Electron Speaker # 1

Hi, electron #1 here

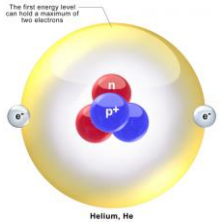
NAME _____ MAIL BOX____

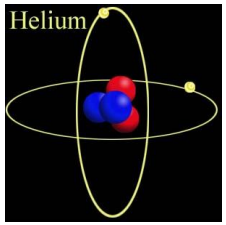
2
He
Helium
4.003

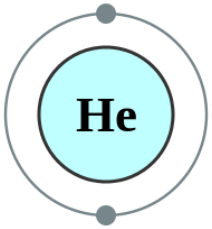
I am one of the electrons that makes up this helium atom. Did you know that while we are only approximately 1/1800th the mass of a proton we are actually the larger surrounding part of our atom? We electrons actually define the outer edge of atoms. We can absorb and emit energy, form bonds with other atoms, can jump ship and be conducted from one atom to another. I am pretty much the business of end for my nucleus.

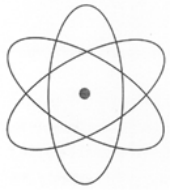
Now as for my size and why I am sooooo far away from my nucleus. I reside in a helium nucleus which, is one of the smaller atoms with only one electron level. Despite this my electron shell has a **diameter** of 1 angstrom or 0.1 nanometers or **10^{-10} meters** or 0.000,000,000,1 meters if you don't speak angstroms. Or, to put it in other words, I should be standing **50 meters** away from my nucleus to represent an accurate model. Mass wise, I'm only 1/1800th the mass of my nucleus. So if you try to visualize me, as a particle relative to the mass and size of my nucleus I'm smaller than the period at the end of this sentence.

Time to gain some atomic potential energy and let off a little kinetic….***(run to the far end of gym, wave your arms like crazy and make lots of noise!)***









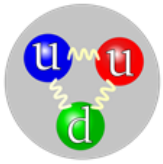
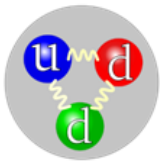
Electron Speaker #2

Hi, electron #2 here

I am also an electron in the valence electron shell orbiting the nucleus of my helium atom home. My helium home isn't ionized so I have but one neighbor that shares this electron shell around this helium nucleus making two of us. The closer I am to a nucleus the greater my kinetic energy and the further away the greater my potential energy. I am bound to the protons of my helium's nucleus by the electromagnetic force. Despite this I have never actually visited my nucleus. The closer I get the faster I move, never actually being able to spiral down in on the proton I am sooooo bound to by charge.

Helium only has one electron energy level so I don't ever really change orbits or more accurately they should be called quanta, clouds or shells. If you hear Mr. Burns call them orbits you should correct him. We electrons are nothing like planets orbiting a star. When we electrons move into higher electron levels, we actually radiate off energy that can be observed.

It looks like this…. ***(run to the far end of gym, wave your arms like crazy and make lots of noise!)***

Nucleus –Speaker #3  

NAME _____ MAIL BOX____

Hi, I am the nucleus of this helium atom. My mass is way greater than those puny electrons out there in never never land. They are so far away, they don't write, they don't call. What gives electrons? Anyway, I am comprised of two protons and two neutrons in this here nucleus. Folks once thought my neutrons may have been formed by a proton colliding with an electron, but the masses just don't add up. Now my protons have a mass of 1.672×10^{-27} kilograms and my neutrons a mass just slightly larger. However, we nuclei are a humble bunch, so we are good with just being referred to as having 1(AMU) or one **atomic mass unit** per proton and neutron that we own. I am a helium nucleus so I have 2 protons and 2 neutrons so my mass is 4 AMU. Despite being so much more massive than puny electrons we are honestly only a single millimeter **1mm** in diameter if you try to visualize us in a stadium model or gymnasium model when our electrons are 50 meters away.
My actual diameter is **10^{-15}meters**.

How is the model just demonstrated in class scaled? Answer this by completing the questions below.

1. Electron Speaker # 1 ← Find diameter of the electron shell also known as a cloud or quanta? _____ report in meters.

2. Nucleus –Speaker #3 ← Find **diameter** of the nucleus? _____ report in meters.

3a. Which has the larger diameter (not mass)? _____ 3b. Which has the smaller diameter (not mass)? _____

Setup the proportion just like we did in class exercise to demonstrate the ratios needed to model an atom here in the auditorium.

Set the **nucleus** equal to a unit of 1mm, then find diameter of electron shell FYI → 100,000mm = 100m

1. Show work legibly	**2. Setup proportion with X**	**3. Label electron shell (e^-)& nucleus**	**4. Box answer**

$$\frac{\text{\_\_\_\_\_}}{\text{\_\_\_\_\_}} = \frac{X}{1\text{mm}}$$

Can we make an accurate to scale model of an atom on a piece of paper? Yes or No ←(circle) What is an atom mostly made up of? _____