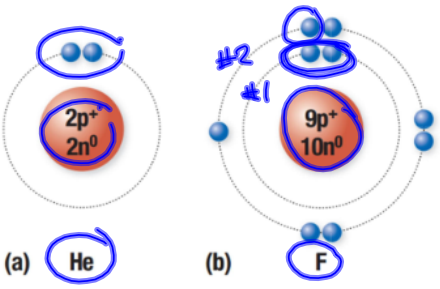
SPH3U 7.1 Atoms and Isotopes

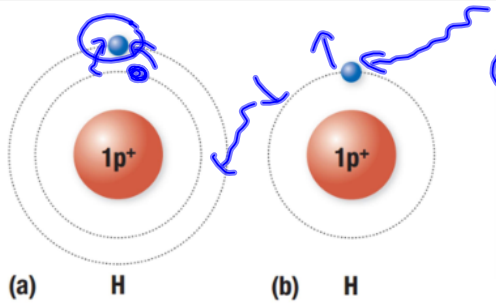
1. Bohr-Rutherford model of the atom

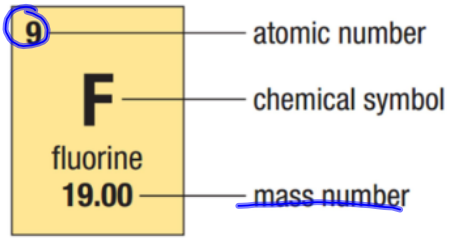
Nucleus:	Centre part, filled with protons and neutrons.	Shells:	energy states of the electrons.



Shell number	Maximum number of electrons
1	2
2	8
3	18
4	32

Excited state:	electrons are at higher-energy states than the ground state.	Atomic number:	# of protons. Unique for each element.
		Mass number:	# of protons + # of neutrons.

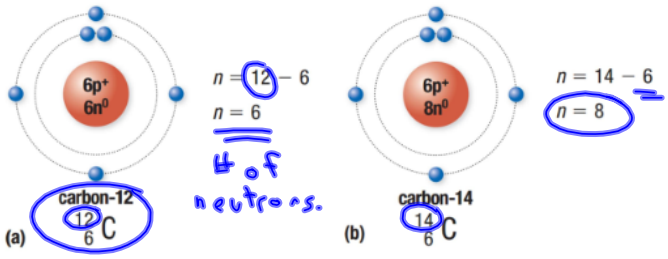




$n^0 = 19 - 9 = 10$

2. Isotopes

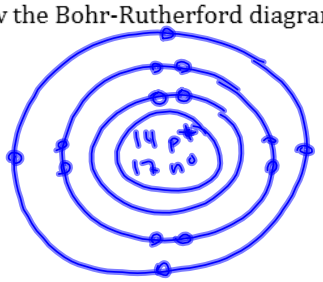
Isotope:	same atomic #, different # of neutrons.



Hydrogen:	1 proton, 1 electron, no neutrons $^{1}_{1}H$
deuterium	$^{2}_{1}H$, has one neutron. } Used to make "Heavy water" (H_2O) ← Canadian nuclear reactors.
tritium	$^{3}_{1}H$, has two neutron. }
Periodic table:	Lists the most commonly occurring isotope.

Naturally occurring → deuterium

Draw the Bohr-Rutherford diagram for silicon-31. $^{31}_{14}Si$ → $n^0 = 31 - 14 = 17$.



3. Medical applications of radioisotopes

Radioisotopes:	Unstable isotope that will decay and release radiation.
nuclear medical imaging	inject a radioisotope into a patient and use the radiation to see internal problems.
radionuclide therapy (RNT)	use radiation to target and kill specific structures (tumors)

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