Office Hours: M 1:30pm – 3:00pm
(in Park 169) W 11:00am – 12:00pm
or by appointment (email me)
or just email me with questions!

TA Hours: TBD

Q-center: https://www.brynmawr.edu/inside/offices-services/q-center/q-center-schedule

---

8/31/2026

Register for Achieve:

https://achieve.macmillanlearning.com/courses/2w2sob

Course ID: 2w2sob

Syllabus & Course Resources

Syllabus link

Course calendar

Textbook: OpenStax 2e (*not* the "Atoms First" version)

Online homework platform: Achieve - course ID 2w2sob

Office hours (in Park 169): M 1:30pm – 3:00pm
W 11:00am – 12:00pm
or by appointment (email me)
or just email me with questions!

TA hours: TBD (will be shared ASAP)

When2meet poll for office hours link

All of this is on Moodle!

Tips for success

- Come to class prepared.
  - Read the assigned text sections before class.
  - Lectures will not be recorded.

- Be active in class.
  - Ask questions!

- Know how to do every assigned homework problem.
  - You should work the Achieve problems by hand, as you would on a quiz or exam, and enter the final answer on Achieve. Show your work (even though it won't be submitted).

- Use all the resources at your disposal.
  - Office hours, TA's, textbook, email/talk to me!

- Study with others.

- Practice consistently & effectively.
  - "Retrieval Practice" versus re-reading/reviewing
  - Work problems! End-of-chapter problems are good extra practice.

What is Chemistry?

composition & how it changes

The science that seeks to understand **what matter does** by studying **what atoms and molecules do.**

Matter is anything that has mass and takes up volume.

not matter: light heat energy / forces

Naturally occurring matter:

- Wood
- Sand
- Water
- Metal ores

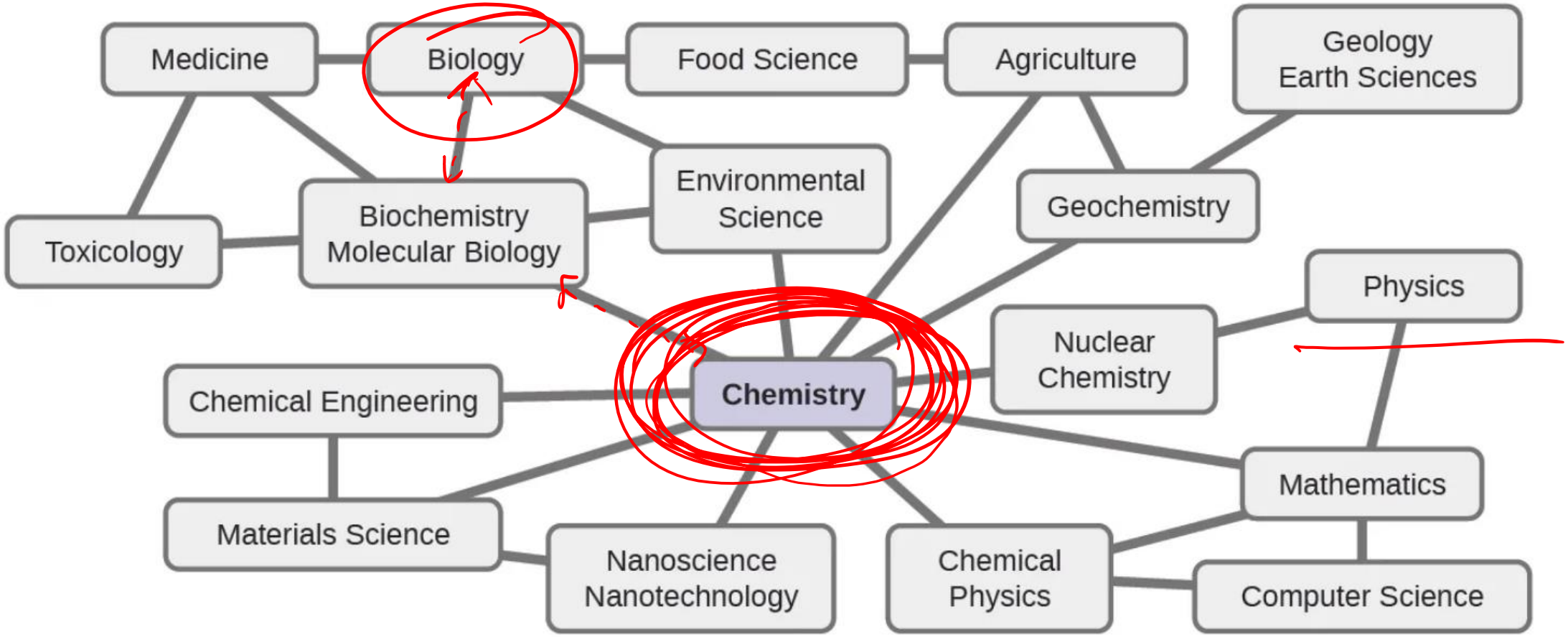
Fe_2O_3

Synthetic (human-made) matter:

- Nylon
- Styrofoam
- Ibuprofen
- Steel

Fe + C

What is Chemistry?



relevant xkcd

Atoms and Molecules

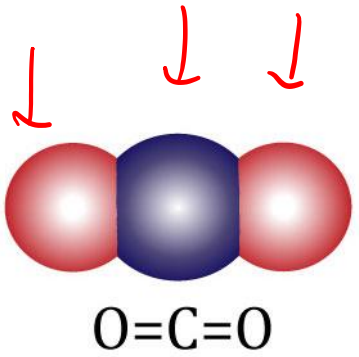
Atoms are very small. Atoms and molecules are tiny particles that compose all common matter.

Ex: H, O, C....

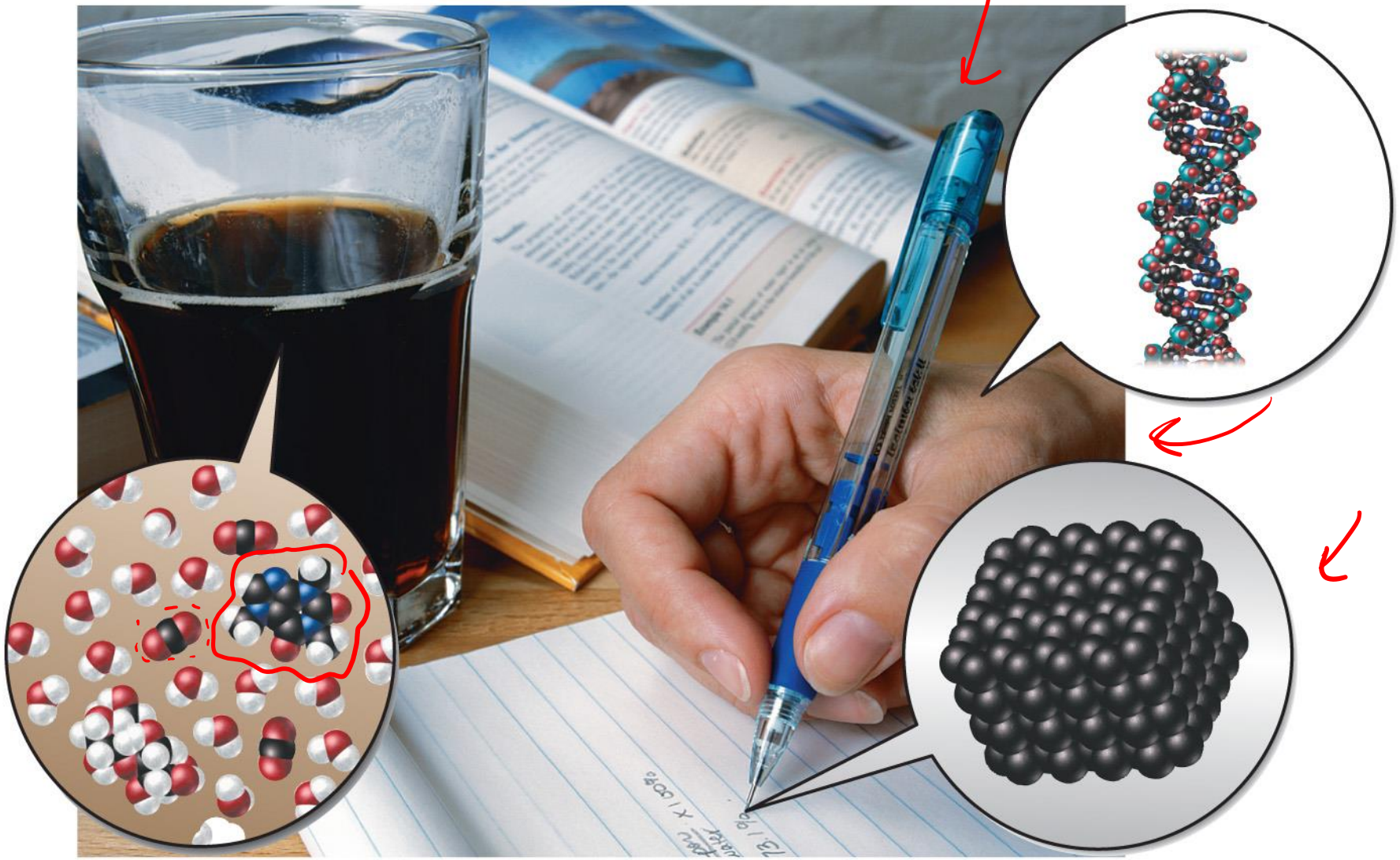
Atoms are bound together to form many different types of **molecules.**

Ex: O_2, H_2O, CO_2 , CH_4 ....

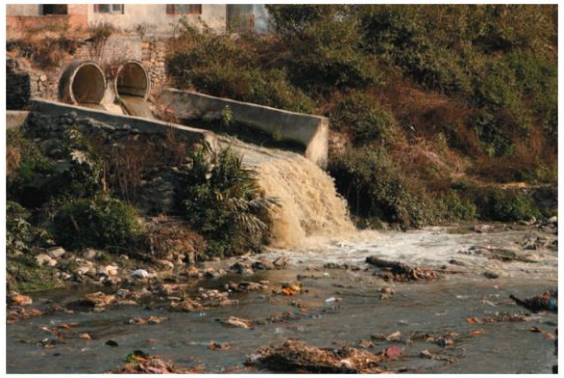
Chemical bonds are the attachments that hold atoms together.



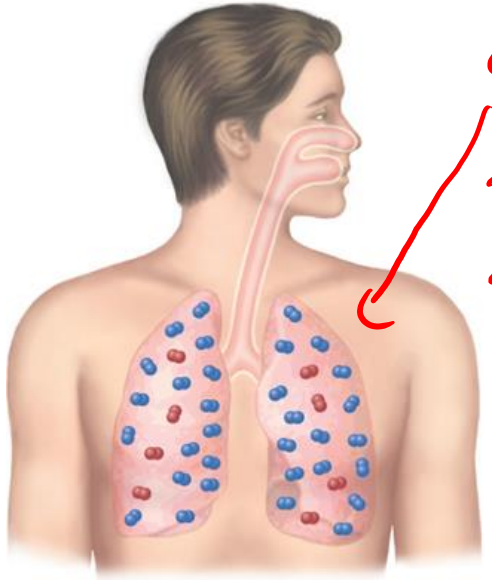
Chemicals Compose Ordinary Things



People often have a very narrow view of chemicals, thinking of them only as dangerous poisons or pollutants.



dihydrogen monoxide



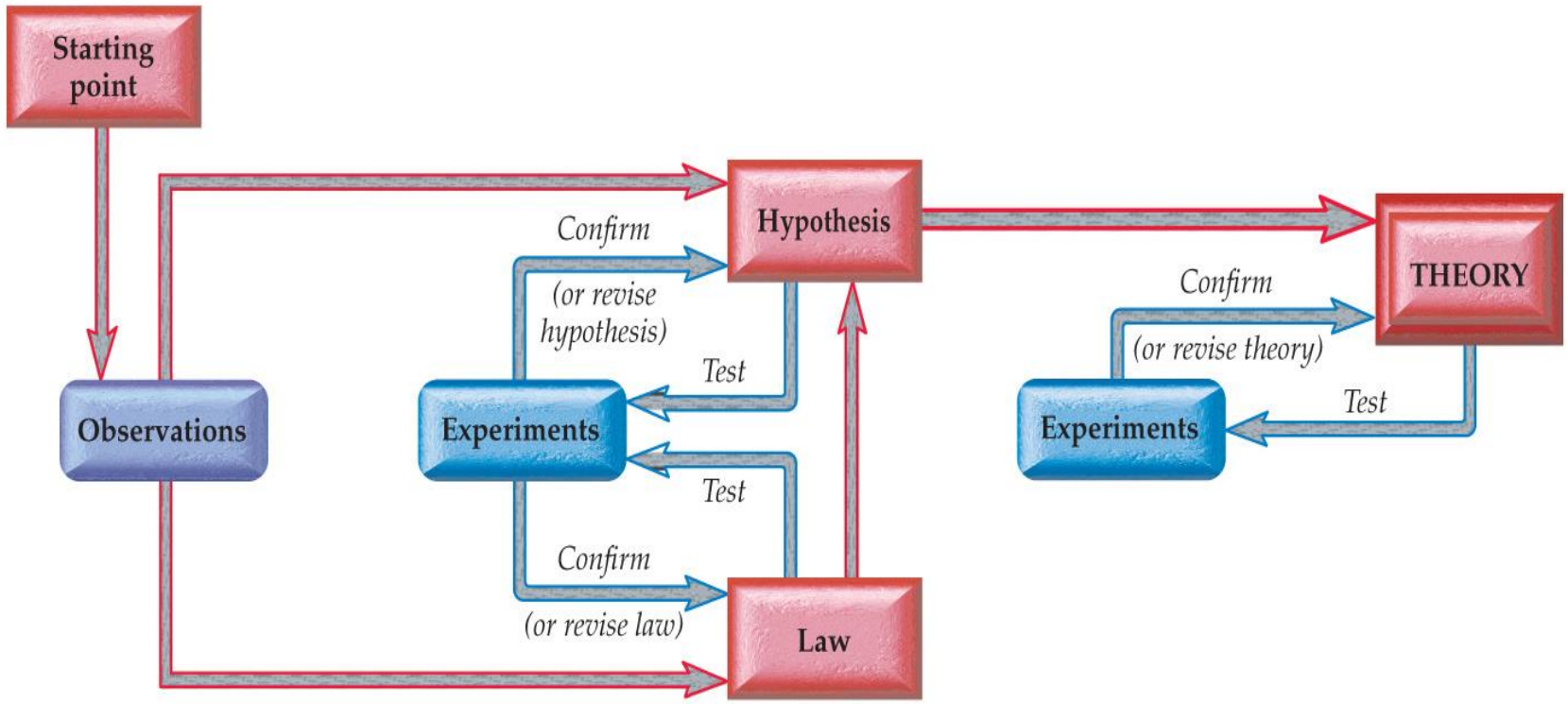
air
~20% O_2
~80% N_2

Ingredients: aqua, vegetable oils, sugars, starch, carotene, tocopherol (E306), riboflavin (E101), nicotinamide, pantothenic acid, biotin, folic acid, ascorbic acid (E300), palmitic acid, stearic acid (E570), oleic acid, linolic acid, malic acid (E296), oxalic acid, salicylic acid, purines, sodium, potasium, manganese, iron, copper, zinc, phophorous, chloride, colours, antioxidant.

The Scientific Method

Chemistry uses the **scientific method:** a mode of investigation that emphasizes a cycle of observation, prediction and experimentation.

+ Communication of results



The Scientific Method: How Chemists Think

- **Observations** involve measuring or sensing some aspect of nature.

What is happening?

- **Hypotheses** are testable predictions about the observations.

Prediction: X will happen if ....

- **Laws** summarize the results of a large number of observations.

X always happens if ...

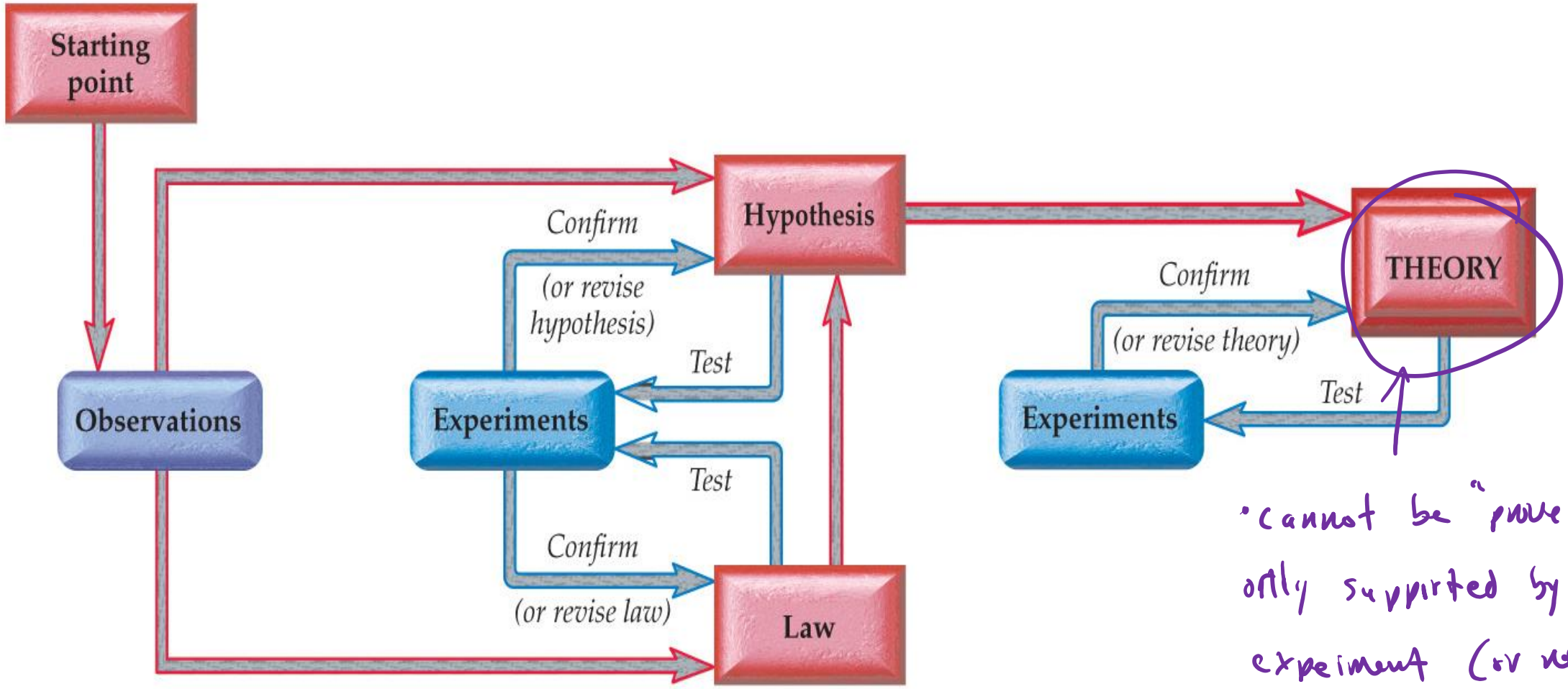
why?? does it happen?

- **Theories** are models that try to explain the underlying cause/mechanism for observations and laws.

X happens because of ...

X is caused by ....

The Scientific Method: Overview



- cannot be "proven" only supported by experiment (or not)
- often revised

* A theory cannot become a Law. they are different concepts!

Scientific Notation

In chemistry, we often use very large or small numbers!

Inconvenient to write large & small numbers in calculations!

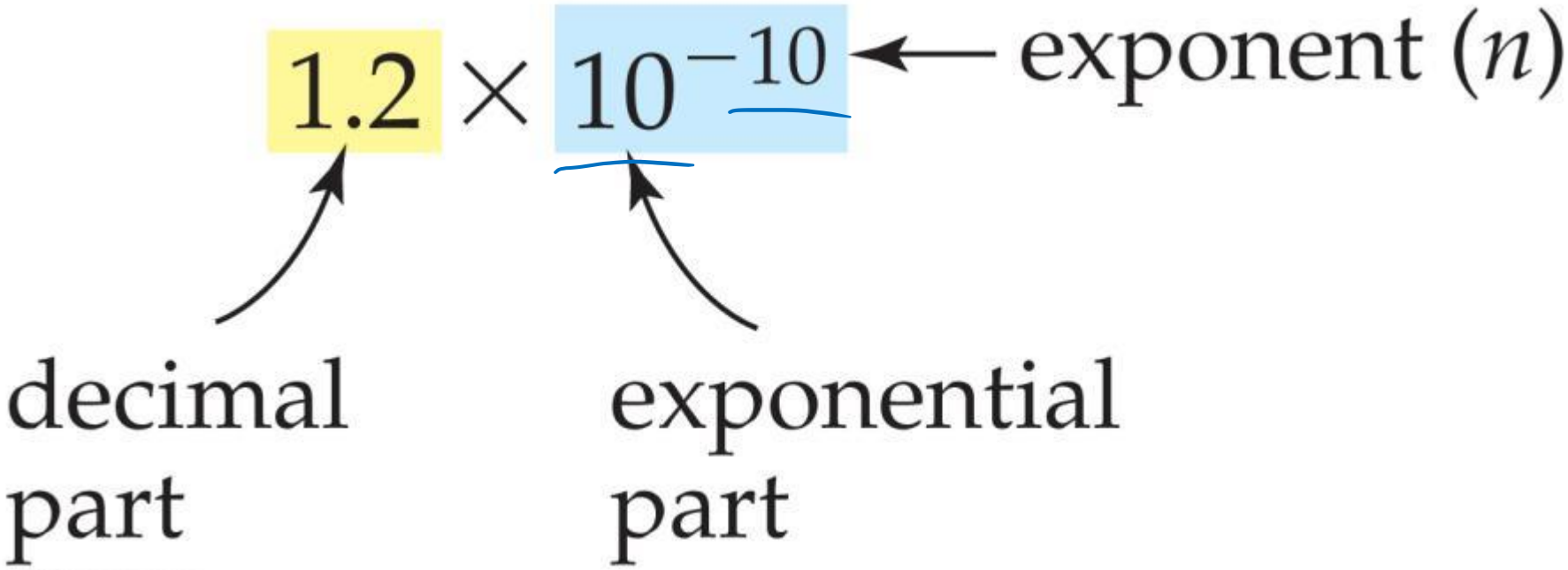
Scientific notation makes them more manageable

0.00000000012

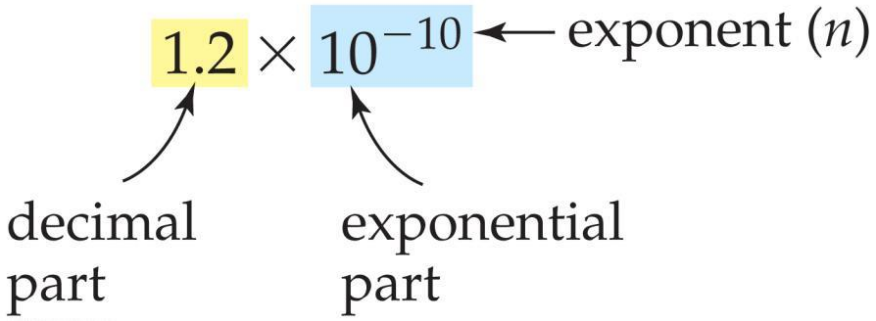
Scientific Notation

A number written in scientific notation has two parts:

- The **decimal part**: **a number that is between 1 and 10.**
- The **exponential part**: **10 raised to an exponent, *n*.**



Writing in Scientific Notation



positive exponent:

multiply by 10 n times.

$$10^0 = 1$$

$$10^1 = 1 \times 10 = 10$$

$$10^2 = 1 \times 10 \times 10 = 100$$

$$10^3 = 1 \times 10 \times 10 \times 10 = 1000$$

negative exponent ($-n$):

divide by 10 n times.

$$10^{-1} = \frac{1}{10} = 0.1$$

$$10^{-2} = \frac{1}{10 \times 10} = 0.01$$

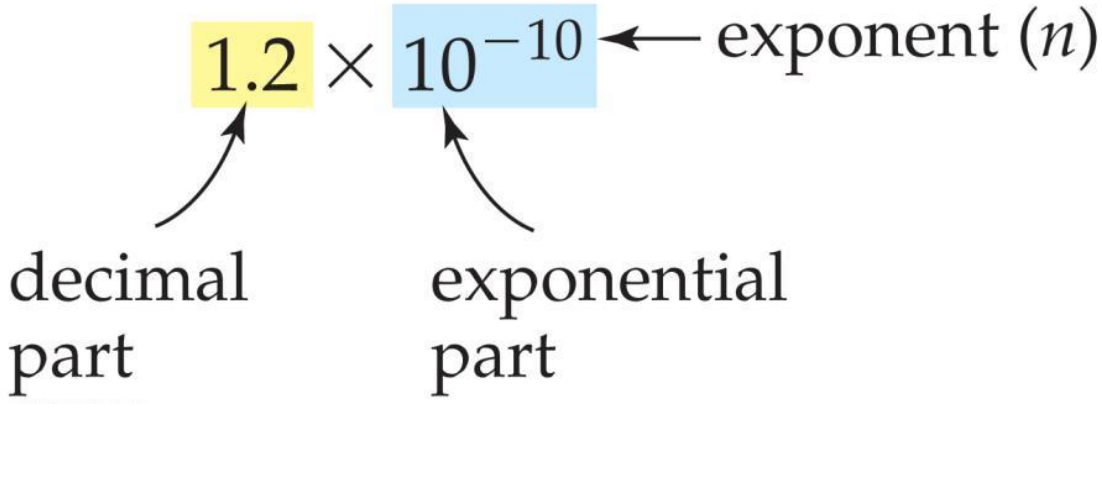
$$10^{-3} = \frac{1}{10 \times 10 \times 10} = 0.001$$

Converting a Number to Scientific Notation

Find the decimal part. Find the exponent.

0.00000000012 < 1

moved 10 places. n is either 10 or -10.



- Move the decimal point *n* times to obtain a number between 1 and 10 (the decimal part).

- Multiply the decimal part by 10^n or 10^{-n} as appropriate.

Converting a Number to Scientific Notation

$5983. = 5.983 \times 10^{3}$

3 2 1

$0.00034 \quad 3.4 \times 10^{-4}$

1 2 3 4

If the decimal point is moved to the left, the exponent (n) is positive.

number > 1

If the decimal point is moved to the right, the exponent (n) is negative.

number < 1

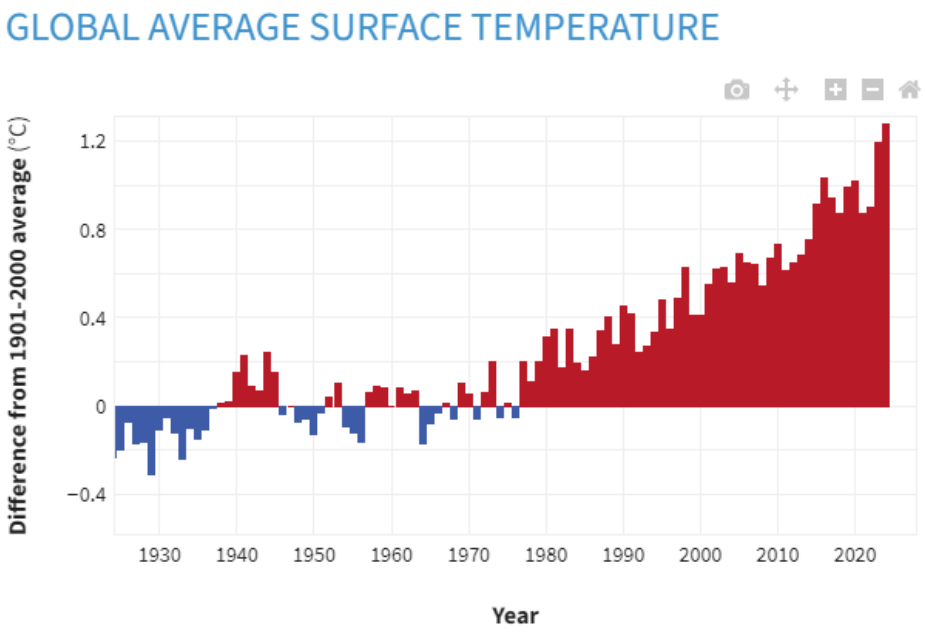
Expressing Uncertainty in a Measurement

The uncertainty in a measurement is indicated by the last reported digit.

A measurement has three "parts": quantity, unit, and uncertainty.

Example: measuring global temperatures

- Average global temperatures have risen by 1.51 °C in the last century. (1924-2024)
- Reporting a temperature increase of 1.51 °C really indicates 1.51 ± 0.01 °C -- reflects the precision of measurement
- The temperature rise could be as much as 1.52 °C or as little as 1.50 °C, but it is certain to be in that range.

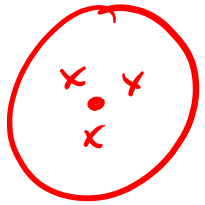


source

Accuracy vs Precision

Accuracy is a measure of closeness to "true" value

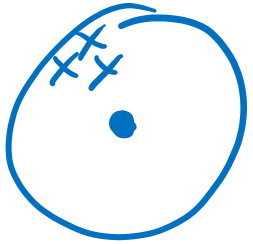
accurate - close to bullseye



accurate + precise

Precision is a measure of reproducibility

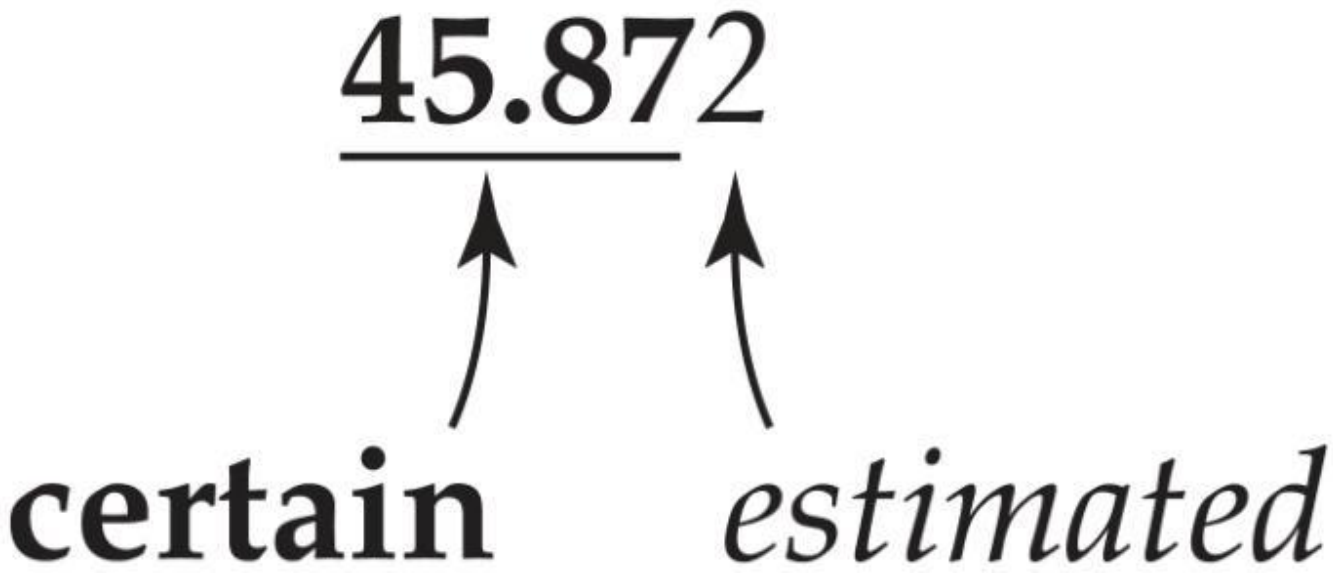
precise - values are close together



↑ precise, not accurate

not accurate or precise.

Reporting Uncertainty in Measurements



The first four digits are certain; the last digit is estimated.

The greater the precision of the measurement, the greater the number of "significant figures."

Significant figures are important!! They communicate the precision of a measurement!!