# Holt Modern Chemistry Review CHAPTER 4: ARRANGEMENT OF ELECTRONS IN ATOMS

#### The following pages contain the bulk (but not all) of the information for the chapter 4 test. Focus on this content, but make sure to review class notes, activities, handouts, questions, etc. If you study this document and NOTHING else, you should at least be able to PASS the test. \*\*\*\*\* Test items will be <u>recall</u>, <u>examples</u>, and/or <u>application</u> of this content. \*\*\*\*\*

### OUTCOMES

- Collaborate with peer(s) to understand chemistry content (C C)
- Communicate chemistry content to teacher and peer(s) (E C)
- 4.3: Write electron configurations in regular order, orbital notation, and noble gas methods (F & PK)
- 4.3: Compare and contrast levels and sublevels (also their positions on Periodic Table) (T & R)

# 4.1: THE DEVELOPMENT OF A NEW ATOMIC MODEL

- Vocabulary
  - o ground state -- the lowest energy state of a quantized system; also known as the "correct" way
  - excited state -- a state in which an atom has more energy than it does at its ground state; also known as the "incorrect" way
- Chapter Highlights
  - An electron in an atom can move from one main energy level to a higher main energy level only by absorbing an amount of energy exactly equal to the difference between the two levels.

# 4.2: THE QUANTUM MODEL OF THE ATOM

- Vocabulary
  - **orbital** -- a region in an atom where there is a high probability of finding electrons; represented by lines or boxes; the number of these is equal to ½ the number of electrons in an individual sublevel
  - **principal quantum number** -- the quantum number that indicates the energy and orbital of an electron in an atom; the "big number"
- Chapter Highlights
  - An orbital, a three-dimensional region around the nucleus, shows the region in space where an electron is most likely to be found.

# 4.3: ELECTRON CONFIGURATIONS

- Vocabulary
  - electron configuration -- the arrangement of electrons in an atom; in the format of 1s<sup>2</sup>2s<sup>2</sup>, etc.
  - noble gases -- one of the elements of Group 18 of the periodic table (helium, neon, argon, krypton, xenon, and radon); noble gases are generally unreactive
  - noble-gas configuration -- an outer main energy level fully occupied, in most cases, by eight electrons; in the format of [Ar]4s<sup>2</sup>3d<sup>10</sup>, etc.
- Chapter Highlights
  - The ground-state electron configuration of an atom can be written by using the Aufbau principle, Hund's rule, and the Pauli exclusion principle. For example:
    - "Hotel must be filled by the least expensive rooms first." (Aufbau)
    - "If possible, accommodate people (electrons) one person to a room (orbital) before doubling up, and each person sleeps in the same direction." (Hund)
    - "Only a maximum of two people (electrons) per room and sleeping head-to-foot (opposite spin)." (Pauli)
  - Electron configurations can be depicted by using different types of notation. Four types of notation are used: orbital notation, orbital diagram, electron-configuration, and noble-gas notation.
    - EXAMPLE: orbital notation





Bromine

 $[Ar]4s^{2}3d^{10}4p^{5}$ 

• How to label Electron Configuration on the Periodic Table:

