Chp 12 Lecture 2: The Atom!!! (stu copy)

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In the beginning

Matter has mass and takes up space. Atoms are _____ of matter, and cannot be chemically subdivided by ordinary means. The word atom is derived from the Greek word *atomos,* which means _____ or uncuttable. The Greeks concluded that matter could be broken down into particles too small to be seen. These particles were called _____

How small is an atom?

Really really really small! The average atom has a diameter of 0.00000003 cm – or three hundred-millionths of a centimeter. It would take 50,000 stacked aluminum atoms to equal the thickness of a sheet of aluminum foil. Also, there are over 6,000,000,000,000,000,000,000 (6×10^{21}) atoms in one drop of water. It would take you about 100 trillion years to count this number out. If we enlarged a penny, or stretched it out, until it was as wide as the US – each of its atoms would be only 3 centimeters across!

What's an atom made of?

Even though an atom is really small, it is made of even smaller particles. Basically, it's made of three subatomic particles:

- _____
- _____
- _____

An Atom's Parts

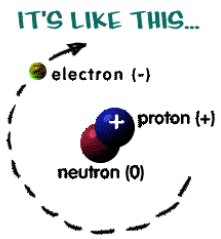
The center of an atom is called the _____

The nucleus contains 2 types of particles:

_____ = _____**(+)** charge

_____ = _____**(0)** charge, neutral

Due to the proton's positive charge, the nucleus has is always a positive charge.



Video Notes: Structure of an Atom

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

These things are teeny

The mass of a proton is really small, so small in fact, that scientists created a whole new unit for it. A proton has a mass of _____

_____

A neutron is actually a little bigger than a proton, but not enough to notice the difference, so we say it also has a mass of

_____

_____

The Outside of the Atom

Around the center of the atom, we find an electron cloud. The electrons are _____

_____

particles that orbit around the nucleus.

Electrons are very small, so small that it takes over 1,800 electrons to equal the mass of 1 proton. Therefore, we usually consider an electron's mass to be 0. So, an electron has a mass of

_____.

Overall Balance

To review, an atom is made up of 3 types of particles which are: Protons (+), Neutrons (0), Electrons (-) Notice that the protons and electrons have opposite charges…what does this mean?

Nucleus + Charge = Electron – Charge

It means that these two parts of the atom balance each other out so the atom is electrically _____, or has no overall charge. As long as there are an equal number of electrons and protons, the charges cancel.

What is (- 2) + (+ 2) → 0 (no charge!)

	Position	Charge	Mass
Proton			
Neutron			
Electron			

How can I remember all of this?

Protons = **P**ositive (+) **N**eutrons = **N**eutral (0) Electrons = **- N**egative (-)

Atomic Structure Video Notes: _____

_____

_____

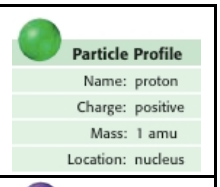
_____

Chp 12 : Lecture 3: The Atom: sect 2 STRUCTURE OF THE ATOM

Matter has mass and takes up space. Atoms are basic building blocks of matter, and cannot be chemically subdivided by ordinary means. The word atom is derived from the Greek word _____**which means indivisible.** The Greeks concluded that matter could be broken down into particles too small to be seen. These particles were called atoms. _____: The smallest piece of an element, which still has the properties of that _____ is called an atom. Central core is called a _____ and has a ___ charge. It is surrounded by an _____ _____ which has a_____charge. These 2 parts_____each other out so that the atom is electrically neutral (or has _____ electric charge)

Atoms are composed of three types of particles:
_____ _____ _____.

Protons and neutrons are responsible for most of the atomic mass (example: in a 150 person 149 lbs, 15 oz are protons and neutrons while only 1 oz. is electrons.) In reality the mass of an electron is almost negligible: 9.108 X 10-28 grams. That's why we basically refer to the **mass of an electron as:_____**
Both the protons and neutrons are located in the nucleus.
Protons have a positive (+) charge,
neutrons have no charge (-) they are neutral.
Electrons occupy in orbital clouds around the nucleus. They have a negative charge (-).

Parts of an atom:	
_____ in the nucleus ____(positive) charge _____	Particle Profile Name: proton Charge: positive Mass: 1 amu Location: nucleus
_____ in the nucleus ___(no) charge _____	Particle Profile Name: neutron Charge: none Mass: 1 amu Location: nucleus
_____ in the electron cloud ____(negative) charge _____	Particle Profile Name: electron Charge: negative Mass: almost zero Location: electron clouds

The number of protons in an atom is called the _____. The elements in the periodic table are arranged according to _____ It is the number of protons that determines the atomic number:
H (element hydrogen) = 1. The number of protons in an element is constant (H=1, for 1 proton, 2= He helium, for 2 protons… and so on). This procedure NEVER changes. The protons are the atomic number. They identify the element. The number of protons is equal to the number of electrons so that the element is electrically stable (or balanced)

_____:the number of **protons _____to the neutrons.**
Mass number can vary for the same element, if the element has different numbers of neutrons. When this happens, these forms of an element are called _____. **Chemical properties of isotopes are the same,** although the physical properties of some isotopes may be different. Some isotopes are radioactive-meaning they "radiate" energy as they decay to a more stable form, perhaps another element half-life: time required for half of the atoms of an element to decay into stable form. An example of an isotope is oxygen, with atomic number of 8 which can have 8, 9, or 10 neutrons.

_____ is another example. If you take the atomic number 6 and subtract is from the AMU of 14 you find that there are **____neutrons in the nucleus.**
This is an isotope of Carbon and is a radioactive isotope known as Carbon-14. This radioactive isotope is critical in helping scientists **date plant and animal_____** and occurs in every 100,000,000 carbon atoms.

_____: Atoms of the same element with different number of neutrons.

6 <-------- _____
C <-------- _____
Carbon <-------- _____
12.011 <-------- _____

Isotope of Carbon would have a _____ atomic mass because the number of neutrons is not equal to the number of protons
Remember: number of protons = number of electrons.
The atom is electrically_____
The region around the nucleus is called the electron cloud. The electrons occupy certain energy levels. The farther an energy level from the nucleus, the more energy the electrons will have in it.
1st level = _____ electrons
2nd level=_____ electrons
3rd level = _____ electrons
_____: The mass of an atom depends on the number of protons & neutrons it contains
_____= Atomic mass unit
_____is the sum of the protons and neutrons.
_____= mass number MINUS (-) the atomic number
_____= NUMBER of _____,
which = NUMBER of _____