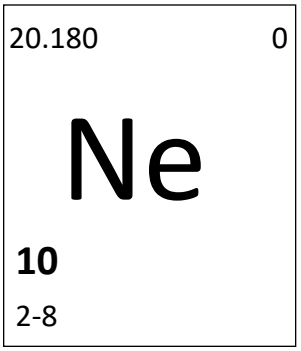
RHW #5 Random Homework Practice name _____

Neon from the periodic table is at right. The numbers all have meaning.

Neon is atom number 10, which means it has 10 protons, the whole table is in ascending atomic number, and the atomic number is the number of protons. Only neon has 10 protons. All atoms with 10 protons must be neon. No exceptions.



Neon, like all atoms, is neutral. With 10 positive protons, it also must have 10 negative electrons. The "2-8" means that these electrons exist in two orbitals, the smaller first one, full up with 2 electrons, and the 8 others filling up the second orbital. With ONLY full orbitals, neon is very stable, so stable that it will not make bonds to other atoms.

The 20.180 is the "official" average weighted atomic mass, which means the sum of all of the isotopes of neon, multiplied by the proportions found naturally occurring in nature, the real average atomic mass. The most common isotope of neon is Ne-20 (which has a mass slightly different that the exact "20"). Isotopes are atoms of an element, with slightly more, or less neutrons. Neutrons are not part of a reaction, or bonding, but they do have mass. Isotopes are chemically identical, but physically slightly different from one another. Only the naturally occurring isotopes are counted (sometimes scientists can make other isotopes in nuclear reactions, we will learn more about that in May).

Neon's 2-8 electrons are in the GROUND STATE, the lowest possible energy levels (orbitals are also energy levels). Lowest energy state is NORMAL. If an atom were to gain some energy, say be being electrified, with electricity, atoms like neon could gain this energy to become excited (not normal) and the electrons would be to energized to remain in this lower energy, ground state. Neon when excited with electricity, might have an electron configuration of 2-7-1, where one of the electrons from the 2nd orbital is too excited to stay there, and jumps "up" to a higher than normal orbital. This is EXCITED neon. Same exact atom, but so energized that the configuration of electrons is not at the lowest possible (normal) position.

The excited state is less stable that the normal ground state. Quickly the atom regains it's normal state by RELEASING the energy it just absorbed. That allows the excited electron in the 3rd orbital to return to the (normal, 2nd orbital) lower energy orbital. The energy released is given off as VISIBLE LIGHT, which we call spectra.

Since every atom has a normal, or ground state, with a certain amount of protons in the nucleus that "pull" on the electrons to keep them in proper places, to excite any kind of atom requires a unique amount of energy. Since that exact, unique amount of energy is also released, to get the electrons back to the ground state, each spectra given off is unique. We can LITERALLY SEE THIS WITH OUR EYES as different colors.

Our eyes are not able to always tell the subtle differences between these colors, because they are mixtures of different colors, at different energy wavelengths, but we can use a REFRACTIVE LENS to break up the color we see, into the pure colors, at particular wavelengths that we can't see with our eyes alone. All substances have unique spectra, but with our eyes alone we can't always tell one bluish light from another. Since each is unique, and we can use a refractive lens to see the actual SPECTRA EMISSION LINES of color (that our eyes blur into one color) we can use these lenses to measure the actual colors of light, at specific energy levels, and those are unique. Scientists can use these specific spectra emission lines to discern one substance from another, even at distances as great as from space. Each substance has a unique electron/proton system, that gets excited uniquely, and measurably.
(Time for a big wow here)

Fill in this table now. The first row is an example. Pay attention to the symbol, make yours the same style.

	Atom	Symbol	Atomic number number of protons	Number of electrons	Ground state configuration	Possible Excited state configuration (one is enough)
Ex	Carbon	C-12	6	6	2-4	2-3-1 or 1-5
A	Nitrogen					
B	Fluorine					
C	Argon					
D	Krypton					
E	Oxygen					

How many protons, neutrons, and electrons are in each of these isotopes?

	Isotope symbol	Protons	Electrons	Neutrons
Ex	C-12	6	6	6
F	C-14			
G	Ne-21			
H	Cu-64			
I	Cu-63			
J	Au-197			
K	Au-198			

What is the electron configuration for each of these atoms?

Ba-139 _____ W-182 _____

Hf-178 _____ Ca-20 _____

Lead has four isotopes, as shown in the data table. Calculate the average weighted atomic mass for lead.

Isotope	Atomic Mass in amu	Naturally occurring percentage
Pb—204	203.973	1.400%
Pb—206	205.974	24.10%
Pb—207	206.976	22.10%
Pb—208	207.977	52.40%

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Do the same for the three isotopes of magnesium.

Isotope	*Atomic Mass in amu*	*Naturally occurring percentage*
Mg-24	*23.99*	*78.99%*
Mg-25	*24.99*	*10.00%*
Mg-26	*25.98*	*11.01%*