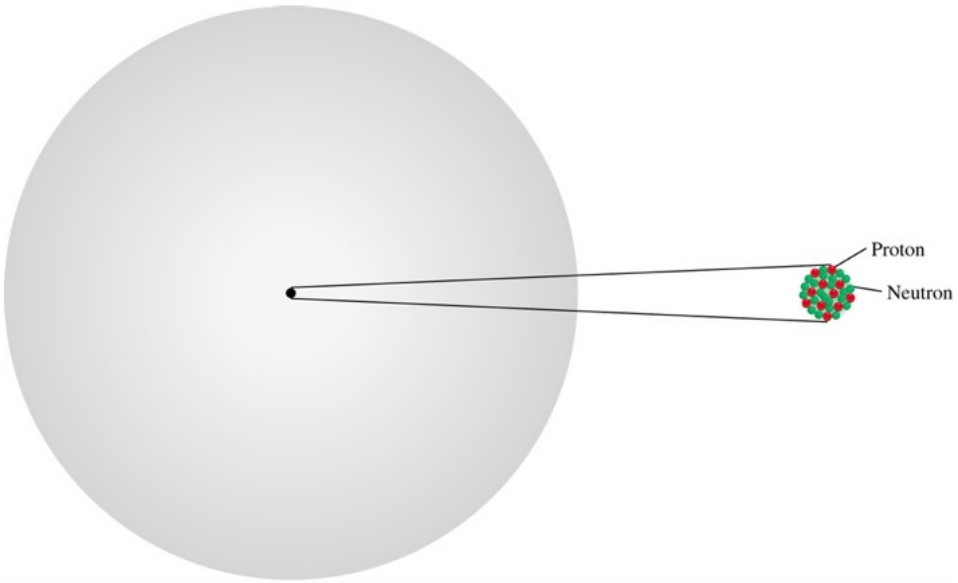
Atoms



nucleus: p+, n°

NUCLEAR MODEL





Atoms - Atomic
Mass #
Isotopes

Gold atoms all have $79p^+$
Lead atoms " " $82p^+$

Not all atoms of gold are identical!
- Some have $118n^0$
- Others have $100n^0$

} $79p^+$

- Isotopes - atoms have same #p^+, + diff't #n^0.

Atomic # (Z) = #p^+
Mass # (A) = #p^+ + #n^0

ex: Gold: Z = 79
1st isotope: $79p^+ + 118n^0$ // 2nd isotope:
A = 197 // $79p^+ + 100n^0$: A=179

Gold-197 Gold-179