These notes are posted on my site for the following reasons:

- **for students to copy in their own hand-writing**
  - **in order to complete their class notes**
  - **if student did not have enough time in class**
  - **if student was away and missed this section**
- **for assistants and tutors to follow progress of the concepts taught**

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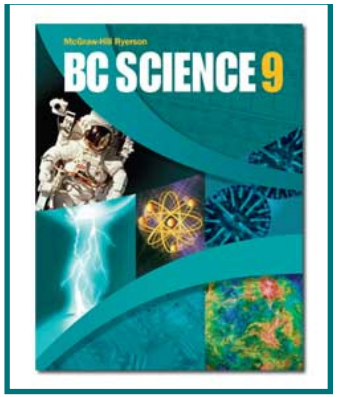
1.3 Atomic Theory



- Early ideas about matter
  - Greek philosophers believed that matter was made of *atomos* that were the smallest pieces of matter.
  - Aristotle believed matter was made of different combinations of earth, air, fire, and water.
  - Alchemists experimented with matter and tried to turn common metals into gold. Their activities marked the beginning of our understanding of matter.

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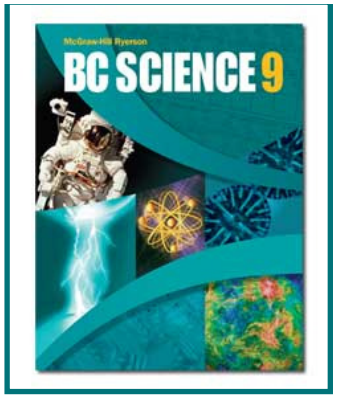
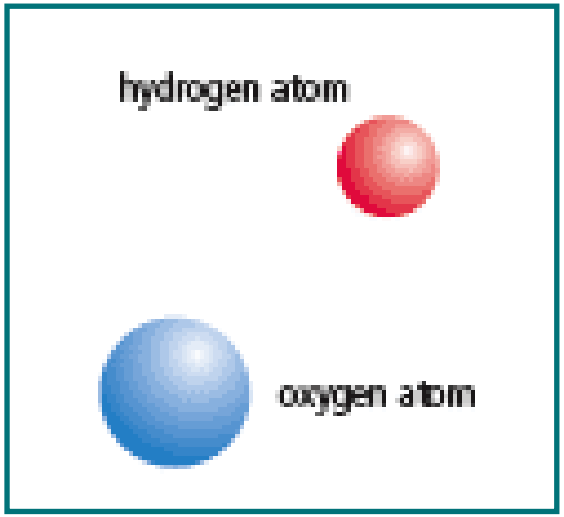


Development of Atomic Theory I

- John Dalton (1766 - 1844)
  - Credited with developing a theory that was a new way of explaining matter.
  - He studied gases that make up Earth's atmosphere.

    Based on his studies, he suggested that:
    - matter is made of small, hard spheres that are different for different elements
    - the smallest particle of an element is called an atom
  - This is the basis for Dalton's Atomic Theory.



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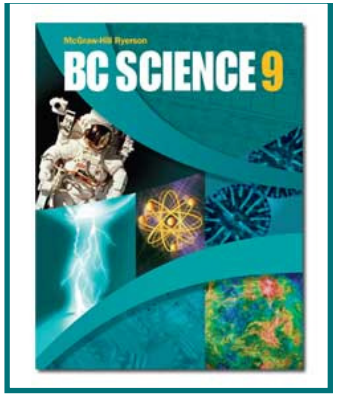
Dalton's Atomic Theory



1. All matter is made of small particles called atoms.
2. Atoms cannot be created, destroyed, or divided into smaller particles.
3. All atoms of the same element are identical in mass and size, but they are different in mass and size from the atoms of other elements.
4. Compounds are created when atoms of different elements link together in definite proportions.

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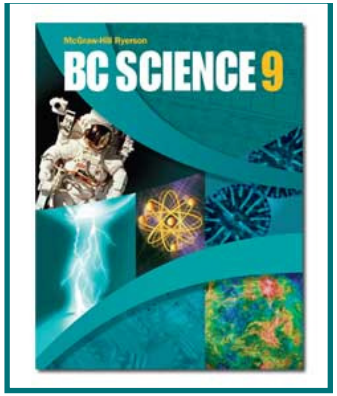
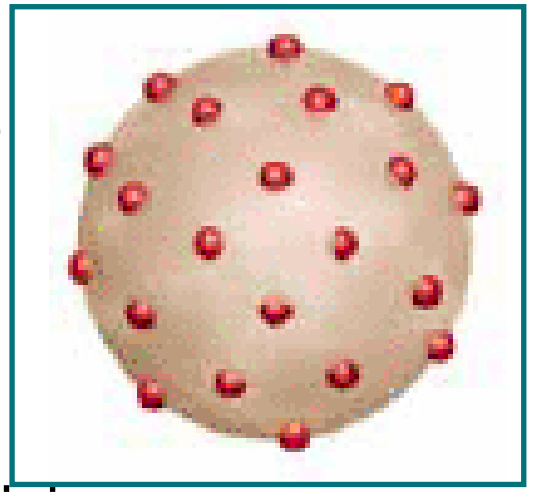
Atomic Theory II



- J. J. Thomson (1856 - 1940)
  - Thomson studied electric currents in gas discharge tubes (like today's fluorescent lights). From his studies, he determined that the currents were streams of negatively charged particles. These were later called electrons.
  - He hypothesized that atoms are made of smaller particles. He proposed the "raisin bun" model of the atom.
  - This model is best visualized as a positively charged bun with negatively charge particles spread out in it like raisins.



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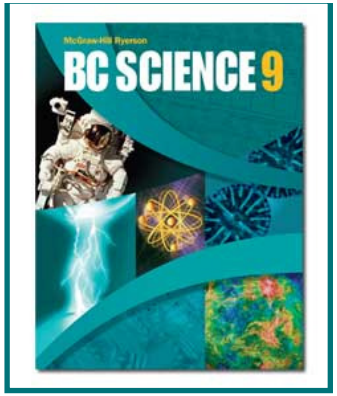
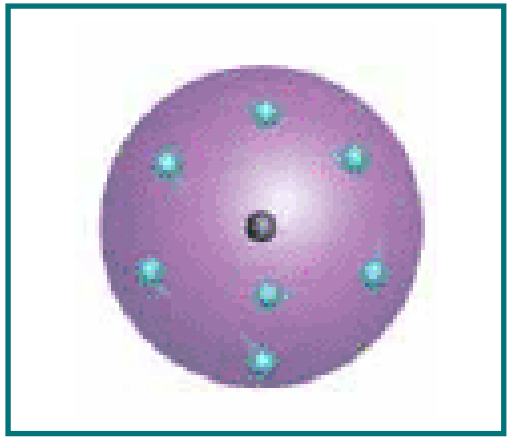
Atomic Theory III



- Ernest Rutherford (1871 - 1937)
  - After experimenting with charged particles, he found that some particles were deflected in directions not originally predicted.
  - He suggested that the deflection of the charged particles was because the atom contained a tiny dense centre called a nucleus, and electrons moved around the nucleus.



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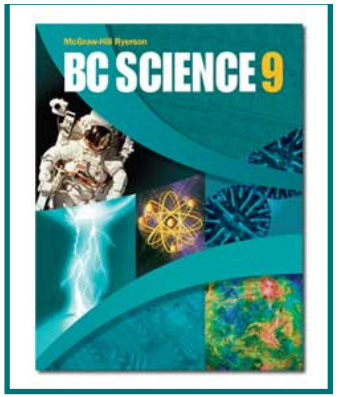
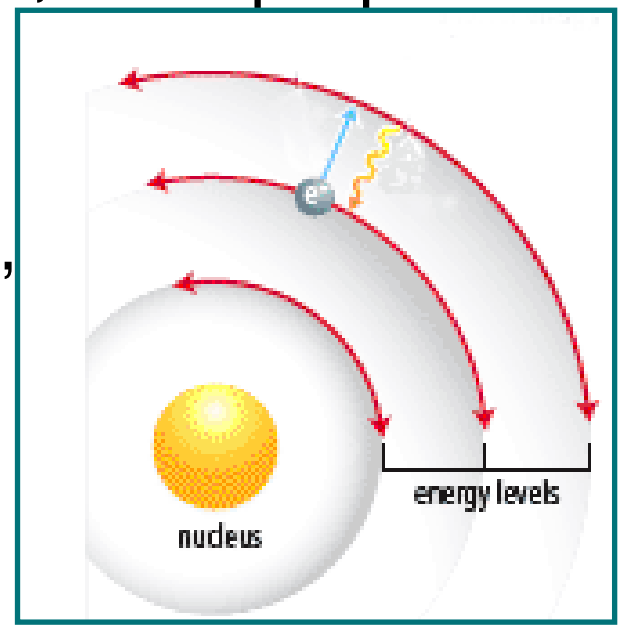
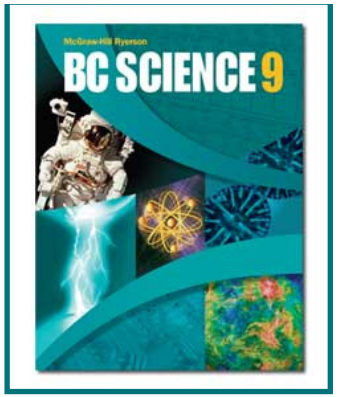
Atomic Theory IV



- Niels Bohr (1885 - 1962)
  - He studied gaseous samples of atoms, which were made to glow by passing an electric current through them.
  - Based on his observations, Bohr proposed that electrons surround the nucleus in specific "energy levels" or "shells."





Inside the Atom

- An atom is the smallest particle of an element that retains the properties of the element.
- All atoms are made up of three kinds of particles called subatomic particles. These particles are:
  - Electrons (-)
  - Protons (+)
  - Neutrons (0)

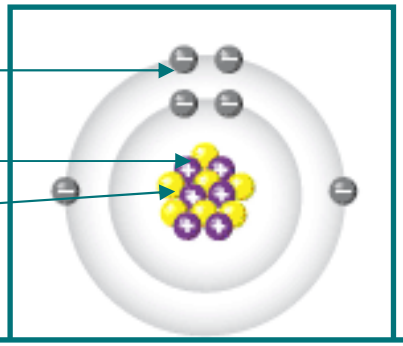


Table 1.2 Subatomic Particles

Name	Symbol	Relative Mass	Electric Charge	Location in the Atom
Proton	p	1836	+	Nucleus
Neutron	n	1837	0	Nucleus
Electron	e	1	−	Surrounding the nucleus

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Take the Section 1.3 Quiz