
Sec 3-0
THE FUNDAMENTAL LAWS

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BROOKS/COLE
CENGAGE Learning

Chapter 1

Chemistry: An Introduction

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Objectives

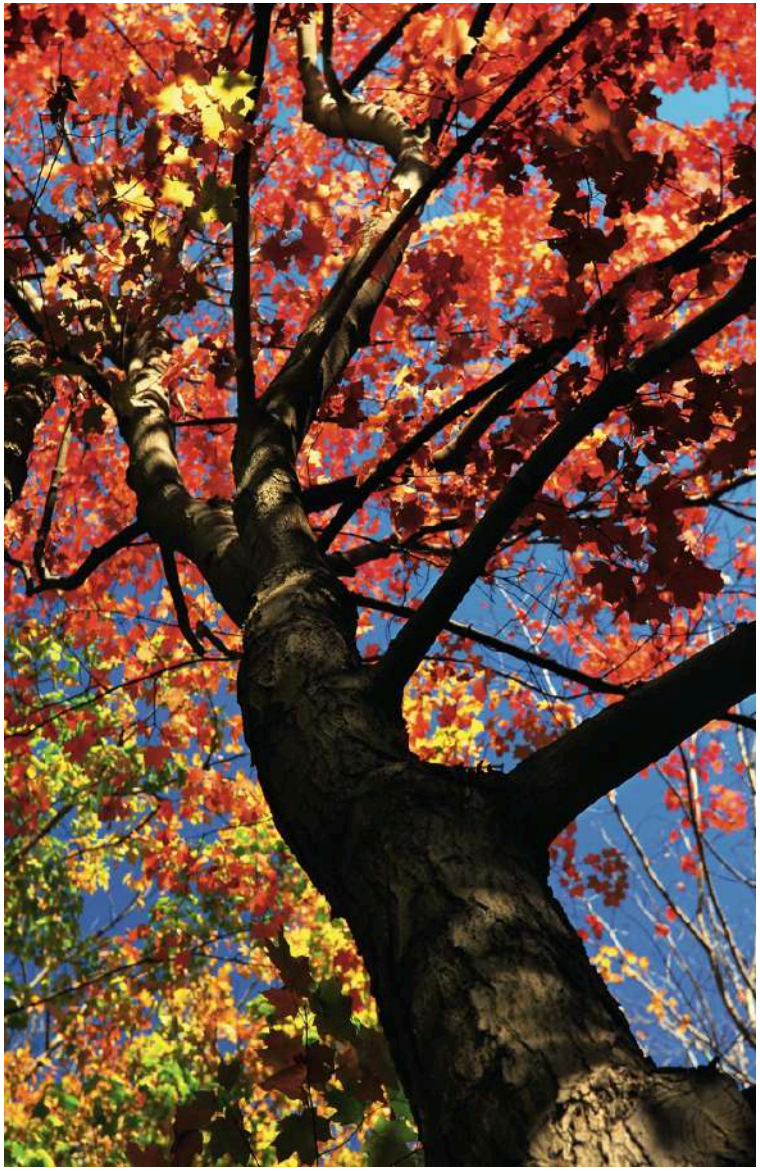
1. To understand the importance of learning chemistry
2. To define chemistry

A. The Importance of Learning Chemistry

- Chemistry is important to everyone because chemistry occurs all around us in our daily lives.
- Chemistry “looks inside” ordinary objects to study how their components behave.
- Chemists develop new materials.
- Chemistry can produce new sources of energy.
- Chemistry can help to control diseases.

The Science of Chemistry

The Science of Chemistry



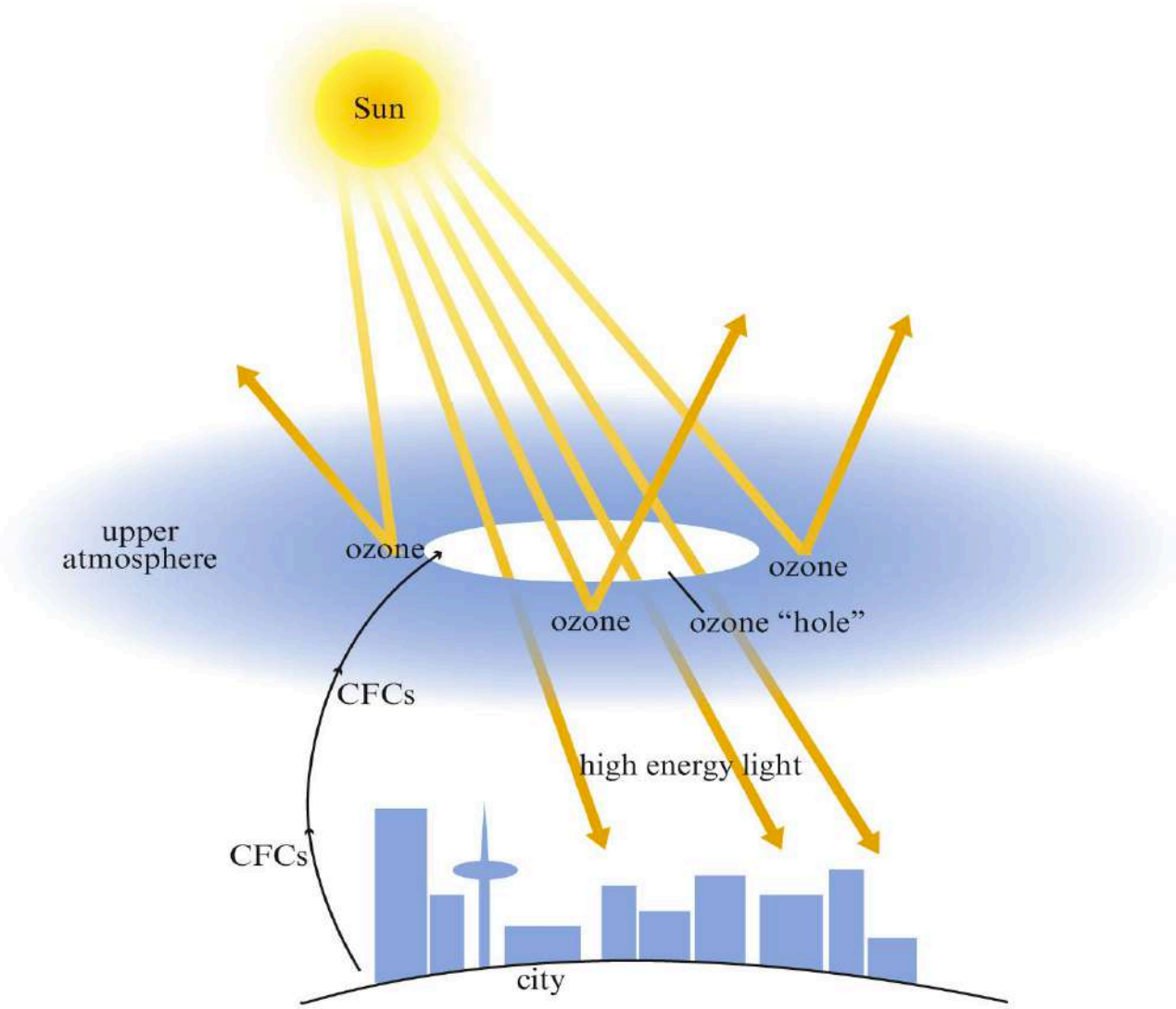

Sun
upper atmosphere
ozone
ozone
ozone
ozone "hole"
CFCs
high energy light
CFCs
city

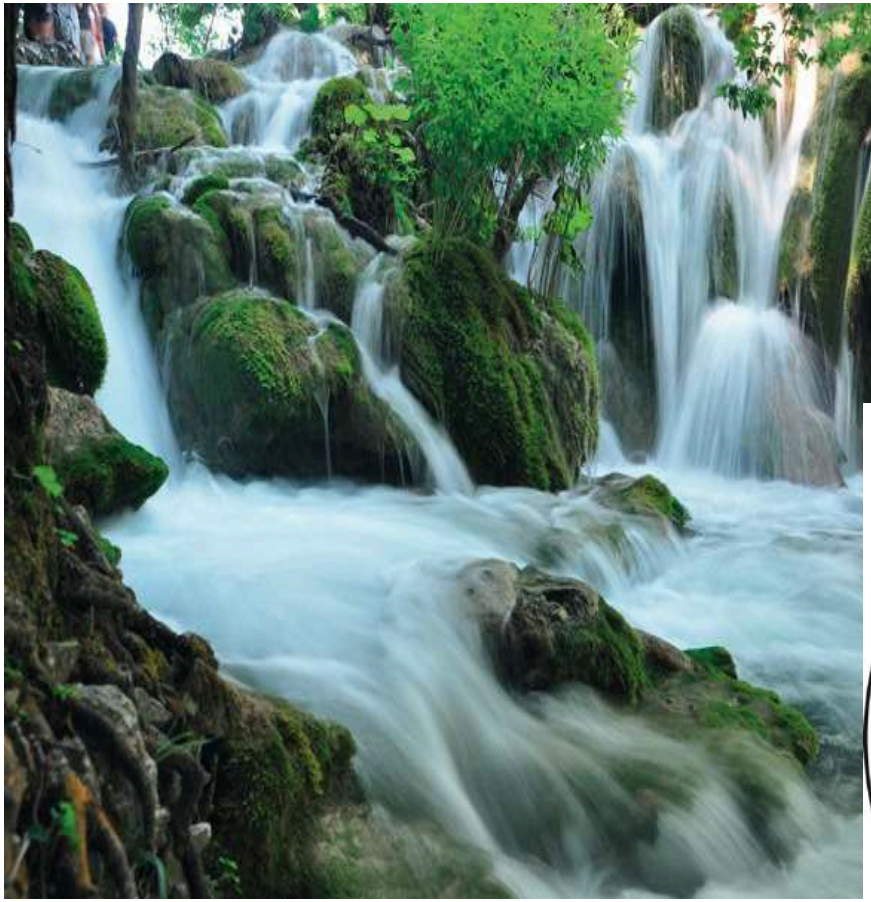
Figure 1-1 p4

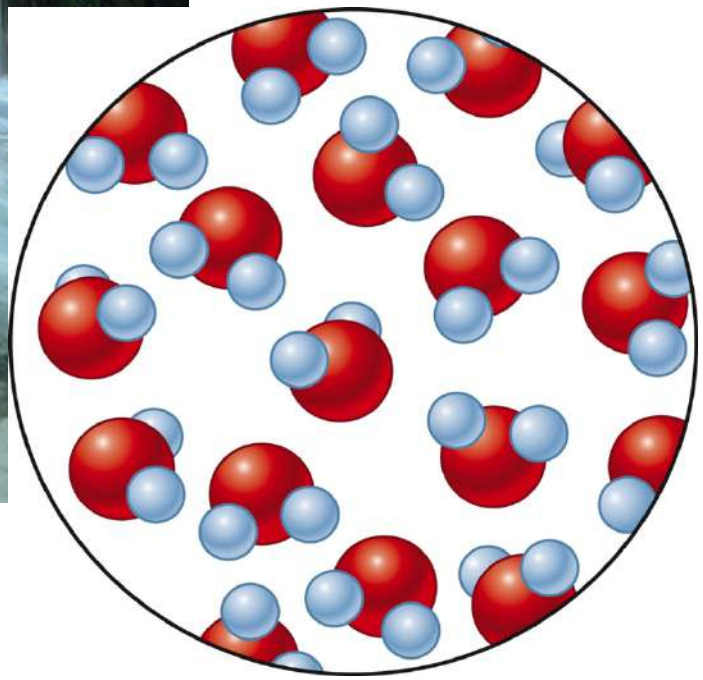
B. What Is Chemistry?

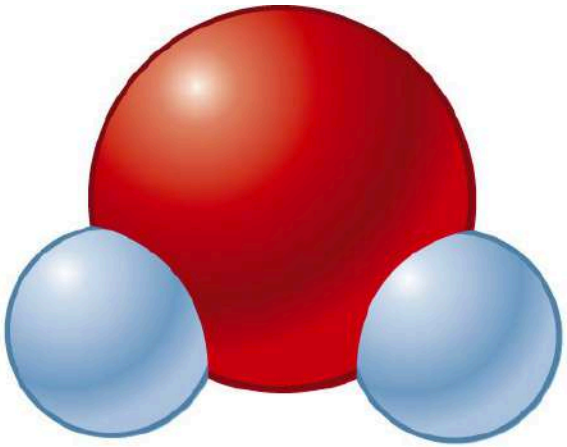
- Chemistry is the science that deals with the materials of the universe and the changes that these materials undergo.

- The goal of chemistry is to connect the **macroscopic** world you live in to the **microscopic** world that makes it all work.
  - All can be explained by the **Particulate Theory of Matter**

The Science of Chemistry







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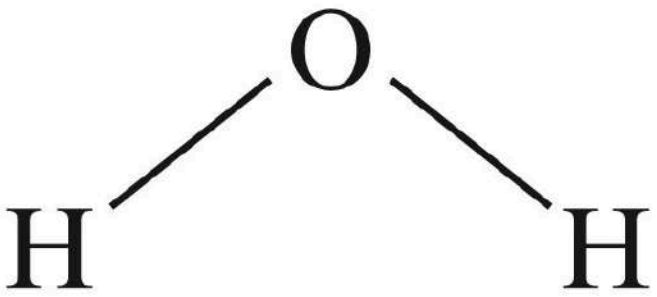


Objectives

1. To understand scientific thinking
2. To illustrate scientific thinking
3. To describe the method scientists use to study nature

A. Solving Everyday Problems

- Scientific thinking helps us solve all types of problems we confront in our lives.

- Scientific thinking involves
  - observations
  - defining a problem
  - construction of explanations
  - evaluation of possible explanations or solutions to the problem

B. Using Scientific Thinking to Solve a Problem

What Is the Disease?			
Observation	**Hypothesis**	**Experiment**	**Results**
David and Susan are ill with specific symptoms.	The disease is lead poisoning.	Look up symptoms of lead poisoning.	Symptoms match almost exactly.

C. The Scientific Method

The scientific method is a procedure for processing the information that flows from the world around us in which we:

- Make observations
- Formulate hypotheses
- Perform experiments

Make observations

- Observations vs. Inferences
- State the problem and collect data
  - Qualitative
  - Quantitative
    - Must include units of measurement
    - Accurate and Precise

Formulate hypotheses

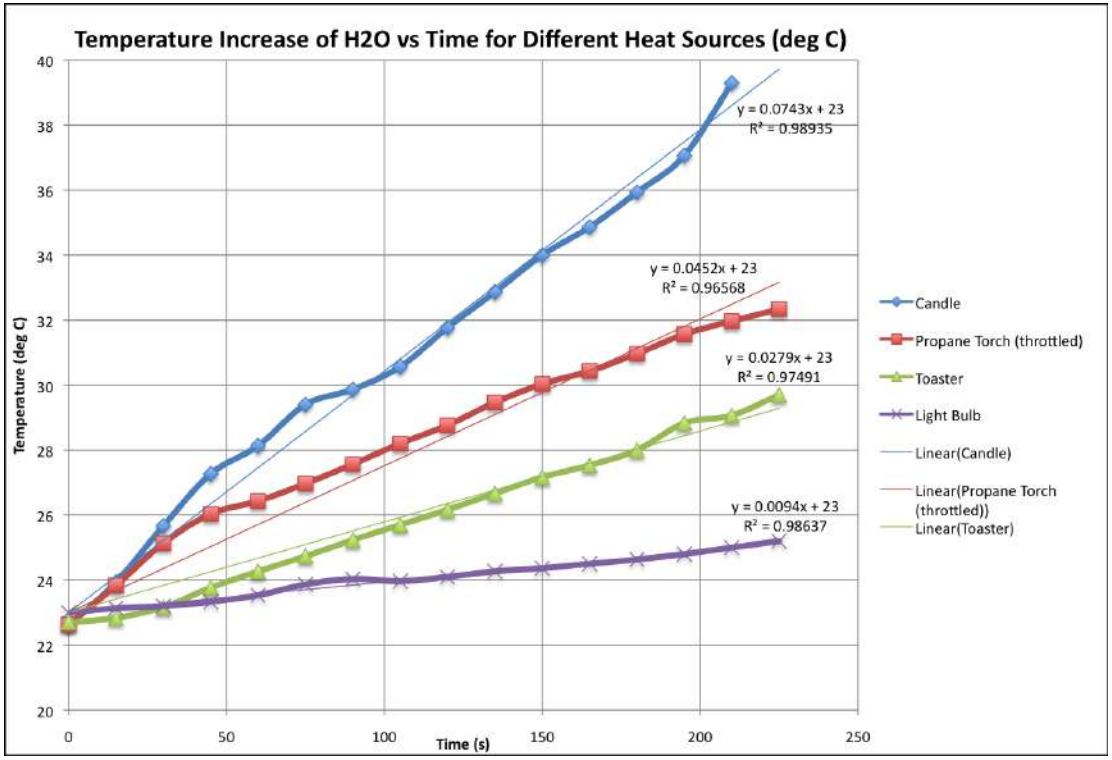
- Provide a possible explanation or solution for why something happens
- Must be testable

Perform experiments

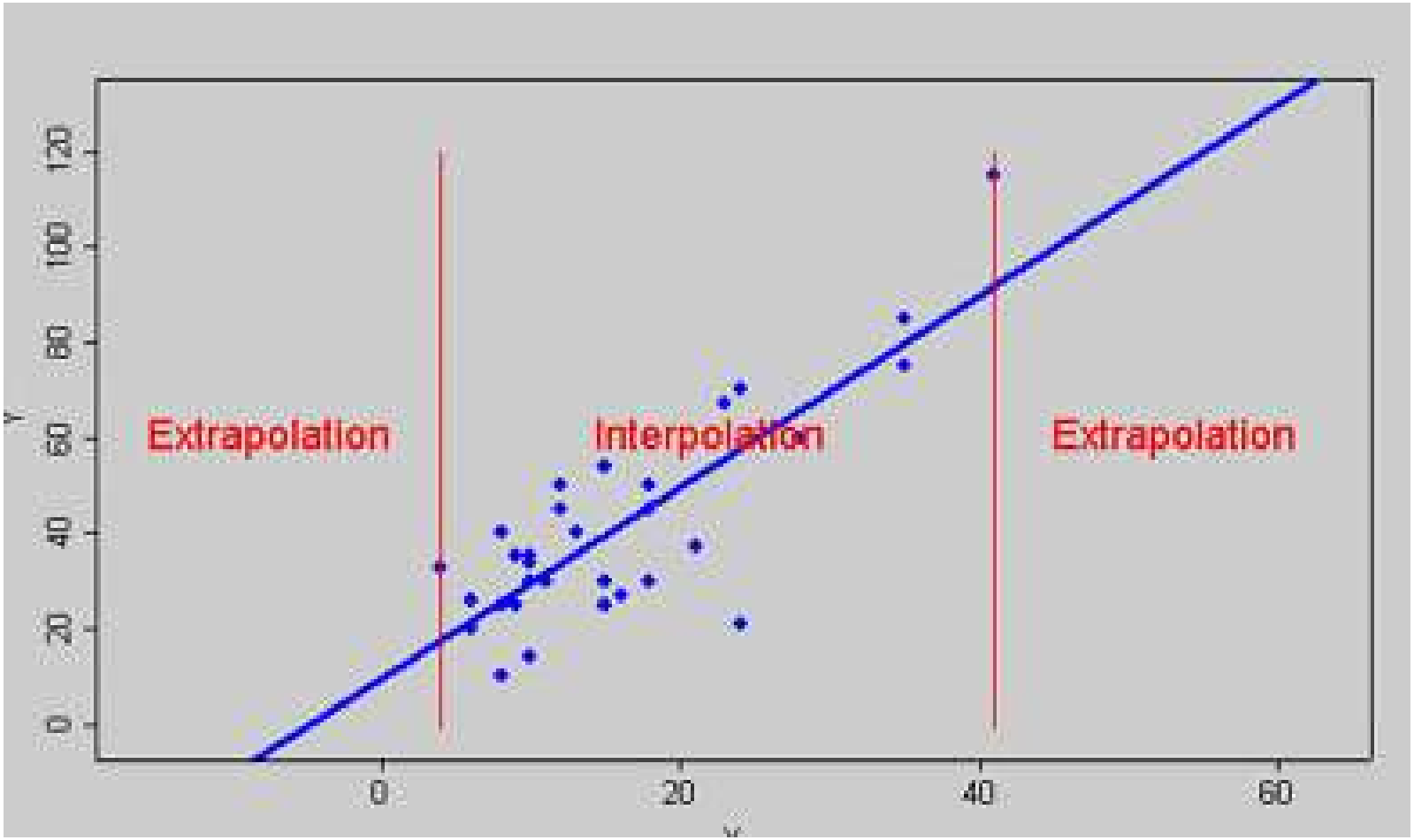
- Means for collective data that can evaluate the hypothesis
- Control Group
- Constants
- Variables
  - Independent
  - Dependent

Analyze Data

- Graphs
  - x-axis (independent variable) and y-axis (dependent variable)

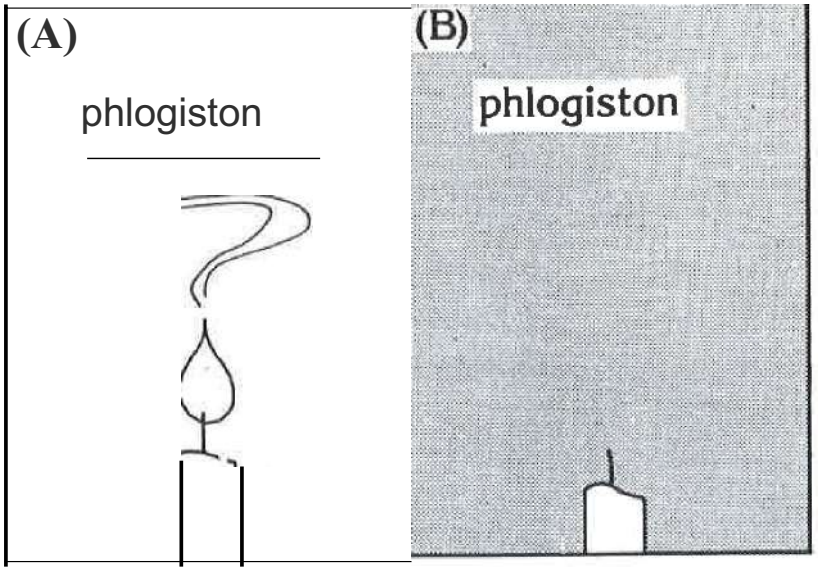


Interpolation vs. Extrapolation



Conclusion

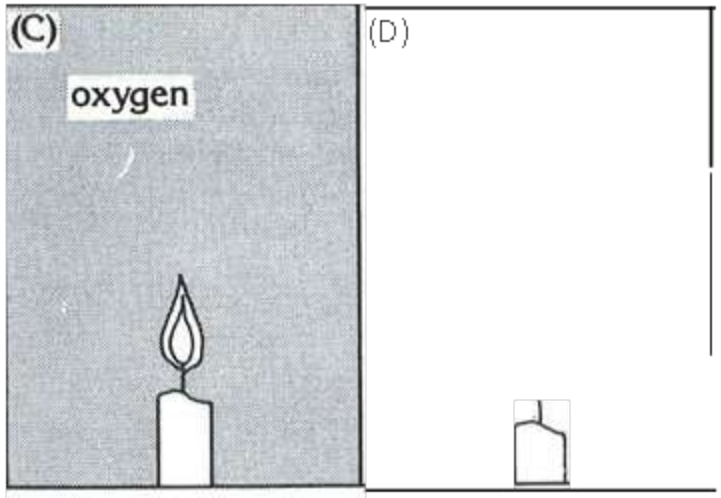
- Do you support or refute the hypothesis
- Use Evidence to Support your claim
- EX – Phlogiston Theory
  - Explained why things stopped burning



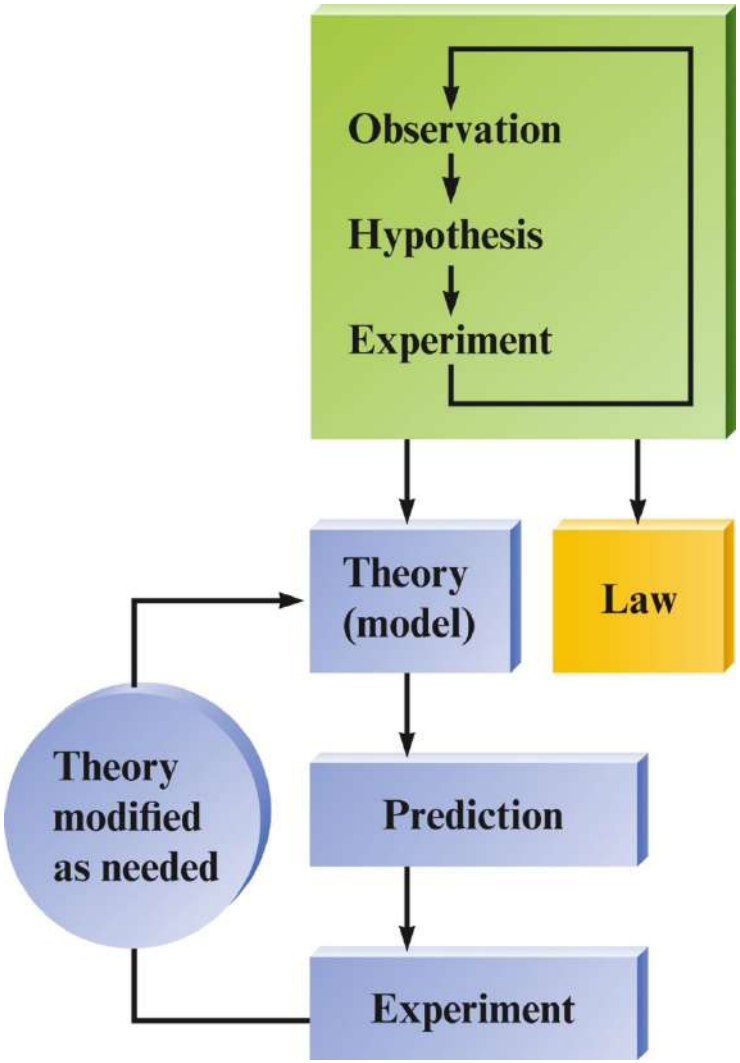
Phlogiston theory of burning. (A) When an object burns, it gives off a substance called phlogiston. (B) When the space surrounding the burning object is filled with phlogiston, the object will no longer be able to burn.

Modern theory of burning. (C)

When an object burns, it uses up a substance (oxygen) in the surrounding space. (D) When the space surrounding the burning object has too little oxygen in it, the object will no longer be able to burn.



C. The Scientific Method



C. The Scientific Method

Observations Are Not Theories

An observation can be witnessed and recorded.
A theory is an interpretation – a possible explanation of why something happens.

Supported by numerous amounts of evidence and experimentation

C. The Scientific Method

Theories Do Not Become Laws

A natural law is a summary of behavior. (WHAT is happening)
A theory is our attempt to explain WHY it happens.