

## Section 1.1

1. Chemistry is the study of the composition of matter and the changes that matter undergoes.
  - a. Matter – anything that has mass and occupies space.
  - b. Because living and nonliving things are made of matter, chemistry affects all aspects of life and most natural events.
2. 5 main areas of Chemistry:
  - a. Organic chemistry – compounds containing carbon
  - b. Inorganic chemistry – compounds that do not contain carbon (non-living things)
  - c. Biochemistry – processes that take place in organisms
  - d. Analytical chemistry – composition of matter
  - e. Physical chemistry – mechanism, rate, and energy transfer that occurs when matter undergoes a change
3. Pure chemistry – pursuit of chemical Knowledge for its own sake
4. Applied chemistry – research that is directed toward a practical goal or application
  - a. Pure research can lead directly to an application, but an application can exist before research is done to explain how it works
  - b. Technology – the means by which a society provides its members with those things that are needed and desired; allows humans to do some things more quickly or with less effort.
5. Chemistry can be useful in explaining the natural world, preparing people for Career opportunities, and producing informed citizens.

## Section 1.2

6. Chemists design materials to fit specific needs
  - a. Macroscopic (see with unaided eye) and microscopic (only seen under magnification)
7. Chemists find ways to conserve energy, produce energy, and store energy

8. Chemistry supplies the medicines, materials, and technology that doctors use to treat their patients
9. Chemists help to develop more productive crops and safer, more effective ways to protect crops
10. Chemists help to identify pollutants and prevent pollution
11. Chemists gather data from afar and analyze matter that is brought back to Earth

## Section 1.3

12. Alchemists developed the tools and techniques for working with chemicals
13. Lavoisier helped to transform chemistry from a science of observation to the science of measurement. Known as the "father" of modern chemistry."
14. Scientific Method
- a. Making observations
- b. Testing hypotheses (plural)
- i. Hypothesis – proposed explanation or educated guess
- ii. Experiment – procedure that tests a hypothesis
- iii. Manipulated variable – independent variable, variable that you change during an experiment
- iv. Responding variable – dependent variable, variable that is observed
- c. Developing theories
- i. Theory – well tested explanation for a broad set of observations
- ii. Scientific law – concise statement that summarizes the results of many observations and experiments
- d. When scientists collaborate and communicate, they increase the likelihood of a successful outcome
- i. Collaboration – working with someone to produce or create something
- ii. Communication – convey knowledge or information with others (face to face, email, journals, internet)

Science is  
observable, measurable,  
repeatable

## Section 1.4

15. Effective problem solving always involves developing a plan and then implementing that plan.

- a. To solve a numerical word problem: analyze,  
calculate, and evaluate
- b. To solve a conceptual problem: analyze and  
solve