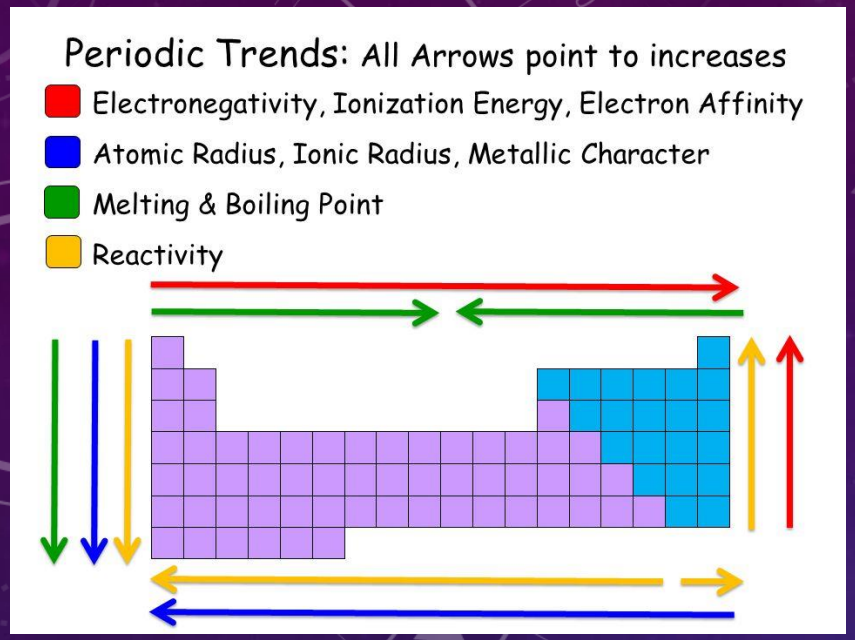
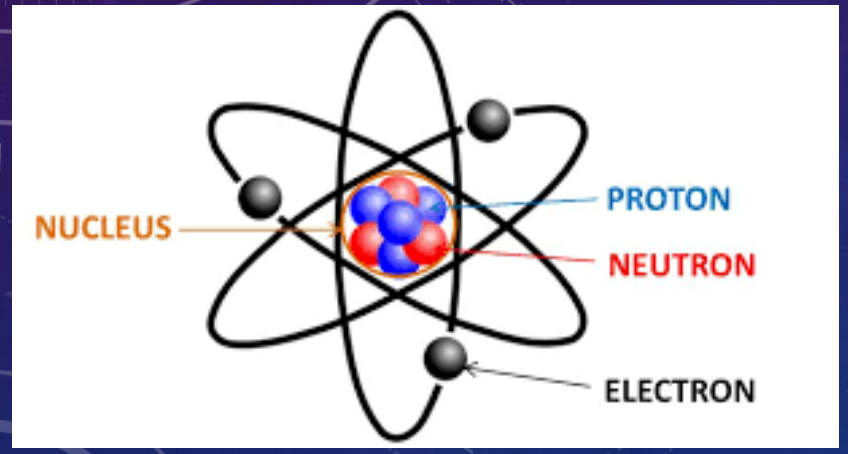




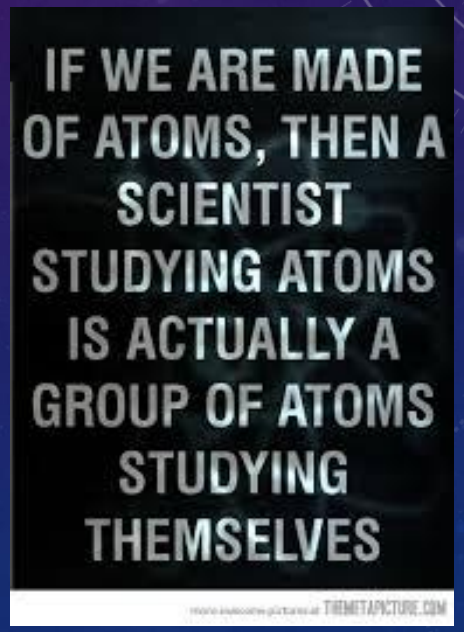
ATOMIC THEORY AND PERIODIC TRENDS

ORGANIZATION OF THE PERIODIC TABLE

- Mendeleev arranges the elements in his periodic table based on physical and chemical properties
- Elements in the same families share similar properties
  - Characteristics repeat in a predictable way
    - Why?
      - To answer this question we need to look at the structure of the atom

WHAT DO YOU KNOW ABOUT ATOMS?

- In your notebook, without referring to you textbook, draw a diagram of a helium atom.
  - What information did you provide about the atom in your diagram?



ELEMENTS ARE MADE UP OF ATOMS

- The atom: Smallest unit of an element that has the properties of that element

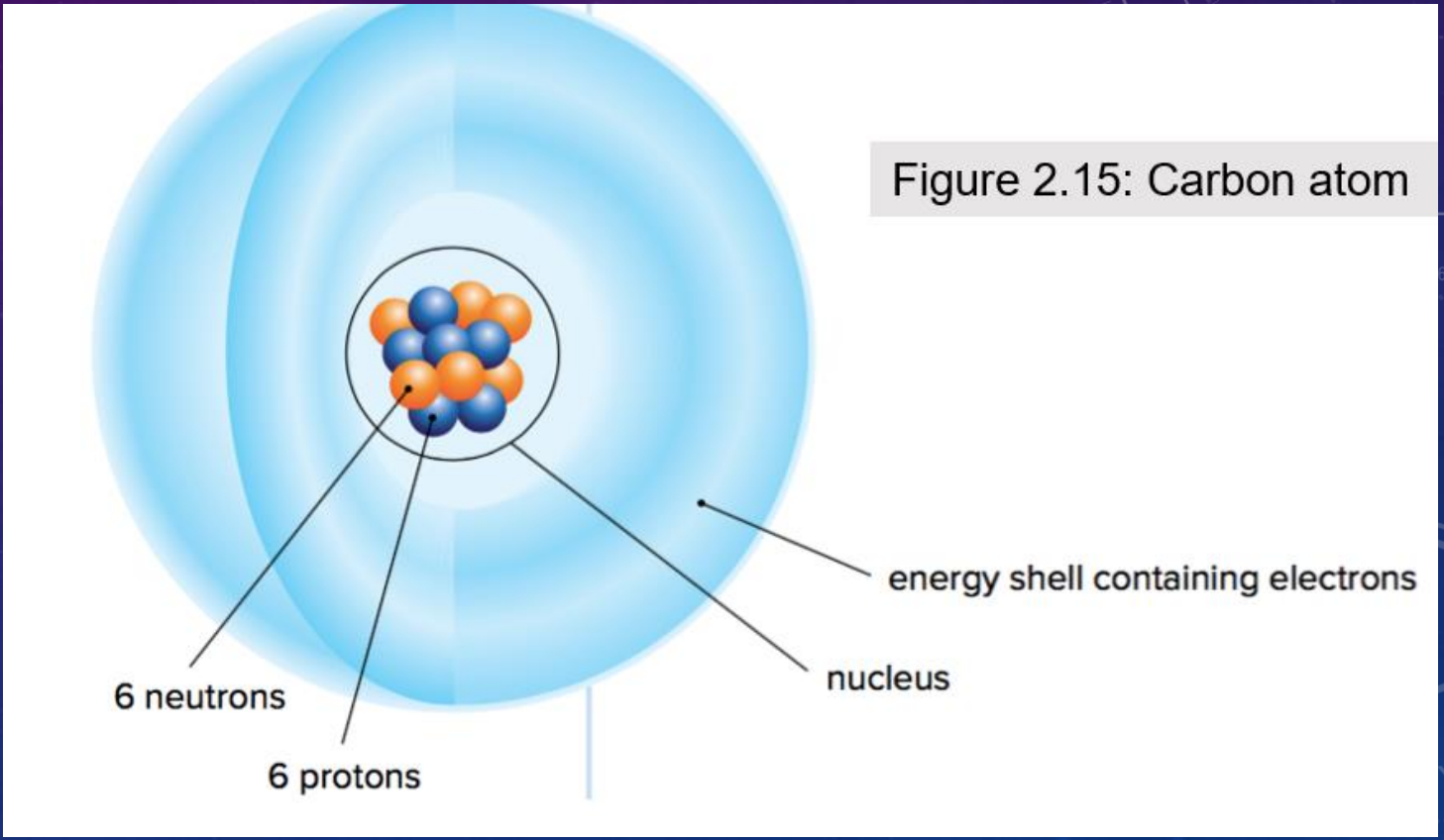


Figure 2.15: Carbon atom

KEY FEATURES OF ATOMIC STRUCTURE

- Each atom has a tiny, dense nucleus with neutrons and protons
- Nucleus is surrounded by electrons, which exist in specific electron energy shells
- Most of the mass of the atom is in the nucleus

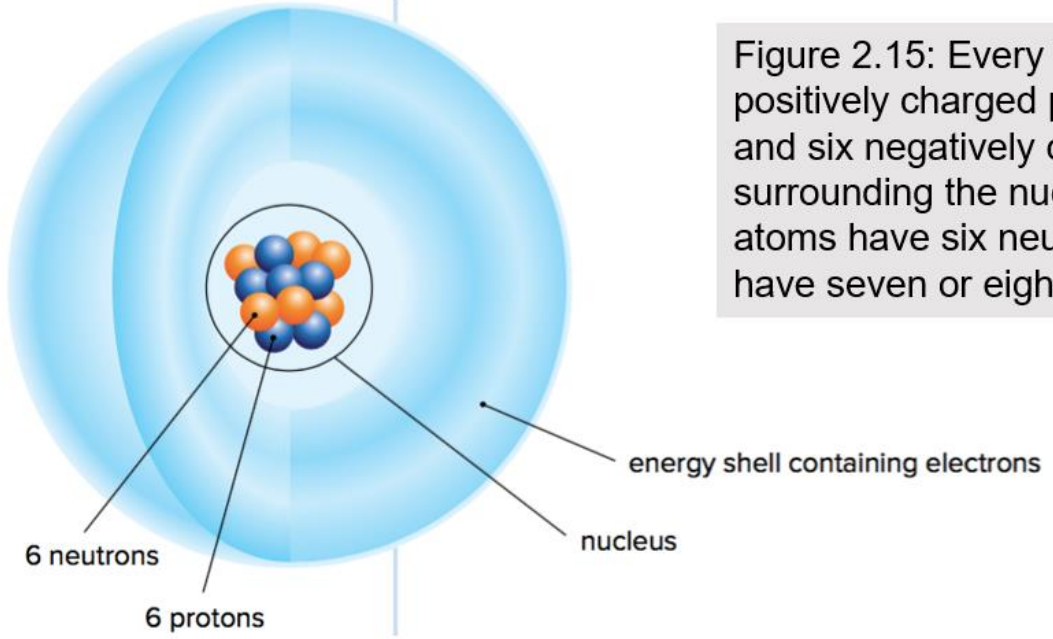


Figure 2.15: Every carbon atom has six positively charged protons in its nucleus and six negatively charged electrons surrounding the nucleus. (Most carbon atoms have six neutrons, but some have seven or eight.)

COMPARING SUB ATOMIC PARTICLES

Table 2.3 Subatomic Particles

Name	Relative Mass	Electric Charge	Symbol	Location in Atom
proton	1836	+	p^+	nucleus
neutron	1837	0	n^0	nucleus
electron	1	–	e^-	electron energy shells surrounding the nucleus

CALCULATING SUB ATOMIC PARTICLES

- In an atom
  - the proton # is equivalent to the atomic #
    - Ex: Carbon's atomic # is 6, how many protons?
  - Since an atom is neutral, the # of protons (+) is equal to the # of electrons (-)
  - The majority of the mass of an atom comes from nucleus
    - Therefore protons + neutrons = atomic mass

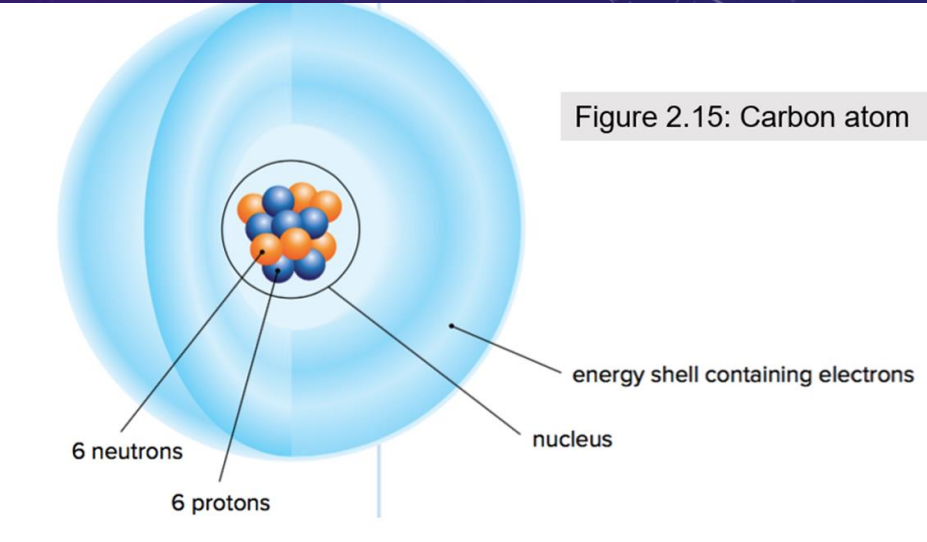


Figure 2.15: Carbon atom

TIME OUT

- Complete “Parts of an atom” worksheet
- Calculate protons, neutrons and electrons for an atom of Lithium, Neon and Phosphorous

BOHR DIAGRAMS ARE A USEFUL WAY TO MODEL ATOMS

Bohr diagrams represent the electron arrangements of atoms using energy shells

- Show how many electrons occupy each specific energy level or shell

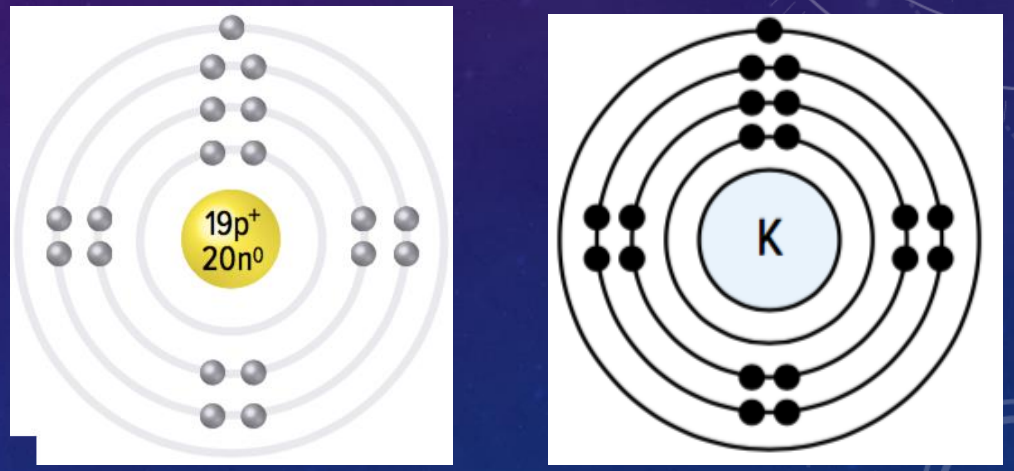
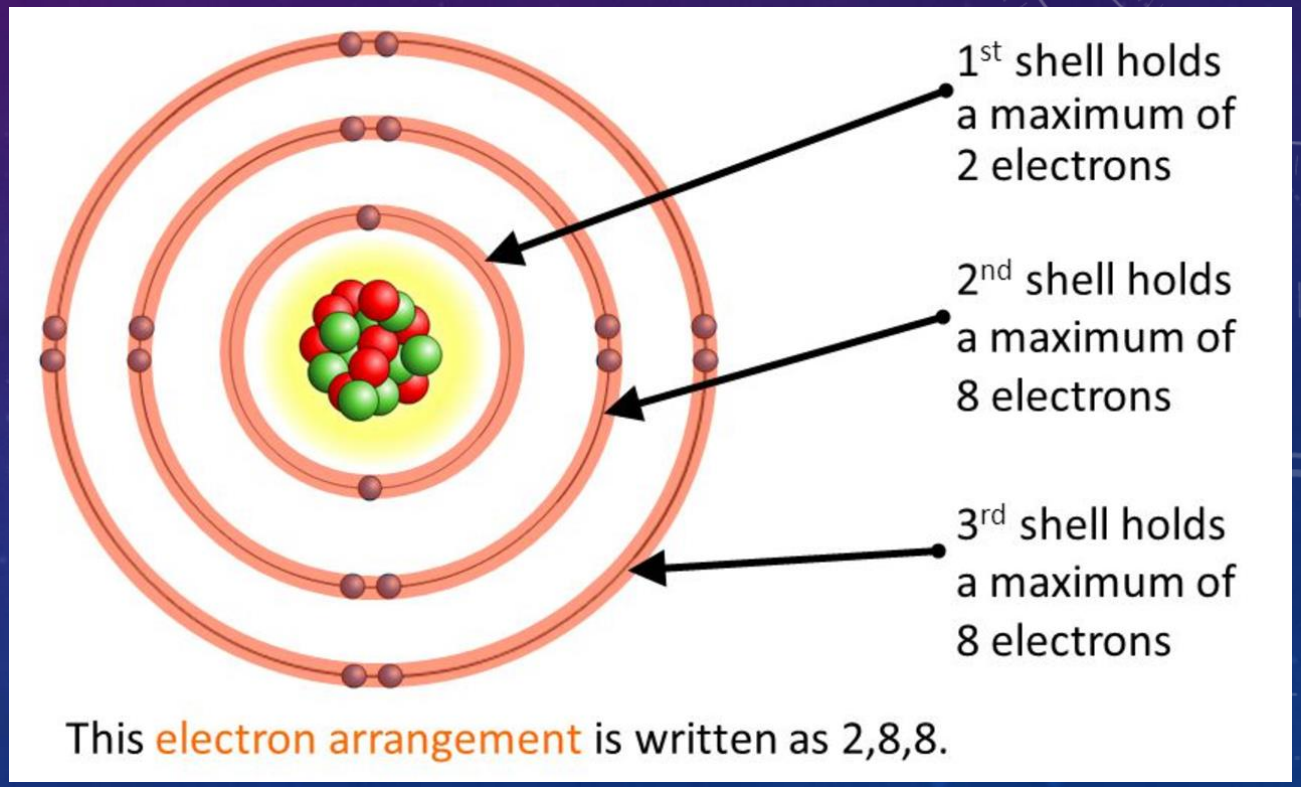


Figure 2.15: Two types of Bohr diagrams representing an atom of potassium (K).

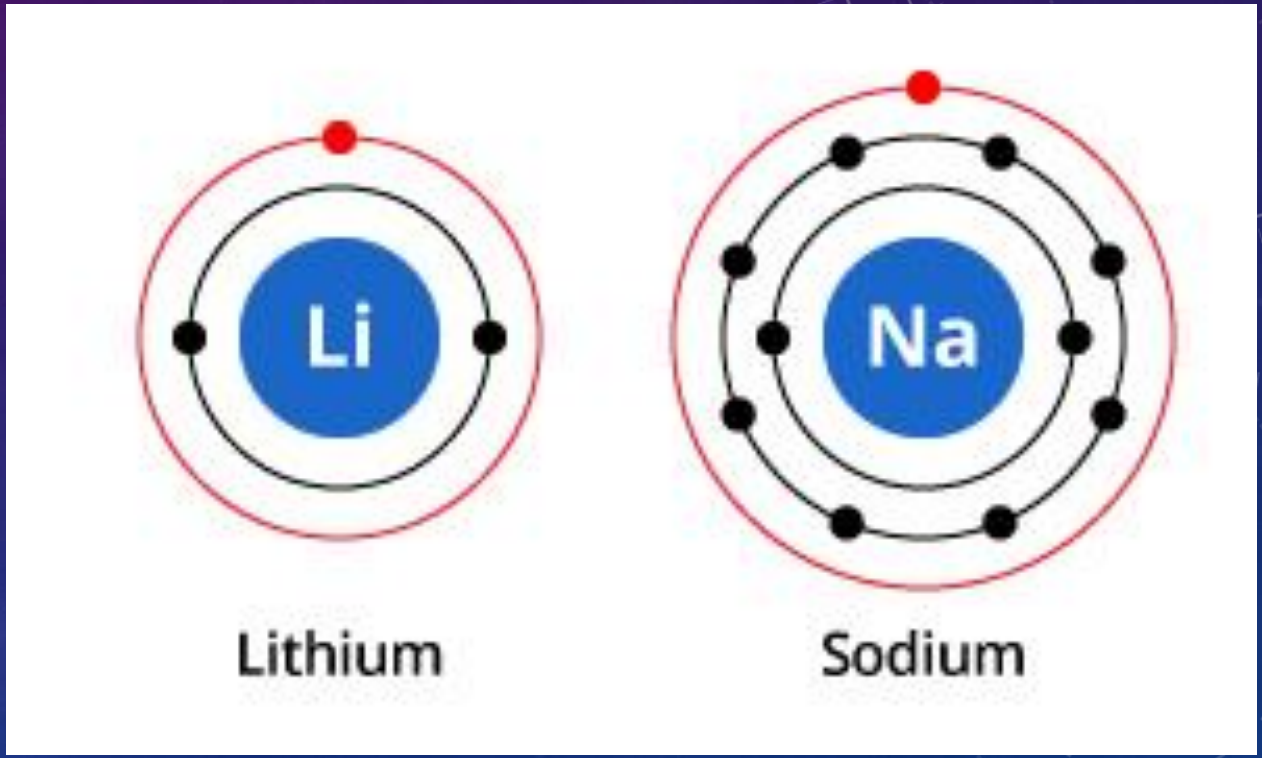
BOHR DIAGRAMS AND ENERGY SHELLS

- First energy shell: maximum two electrons
- Second and third energy shell: maximum eight electrons (for the first 20 elements)



VALENCE SHELL

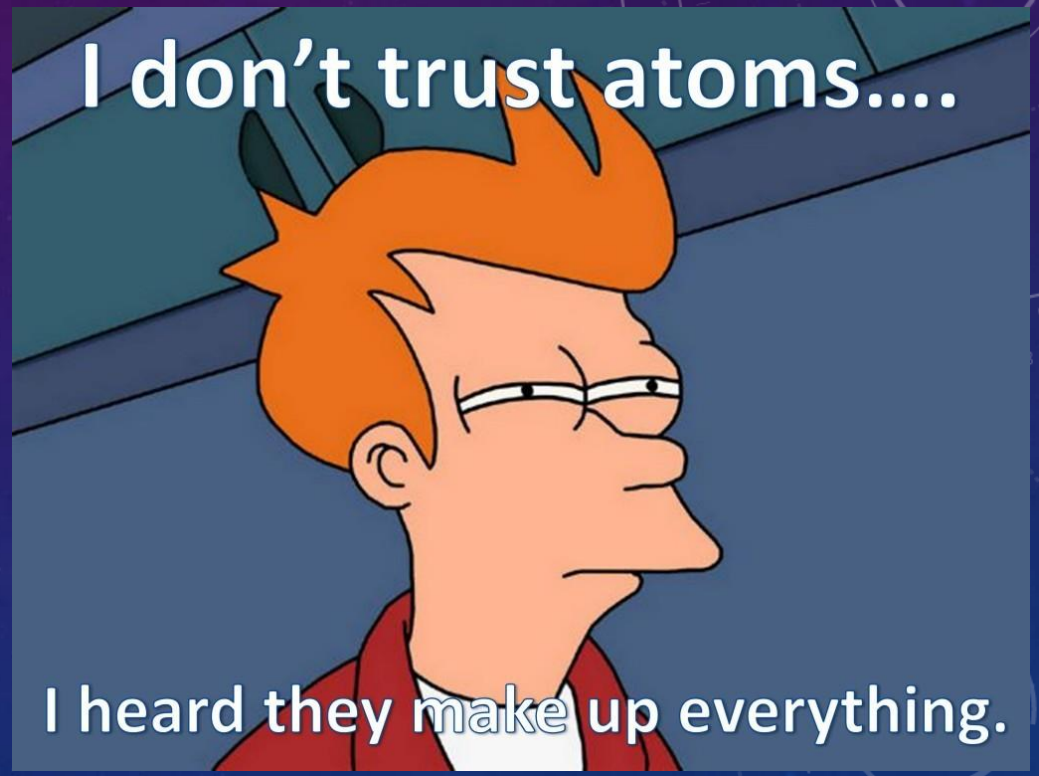
- **Valence shell** (outermost energy shell)
  - occupied by **valence electrons** (electrons in the outermost occupied energy shell of an atom)



DISCUSSION QUESTIONS

1. Draw a diagram of an atom, labelling protons, electrons, and neutrons.

2. List how many electrons can be found in the first, second and third energy shells.



DRAWING A BOHR DIAGRAM

- Fill in your Bohr Diagram chart for the first 20 elements
  - Lets do the first couple together