

Chapter 1 (1.8): description of an atom

Structure of an atom:

- cloud (electron)
- nucleus (protons and neutrons)
- about $1 \cdot 10^{-10}$ m or 0.1 nm

Subatomic particles:

Proton - p^+ $\left\{ \begin{array}{l} \rightarrow \text{mass of } 1.6731 \cdot 10^{-27} \text{ kg} \sim 1 \text{ amu} \\ \text{positive charge} \end{array} \right.$

neutron - n^0 \rightarrow mass of $1.675 \cdot 10^{-27} \text{ kg} \sim 1 \text{ amu}$

electron - e^- $\left\{ \begin{array}{l} \rightarrow \text{mass of } 9.11 \cdot 10^{-31} \text{ kg} \sim 0.002 \text{ amu} \\ \text{negative charge} \end{array} \right.$

$$q_{e^-} = q_{p^+}$$

the nucleus contains 99% of the mass of an atom

Strong force holds p^+ and n^0 together

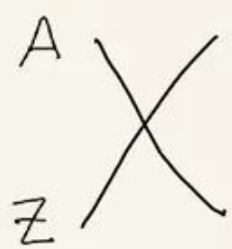
p^+ Solely determines the element type

p^+ is the "atomic number of a nucleus"

$$Z = \# p^+$$

A = mass # = sum of total protons + neutrons

elemental symbol:



$$A = p^+ + n^0$$

$$Z = p^+$$

total charge = sum of all charges in atom

isotopes:

same element different masses

natural abundance:

factors isotopes in nature

average mass: weighted average of all isotopes