Name: _____

Period: _____

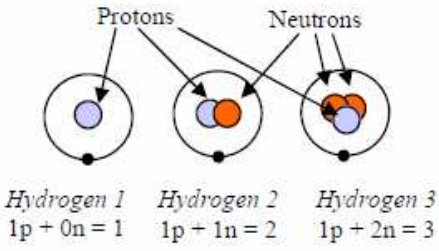
Isotopes and Making Atoms

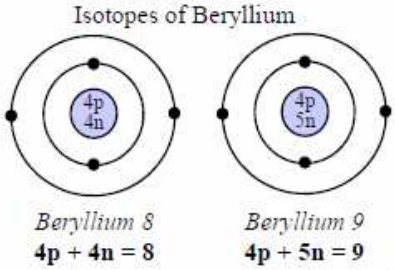
Isotopes

An isotope is a variation of an element. It has the same number of protons (same element), but a different number of neutrons (different isotope).

Isotopes of Hydrogen

Because they each have 1 proton, they are all hydrogen atoms, but are different ***isotopes*** because they have numbers of neutrons .





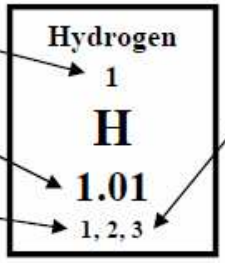
Reading the Tiles

The atomic mass is an average. Round it to find the most common isotope.

Atomic number *(number of protons)*

Atomic mass *(average of all the isotopes)*

Mass numbers *(Most common isotopes)*



Finding the # of Neutrons

Mass # = protons + neutrons

Neutrons = mass # – protons

For Hydrogen 3:
3 (mass #) – 1 (atomic #) = 2 (neutrons)

Hydrogen 3 has 2 neutrons.

Ions and Neutral Atoms

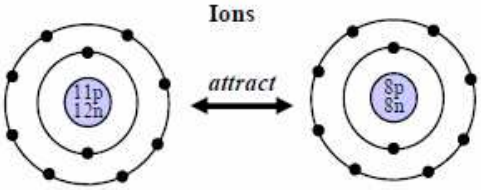
If the number of electrons equals the number of protons the atom is neutral. If not, it is an ion.

Neutral Atoms

1 proton = Hydrogen
1 proton (+1)
1 electrons (–1)
+1 –1 = 0
neutral atom

2 protons = Helium
2 proton (+2)
2 electrons (–2)
+2 –2 = 0
neutral atom

Ions



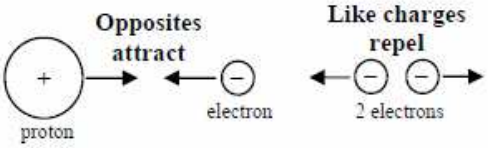
Positive and negative ions attract each other.

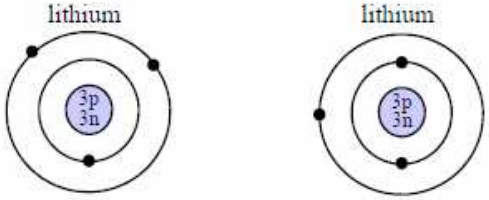
11 protons = Sodium
11 p –10e = +1
positive ion: Na^{+1}

8 protons = Oxygen
8 p –10e = –2
negative ion: O^{-2}

Electrons Orbits

Electrons will want fill up inner orbits first to get as close to the nucleus as possible. They also want to stay as far away from each other as possible.





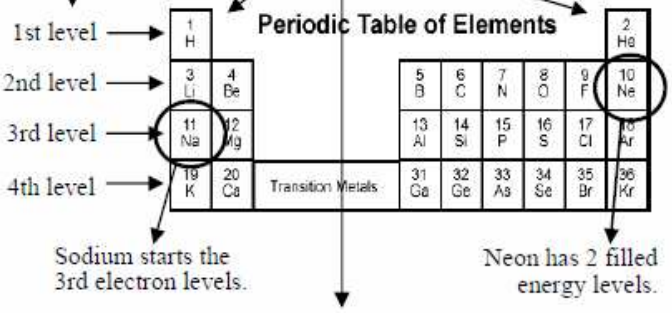
Incorrect! - The electrons will fill up the inner levels first. The first level takes 2 electrons.

Correct! - Inner orbit is full (with 2); one outer electron.

 # rows = # of energy levels.

The # of elements in a row = # of electrons in a level.

End of a row means a full energy level.



Sodium starts the 3rd electron levels.

Neon has 2 filled energy levels.

1st row has 2 elements, so the first energy level can hold 2 electrons.

1. Isotope	A. An average of all the isotopes; the mass of average atom.
2. Atomic mass	B. An atom with an equal number of electrons and protons.
3. Atomic #	C. An atom with more or less electrons than protons.
4. Neutral atom	D. A variation of an element with a different number of neutrons.
5. Ion	E. Total number of protons and neutrons in the nucleus.
6. Mass #	F. Number of protons; determines the element.

Give abbreviations and number of protons

Calcium (*Ca*) ___20___. Boron (____) _____

Potassium (____)_____ Selenium (____) _____

Copper (____) _____ Silver (____)_____

Zirconium (____) _____ Mercury (____) _____

Which of the following are isotopes?

Element A: 15 protons; 15 electrons; 16 neutrons
Element B: 14 protons; 16 electrons; 14 neutrons
Element C: 15 protons; 18 electrons; 15 neutrons
Element D: 16 protons; 18 electrons; 15 neutrons
Element E: 15 protons; 18 electrons; 14 neutrons

7 protons and 10 electrons. *Neutral atom or ion?*
15 protons and 15 electrons. *Neutral atom or ion?*
35 protons and 37 electrons. *Neutral atom or ion?*
89 protons and 89 electrons. *Neutral atom or ion?*

Give the element abbreviation and charge.

5 protons and 2 electrons: Element: B Charge: +3

16 protons and 18 electrons: Element: ___ Charge: _____

35 protons and 36 electrons: Element: ___ Charge: _____

12 protons and 10 electrons: Element: ___ Charge: _____

Sulfur 32 has *16* protons and *16* neutrons. *(32 – 16p = 16n)*

Magnesium 25 has ___ protons and _____ neutrons.

Carbon 14 has ___ protons and _____ neutrons.

Lithium 7 has ___ protons and _____ neutrons.

Chlorine 35 has ___ protons and _____ neutrons.

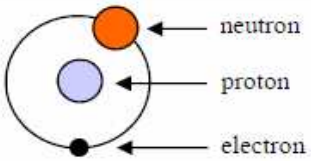
Fluorine 19 has ___ protons and _____ neutrons.

Oxygen 16 has how many neutrons?

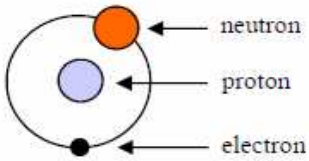
Beryllium 8 has how many neutrons?

Boron 11 has how many neutrons?

What's wrong with this picture of an atom?



What's wrong with this picture of an atom?

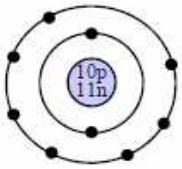


Oxygen 16 has how many neutrons?

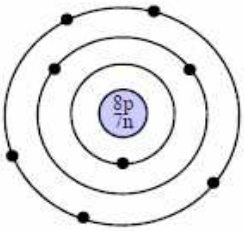
Beryllium 8 has how many neutrons?

Boron 11 has how many neutrons?

This picture is supposed to be of a neutral atom. Fix it.



What is wrong with this picture of an atom?



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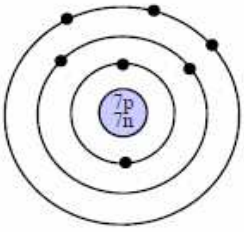

Which row is Lithium (Li) in? 2 . It has electrons in levels 1 and 2.

Which row is phosphorous (___) in? ____ So, phosphorous has electrons in which electron levels?

Which row is calcium (___) in? ____ So, calcium has electrons in what levels?

Which row is argon (___) in? ____ So, argon has electrons in what levels?

Argon (___) is at the end of row ___. So argon has ____ full electron levels.

Helium (___) is at the end of row ___. So helium has ____ full electron levels.

Xenon (___) is at the end of row ___. So xenon has ____ full electron levels.

How many full electron levels does Calcium have?

How many full electron levels does Sulfur have?