



Atomic Structure



EQ:

Explain how the physical properties of elements and their reactivity have been used to produce the current model of the periodic table of elements!



TRANSLATION

- Explain how each element's specific physical and chemical properties helped to create the current periodic table.



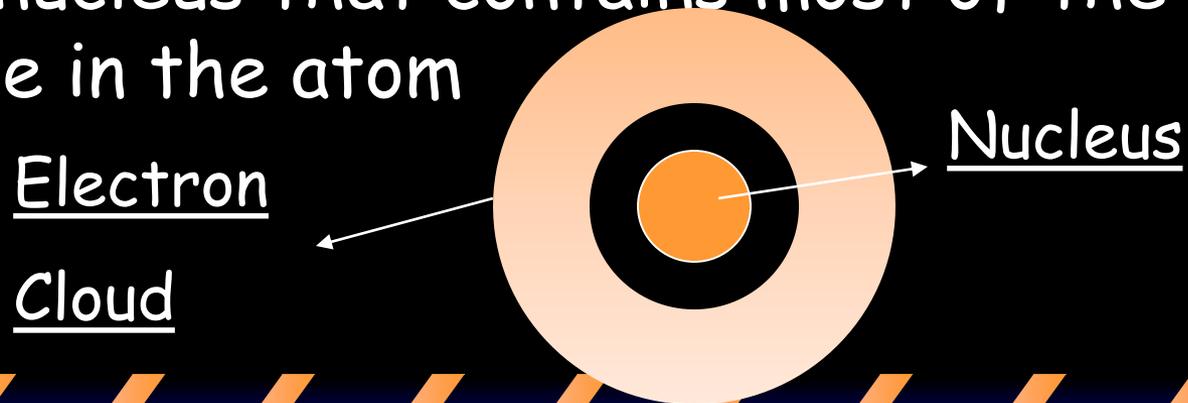
What is an atom?

- Atom: the smallest unit of matter that retains the identity of the substance.
- Our visual of an atom is called the Bohr Models. (After the scientist who discovered it!)



Atomic Structure

- Atoms are composed of 2 regions:
 - Nucleus: the center of the atom that contains the mass of the atom
 - Electron cloud: region that surrounds the nucleus that contains most of the space in the atom



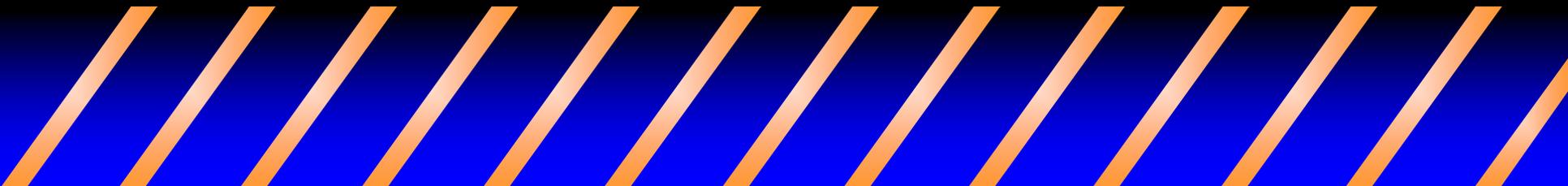
Atomic Structure

- The nucleus and electron cloud are made up of 3 pieces called “subatomic particles”.



What's in the Nucleus?

- The nucleus contains 2 subatomic particles:
 - Protons: positively charged
 - Neutrons: has no charge



What's in the Electron Cloud?

- The 3rd subatomic particle resides outside of the nucleus in the electron cloud.
 - Electron: a negative charge



Electrons

- Smallest subatomic particle
- Extremely fast
- No real mass



How do these particles interact?

- Protons and neutrons live in the positively charged nucleus accounting for most of the mass of the atom.



How do these particles interact?

- The negatively charged electrons are small and have a relatively small mass but occupy a large volume of space outside the nucleus.



How do the subatomic particles balance each other?

- In an atom:
 - The protons = the electrons
 - If 20 protons are present in an atom then 20 electrons are there to balance the overall charge of the atom—atoms are neutral
 - The neutrons have no charge; therefore they do not have to equal the number of protons or electrons

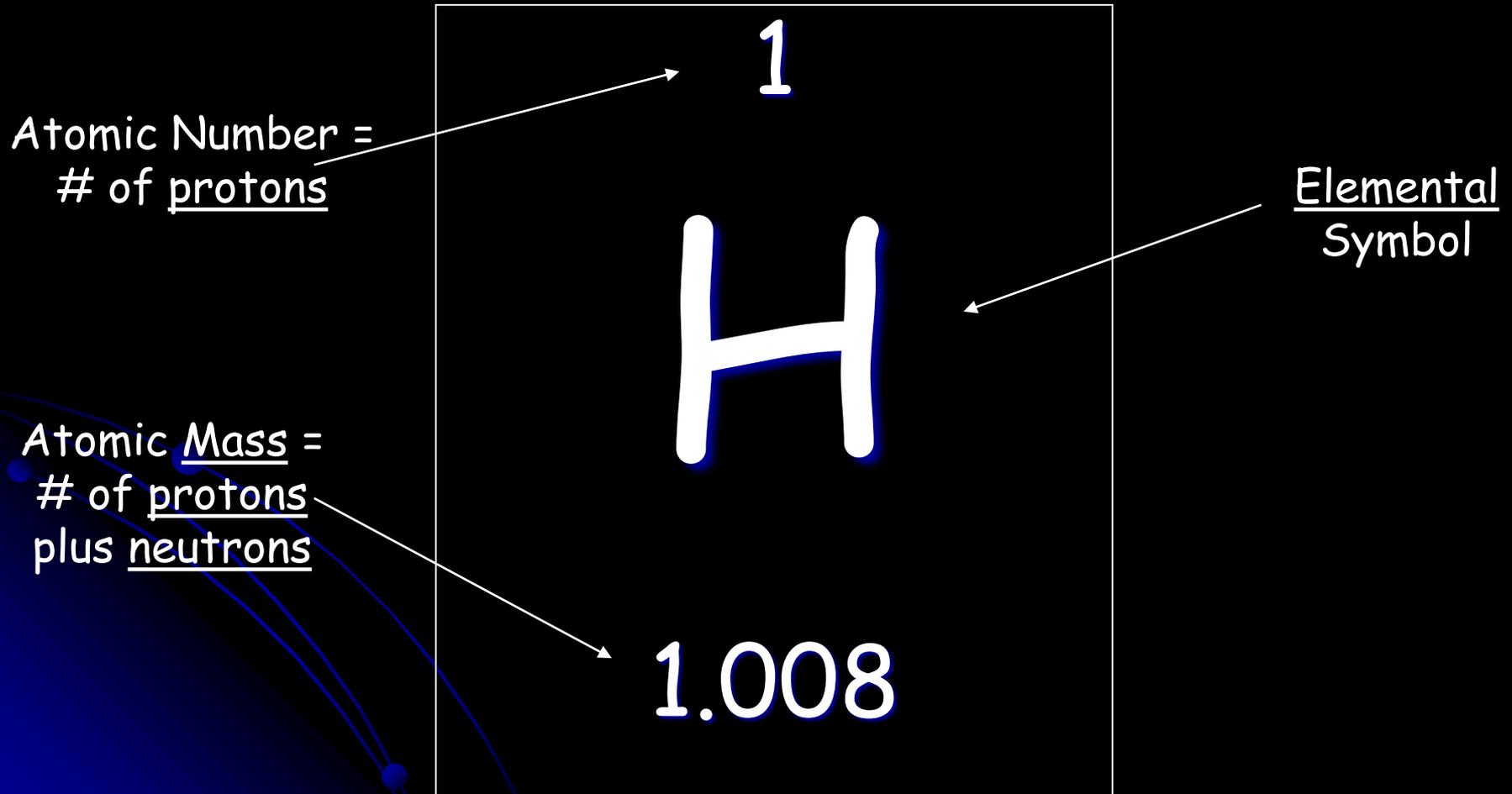


How do we know the number of subatomic particles in an atom?

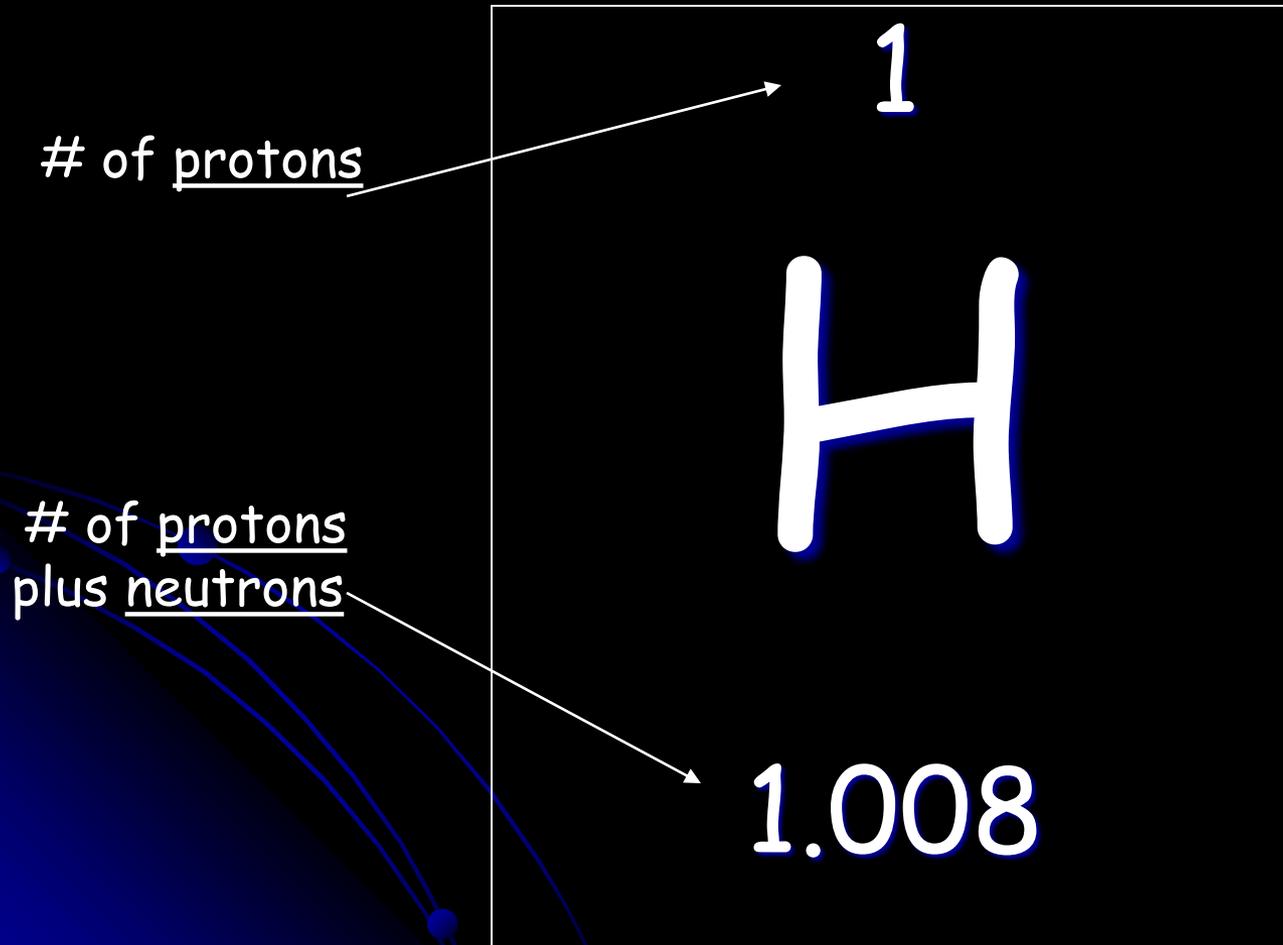
- By knowing how to read a periodic table tile...



What does the information in the box tell me?



How do we find the neutrons?!



By
subtracting
the atomic
number from
the atomic
mass!

Make sure
you round
the atomic
mass first!

Example:

- Mass number: the number of protons and neutrons in the nucleus
 - Ex: oxygen can have a mass of 16.
Since it has 8 protons it must have 8 neutrons
 - # of neutrons = mass # - atomic #



Example:

- Li has a mass number of 7 and an atomic number of 3
 - Protons = 3 (same as atomic #)
 - Neutrons = $7 - 3 = 4$ (mass # - atomic #)
- Ne has a mass number of 20 and an atomic number of 10
 - Protons = 10
 - Neutrons = $20 - 10 = 10$



What about the electrons?

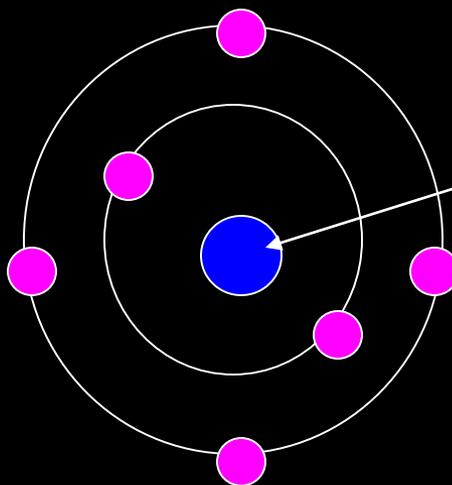
- The electrons are equal to the number of protons
 - So $e^- = p = \text{atomic \#}$
- Ex: He has a mass # of 4 and an atomic # of 2
 - $p^+ = \underline{2}$
 - $n^0 = \underline{2}$
 - $e^- = \underline{2}$



Bhor Model:

Mass # = 12

atomic # = 6



6 p and 6 n live
in the nucleus

$p^+ = \underline{6}$

$n^0 = \underline{6}$

$e^- = \underline{6}$

