

Chapter 1 Introduction to Chemistry

What is Chemistry?

Chemistry is the:

Japanese symbols for Chemistry:

means:

Branches of Chemistry

Organic Chemistry:

Inorganic Chemistry

Physical Chemistry

Analytical Chemistry:

Biochemistry:

Which pictures are clearly chemical reactions?

List three activities you have done today

Why study Chemistry?

As a citizen, knowledgably voting on issues:

You may become a professional chemist!

- developing new products:

- develop methods to save the planet!

Chemistry is necessary to study for other professions:

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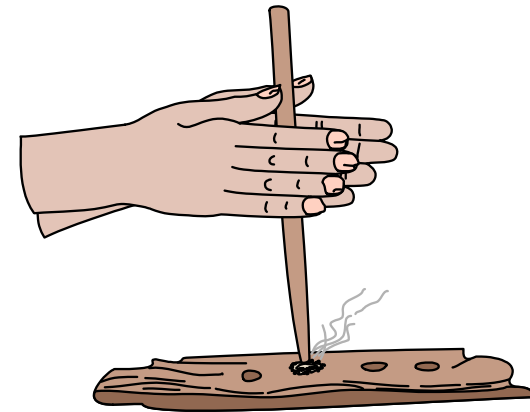
Classifying Scientific Pursuits

Basic research:

Applied research:

Technology:

Thinking Skills



A Lost Child Keeping Warm Once upon a time a small child became lost. Because the weather was cold, he decided to gather material for a fire. As he brought objects back to his campfire, he discovered that some of them burned and some of them didn't burn.

To avoid collecting useless substances, the child began to keep track of those objects that burned and those that did not.

This procedure is one of the elementary logical thought processes by which information is systematized. It is called **inductive reasoning** (*a general rule is framed on the basis of a collection of individual observations (or facts)*). He proposed a possible "generalization."

Perhaps Cylindrical Objects Burn

“Cylindrical Objects Burn”

WILL BURN

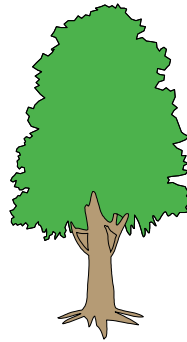
Tree limbs

Broom handles

Pencils

Chair legs

Flagpoles



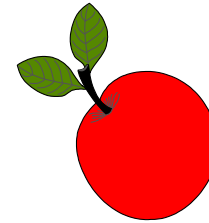
WON'T BURN

Rocks Apples

Blackberries

Marbles

Paperweights



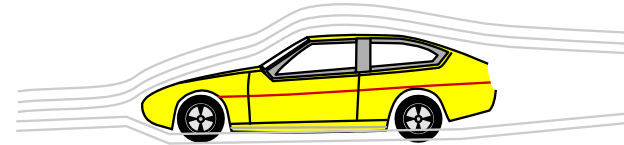
Using his generalization, the boy gathered more substances to burn.

He collected three pieces of pipe, two ginger ale bottles, and the axle from an old car, while leaving a huge cardboard box and newspapers.

During the long cold night that followed he drew ~~the~~ **conclusions**:

- (1) *The cylindrical shape of a burnable object **may not be** intimately associated with its flammability after all.*
- (2) *Even though the “cylindrical” rule is no longer useful, tree limbs, broom handles, pencils, and other burnables still burn*
- (3) *He’d better bring the list along tomorrow.*

New idea: Perhaps **“Wooden objects burn.”**



The Study of Chemistry will sharpen your

Job Skills for the Future

- Evaluate and Analyze
 - Think Critically
 - Solve Math Problems
 - Organize and Use References
 - Synthesize Ideas
 - Apply Ideas to New Areas
 - Be Creative
 - Make Decisions with Incomplete Information
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- Communicate in Many Modes Chemistry will develop ALL of these skills in YOU

Dow Chemical Commercial

<http://news.dow.com/dowtv/>

Usefulness of Chemistry

New materials:

Today we use _____ for many things
also called _____

strength-to-weight ratio:

Plastic in the car:

Materials in the kitchen:

Energy

Our main source:

Renewable sources:

Development of better batteries:

Medicine

Drug companies have _____ impact
on our _____

Examples:

Medical applications:

Biotechnology:

Examples

Agriculture

Food Production:

Improving plants:

Pest control:

The Environment

Pollution:

Ozone:

Global Warming:

Space Exploration

A. If you look 'chemistry' up in Webster's Dictionary, you'll see:

"chem·is·try n., pl. -tries. 1. the science that systematically studies the composition, properties, and activity of organic and substances and various elementary forms of matter. 2. chemical properties, reactions, phenomena, etc.: the chemistry of c sympathetic understanding; rapport. b. sexual attraction. 4. the constituent elements of something

My glossary definition is the short and sweet, "scientific study of matter, its properties, and interactions with other matter energy".

An important point to remember is that chemistry is a science, which means its procedures are systematic and reproducib hypotheses are tested using the scientific method. Chemists, scientists who study chemistry, examine the properties and c of matter and the interactions between substances. Chemistry is closely related to physics and to biology. As is true for ot sciences, mathematics is an essential tool for the study of chemistry.

20. Energy research could mean cleaner energy, less pollution and a renewable source of energy (unlike fossil fuels)

21. The Ozone layer protects the earth from harmful UV rays

22. Some plastics are stronger than steel, they do not rust, Automobiles with plastic components are lighter and more fuel efficient

24. Figuring out the leak in my kitchen sink
Determining why the blow dryer won't come on

25. If you are sure your experiment is not flawed, you must revise your hypothesis

30 The Dr's hypothesis is that you have strep throat (streptococci bacteria) She tests her hypothesis by learning whether or not the bacteria are present.

33. seed : plant, data: theory
hub: wheel , chemistry: science
part: whole , theory: law

The steps of the Scientific Method are:

- Question
- Research
- Hypothesis
- Procedure/Method
- Data
- Observations
- Conclusion

Goal

- What is the scientific method?
- What does the scientific method **assume**?
- Does the scientific method work?
- What is not a scientific argument.
- Does astrology follow the scientific method?

The Scientific Method

1. **Observe** an event.
2. Develop a **model** (or **hypothesis**) which makes a **prediction**.
3. **Test** the prediction.

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4. **Observe** the result.
5. **Revise** the hypothesis.
6. **Repeat** as needed.
7. A **successful** hypothesis becomes a **Scientific Theory**.



Theories

- So: a theory is a highly successful hypothesis.
- All hypotheses make predictions.
- All theories make predictions.
- All theories can be tested.
- **Result: Any scientific theory is subject to change as our ability to make tests, or make observations of a test's results, improves with time.**

Medical Science

Scientific Method	High Cholesterol
Observation	Patient has high cholesterol
Hypothesis (prediction)	Certain chemicals may dissolve cholesterol deposits.
Test	Give 100 patients these chemicals, give 100 patients placebo.
Observe result	Same number lower their cholesterol as placebo patients.
Revise hypothesis?	Try different combo of chemicals.
New test?	Re-run medical test. Observe results.
Scientific Theory	Lipitor reduces cholesterol.



Scientific Method	Car Repair
Observation	Engine won't turn over.
Hypothesis (prediction)	Predict battery is dead.
Test	Replace battery.
Observe result	Engine now turns over.
Revise hypothesis?	Not needed.
New test?	Not needed.
Scientific Theory	Cars won't work without a fully charged battery.

How to Study Chemistry

Use your textbook:

Find the Objectives for Sec 1.1

List the vocabulary from Sec 1.1

When studying for a test or quiz on this chapter, find the objectives and make sure you can define, list or explain them

Find the objectives for Section 1.2
Describe how you might answer these:

Look at the Chapter review on page 25-27
Where can you find the answers to # 17,19,21 etc?