

## Chemistry

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## What is Chemistry?

- Chemistry is the science that deals with the materials of the universe and the changes these materials undergo.
- The study of the interactions of matter (atoms and molecules) and the energy involved.

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## Chemicals

- Any pure substance is a chemical.
- Everything, all forms of matter are made up of chemicals.
- Water is a chemical. The air is made up of nitrogen, oxygen and argon primarily. They are all chemicals.
- Chemicals may be naturally occurring, or produced through some type of reaction.
- Whether it is naturally produced or not tells us **nothing** about how safe or harmful it is.

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## Gathering Information

- Observation- a fact you use one of your senses to determine
- (the thermometer reads 24° C, this font is white)
- Inference- something you reason out
- (Heat entered the liquid causing the temperature to rise)
- Inferences are not as reliable as observations but sometimes required.

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## Problem Solving

1. Recognize some problem, and clearly state it.
2. Propose a possible solution to the problem, this is formulating a hypothesis.
3. Test your hypothesis by running some type of an experiment

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## Scientific Method

- ~A procedure for solving problems
- Gather information
- Form a hypothesis
- Test your hypothesis
- Analyze your results
- Draw conclusion
- Repeat your work and share it with others

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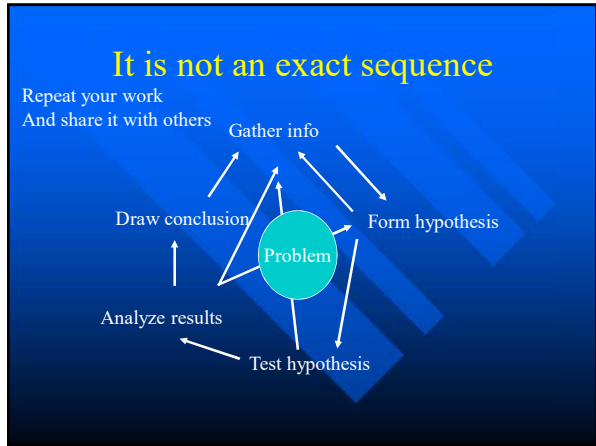
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- ### Experiment
- There are many ways to experiment
  - Variable- what you are testing
  - only test one variable at a time
  - A control group is necessary for an accurate comparison (the experiment without the variable)
  - **Blinded** control groups don't know they are the control
  - **Double blinded** studies have patients who don't know they are the control and experimenters who don't know they are working with the control

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### Theories and Laws

- Common definitions of these words cause confusion.
- Theory- commonly is a hypothesis. An educated guess as to the solution of the problem.
- Law- a rule, that must be followed.
- THIS IS NOT THE DEFINITION OF SCIENTIFIC THEORY OR LAW!!

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### Theories and Laws

- Theory- attempts to explain why data gained from conclusions and observations are so.
- Law- summary of what is said in several conclusions and observations.
- Theories do NOT become laws!
- The names have nothing to do with level of acceptance.

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### Models

- Model- any representation of an object or a system
- A theory is sometimes called a model as it explains helps to explain how something works.
- The theory or model of how a gas works would be countless tiny particles (atoms and molecules) moving about rapidly colliding with everything.
- This is the best possible accepted account for why gas act the way they do.

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## Laws

- A Natural Law is a summary statement.
- Like Charles' Law, put simply, heating a gas makes it expand, cooling it makes it contract.
- There is no why in a Law, just what happens.
- A law is **NOT** a more proven version of a theory, it is a different type of a statement.

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