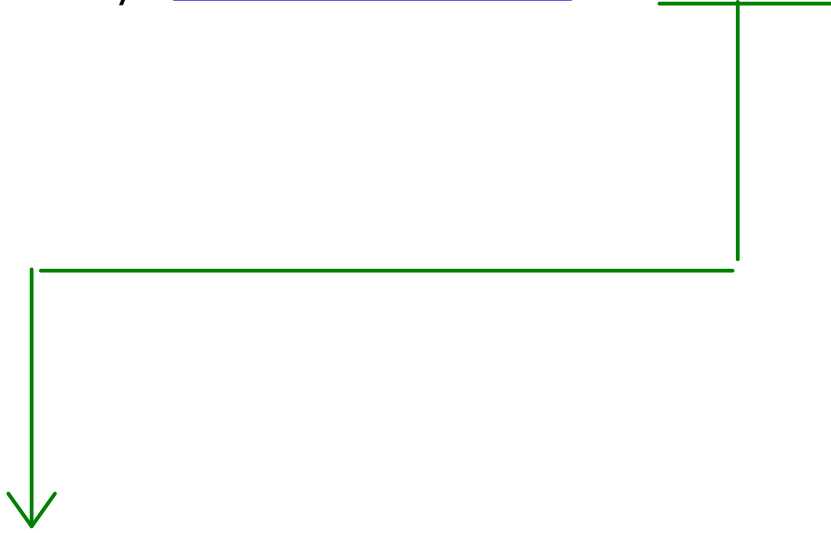


Some basic definitions:

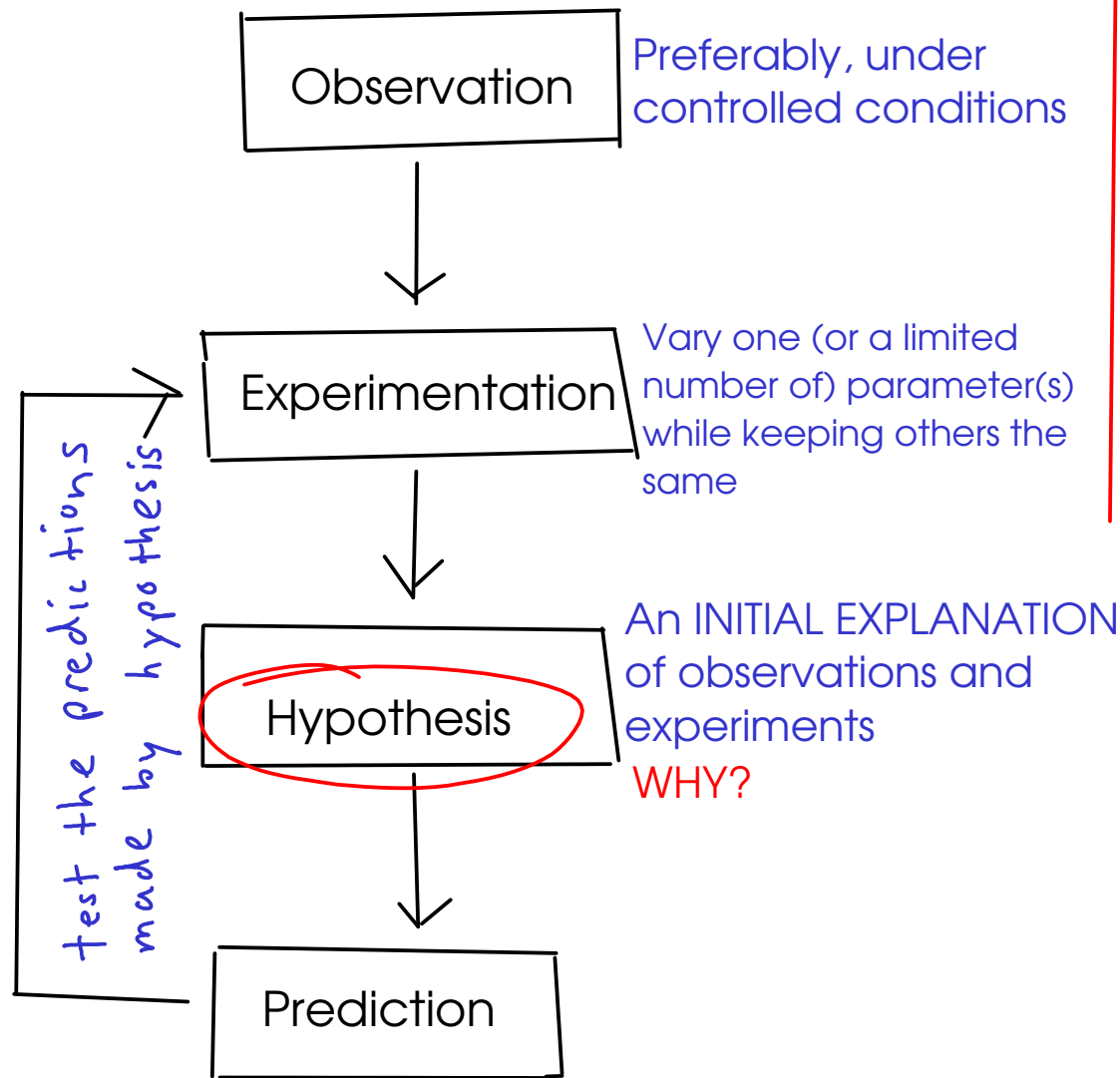
Chemistry: SYSTEMATIC STUDY OF MATTER AND THE CHANGES IT UNDERGOES



Matter: Anything that takes up space and can be perceived (or DETECTED)

... so what about SYSTEMATIC STUDY?

Systematic study? The scientific method



Scientific laws

- are SUMMARIES of observations, often in equation form

Scientific laws DO NOT EXPLAIN the observations they are describing. In other words, they tell WHAT, not WHY.

Scientific theories

- are EXPLANATIONS of observations that have been supported by many experiments

- similar to HYPOTHESES, but with a lot more supporting data

Explanations are called theories when there's enough data for most scientists to accept the explanation as valid.

You flip the light switch in your den, but nothing happens. What is wrong?

observation / experiment: Flip light switch, nothing happens.

→ hypothesis: ~~Explanation: Circuit breaker has tripped (there was a recent storm).~~
Explanation: Burned out bulb.

prediction: ~~Resetting the circuit breaker will restore the light.~~
Changing the bulb would restore the light.

experiment: ~~Reset the circuit breaker, then try light switch again.~~
~~The light is still off.~~
Change the bulb, and try the switch again. Bulb comes on!

Measurements

Measurements are COMPARISONS of properties against accepted standards, called units.

A properly-reported measurement has TWO PARTS:
(1) a measured NUMBER
(2) a UNIT

English/US Units:

1 foot = 12 inches 1 yard = 3 feet 1 mile = 1760 yards

5280 feet = 1 mile

So what's the problem?

English units are (mostly) independently defined, meaning that they don't relate to one another in meaningful ways.

English units can't be easily converted without calculators.

Different kinds of English units have completely different relationships.

English units are nonstandard and difficult to use. Solution?

THE METRIC SYSTEM

All metric units are made up of COMBINATIONS of BASE UNITS!

Metric Base Units:

Length	meter	m
Mass	kilogram*	kg
Temperature	Kelvin	K
Time	second	s

*we usually treat the gram as if it's the base unit for mass!

Comparing to the English system:

- One meter is approximately 3.3 feet.
- One kilogram is approximately 2.2 pounds.

What about SIZE?

Metric units may be made larger or smaller by adding PREFIXES.

Metric Prefixes:

mega-	10^6	M
kilo-	10^3	k
centi-	10^{-2}	c
milli-	10^{-3}	m
micro-	10^{-6}	μ

Bigger units

Memorize
these
prefixes!

smaller units

Applying prefixes

$$1 \text{ ___ m} = \text{ ___ m}$$

$$1 \text{ mm} = 10^{-3} \text{ m} \left(\frac{1}{1000} \text{ m} \right)$$

$$1 \text{ km} = 10^3 \text{ m} \left(1000 \text{ m} \right)$$