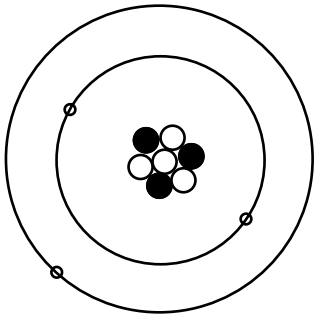
The Shell Model of the Atom : Notes/W.S.-6 5

The Bohr (or shell) model of the atom is largely correct. The small positively charged nucleus contains the protons and neutrons. The small negatively charged electrons move around the nucleus in specific orbits called shells.

- The number of protons equals the atomic number.
- The number of electrons equals the atomic number (for a neutral atom)
- The number of neutrons is equal to the mass number (p + n) minus the atomic number.
- The first shell contains a maximum of two electrons. The second shell contains a maximum of eight electrons. In general, the n'th shell contains a maximum of $2n^2$ electrons.

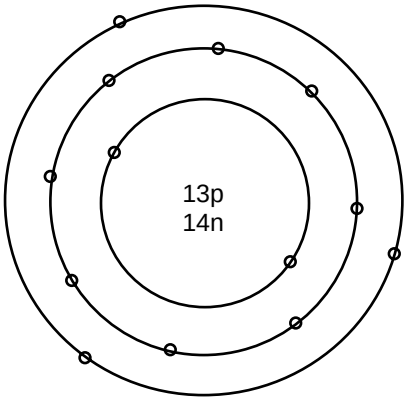
Using this model we can draw pictures of atoms.

Example 1: Draw a picture of the lithium-7 atom.



The nucleus has 3 protons (black) and 4 neutrons. The first shell has a maximum of 2 electrons. The third electron must be in the second shell.

Example 2: Draw a picture of the aluminum-27 atom.



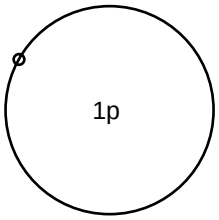
Problems: 1) Draw pictures for the following atoms. The top number is the mass number. The bottom number is the atomic number.

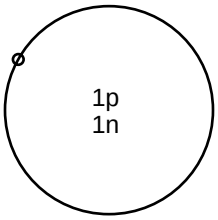
a) $^{1}_{1}H$ b) $^{2}_{1}H$ c) $^{4}_{2}He$

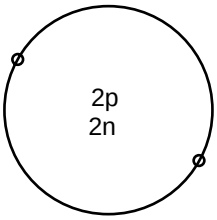
d) $^{9}_{4}Be$ e) $^{19}_{9}F$ f) $^{20}_{10}Ne$

g) $^{23}_{11}Na$ h) $^{31}_{15}P$ i) $^{40}_{18}Ar$

Answers: 1)

a) 

b) 

c) 

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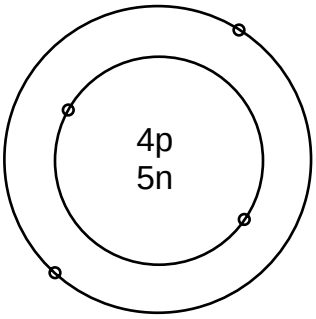

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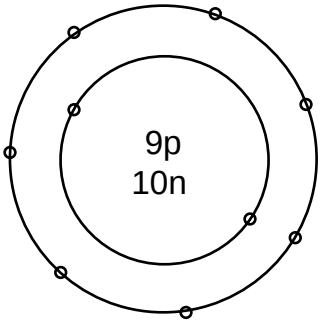

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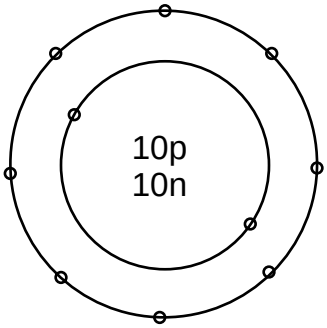

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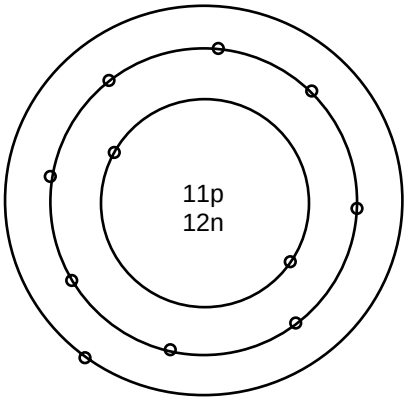
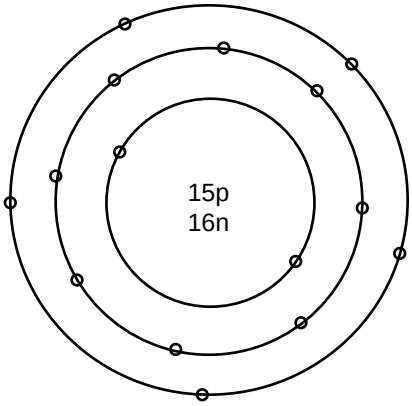


h)



i)