

01a

Pick up a copy of each handout
(unless you downloaded and
have that handout)

Introduction

section 21
CRN 11718

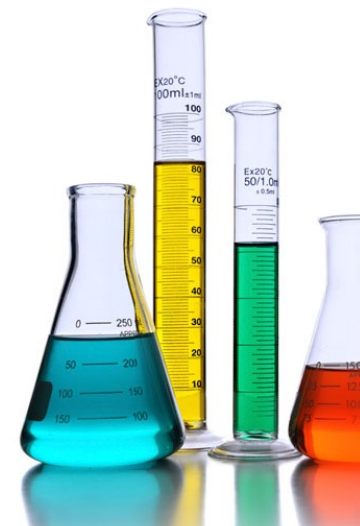
Welcome to Chem 50
Preparation for General Chemistry

If you are enrolled
or on the wait list—sign
the roll sheet!
If you are trying to add the
class, add your name!



version 1.5

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Class Introduction

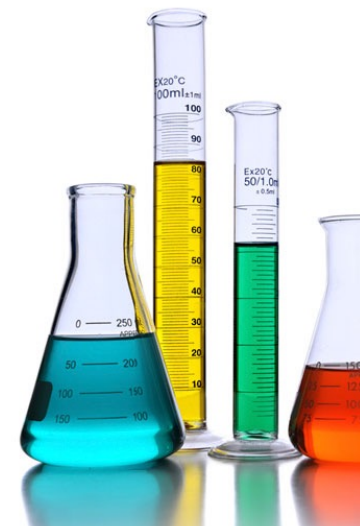
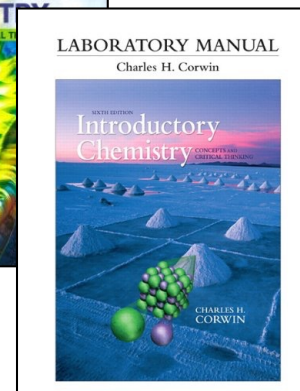
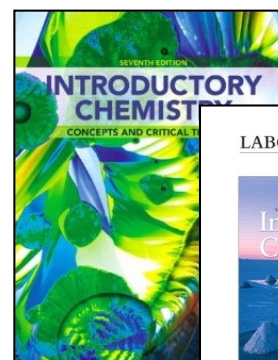
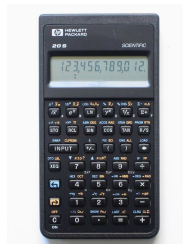
➔ Are you in the right room?

- ▶ Instructor
- ▶ Requirements
 - ▶ Pre-req's
 - ▶ Schedule
 - ▶ Dates & Times
 - ▶ Materials
- ▶ Evaluation (Grades)
 - ▶ How to get an "A"
 - ▶ Reports
 - ▶ Knowing where you are.
- ▶ Other Resources



▶ Introduction to Content

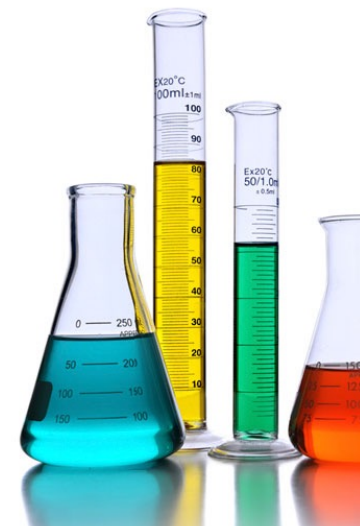
- ▶ Getting started
 - ▶ Knowledge
 - ▶ Science
 - ▶ Chemistry
- ▶ Overview of Topics
 - ▶ What this class offers.



Are you in the right room?

- ▶ This is Chem 50: Preparation for General Chemistry
 - ▶ section 21
 - ▶ CRN 11718
- ▶ This class has a lab and lecture component, both are required.
- ▶ This class is useful to
 - ▶ folks looking to get a good start with general chemistry, here or at any college.
 - ▶ it also meets the requirements for *some* nursing programs
 - ▶ check with your counselor if you're unsure
- ▶ Check that your name is on the roll sheet.
 - ▶ Sign in so I know not to drop you.
- ▶ If you want to add this class:
 - add your name to the roll sheet and talk to me after class.

If you are enrolled
or on the wait list—sign
the roll sheet!
If you are trying to add the
class, add your name!



Class Introduction

- ▶ Are you in the right room?



Instructor

- ▶ Requirements

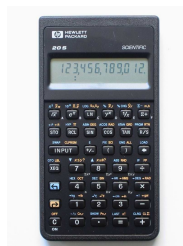
- ▶ Pre-req's
- ▶ Schedule
 - ▶ Dates & Times
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- ▶ Evaluation (Grades)

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- ▶ Other Resources



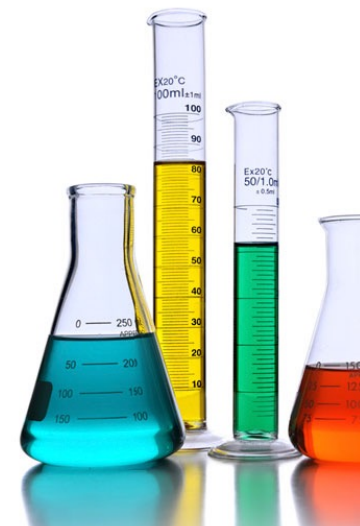
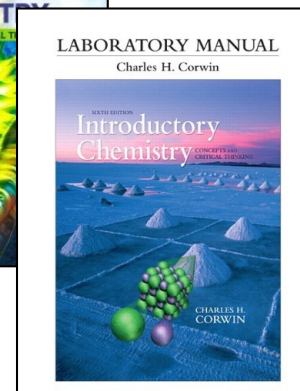
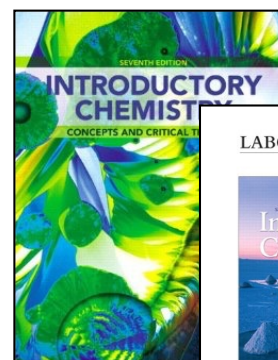
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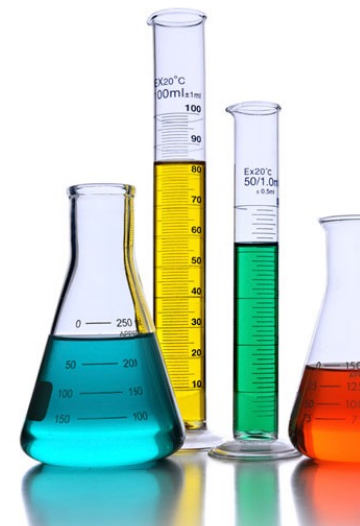
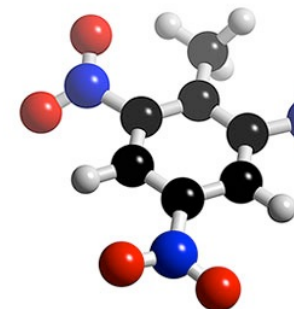
Instructor for Chem 30B

- ▶ Prof. Nick De Mello, Ph.D. “Professor De Mello”
 - ▶ Lecturer & Lab Instructor



nick@chemlectures.com

- Lecturing College Chemistry since 2007
- Created Educational Software at UCLA for McGraw Hill & the Ministry of Education of Malaysia
- Post Doctoral Research at UCLA
Computational & Organic Chemistry
- Ph.D. at University of Pittsburgh (Pennsylvania)
Synthetic Organic & Computational Chemistry
- B.S. at Cal Berkeley (California)
Nuclear & Synthetic Organic Chemistry
- Sequoia High School Graduate
... just up the road.



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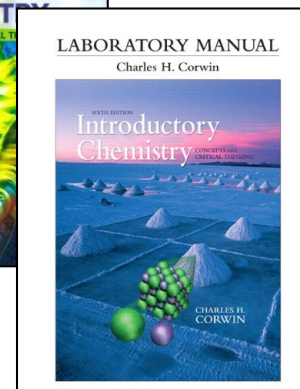
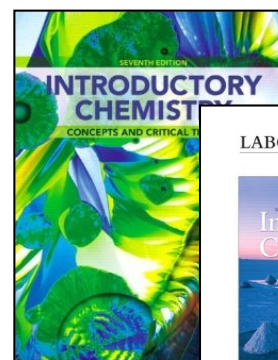
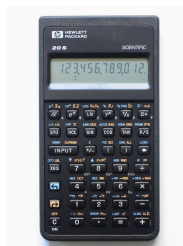
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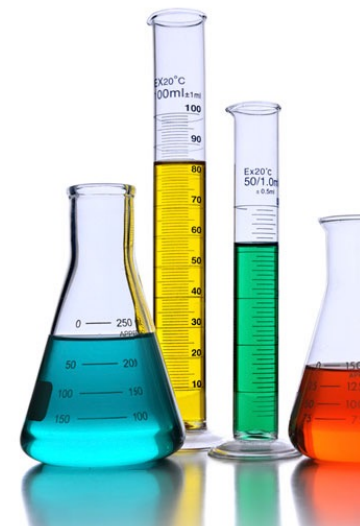
▶ Overview of Topics

▶ What this class offers.



Requirements: Pre-reqs

- ▶ No previous chemistry is required
 - ▶ General science experience will be useful
- ▶ You must have taken:
 - ▶ Mathematics 114 or equivalent
 - ▶ Basic algebra will be needed to follow the discussions and reading.
- ▶ You are recommended to have taken either:
 - ▶ English Writing 1A or
 - ▶ English as a Second Language 5
- ▶ That's it.
- ▶ We're gonna start at square one.



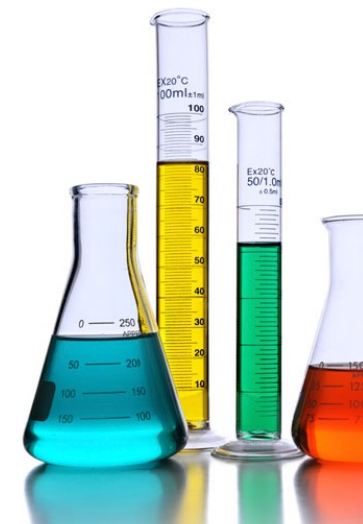
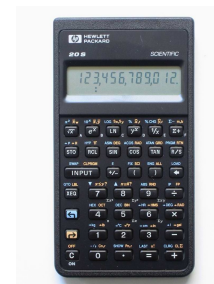
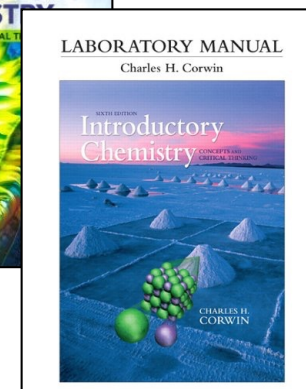
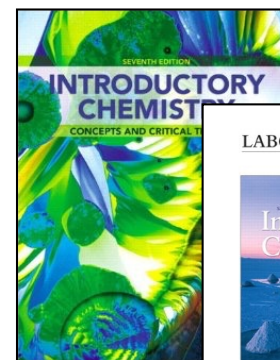
Requirements: Schedule

- ▶ This class meets: 6/29/15 - 8/6/15 M/T/W/Th
- ▶ LAB:
 - ▶ 3:00 pm - 4:15 pm (M/T/W/Th)
 - ▶ in Room 2210 of SC2 Building
- ▶ LECTURE:
 - ▶ 4:30pm - 6:20pm (M/T/W/Th)
 - ▶ in Room 2210 of SC2 Building
- ▶ Attendance is required.
 - ▶ Students missing more than two consecutive lectures, more than four lectures in total, or any lectures during the first two weeks of class, may be dropped from the class.
 - ▶ Two or more absences from lab may result in the student being dropped.
- ▶ There will be sign in sheet at each lecture and lab, you must sign the the sheet to have your attendance recorded.
- ▶ Not signing the sheet is the same as being absent.



Requirements: Class Materials

- ▶ You'll need the following:
 - ▶ Textbook, Corwin, Charles H. "Introductory Chemistry: Concepts & Connections", 7th Ed. Prentice Hall, 2013.
 - ▶ ISBN 0-321-80490-2
 - ▶ 6th Edition is also acceptable.
 - ▶ Earlier editions may be acceptable.
 - ▶ Lab manual, Corwin, Charles H., "Introductory Chemistry, Concepts & Connections: Laboratory Manual", 7th Ed. Prentice Hall
 - ▶ ISBN 0-321-75094-26 (available from the campus bookstore)
 - ▶ A Mastering Chemistry access code for online homework. (can be purchased with the above text book at the campus bookstore or separately online)
- ▶ Bring to every class:
 - ▶ Laboratory safety goggles (can be purchased at the campus bookstore) are required for all lab experiments.
 - ▶ A simple scientific calculator.
 - ▶ A spiral bound notebook for doing problems in class, taking notes, and recording data.
 - ▶ Pencils (2) with an eraser.



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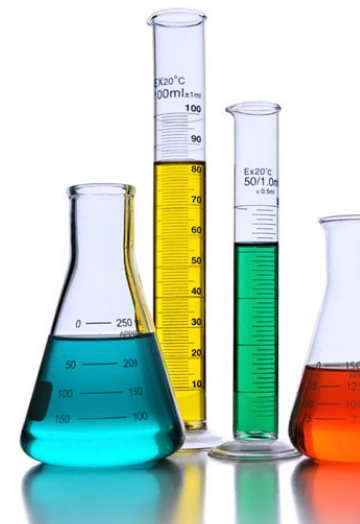
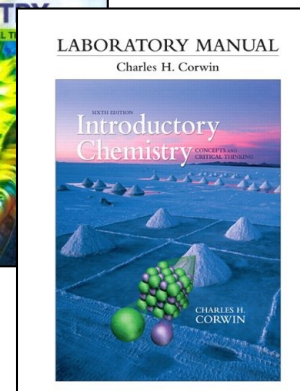
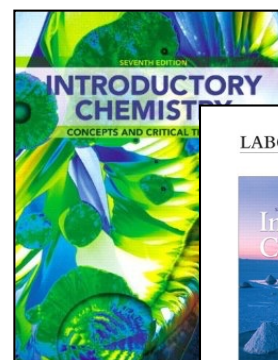
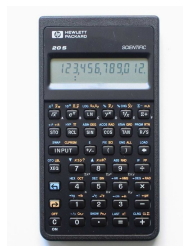


- ▶ Introduction to Content
 - ▶ Overview of Topics
 - ▶ The big picture.
 - ▶ Getting started
 - ▶ Knowledge
 - ▶ Science
 - ▶ Chemistry



Evaluation (Grades)

- ▶ How to get an "A"
- ▶ Reports
 - ▶ Knowing where you are.
- ▶ Other Resources



Chem 50 – Evaluation

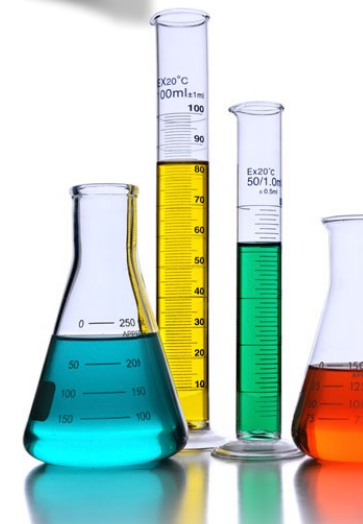
- ▶ There will be about 1,000 points available during the semester.
 - ▶ There will be three midterm exams (120 pts each), given during lecture section.
 - ▶ The final exam will be worth 160 pts, according to the college final exam schedule.
 - ▶ There are about 12 homework assignments (20 pts)
 - ▶ most will be done using mastering chemistry online.
 - ▶ Experiments will be hands on explorations of chemistry in lab section:
 - ▶ Each experiment will have a pre-lab and a report (15 pts combined).
 - ▶ Includes pre-lab quizzes or required at home preparation & reports
 - ▶ Best 8 scores will be counted.
 - ▶ There will be a lab practical or exam (60 pts).
- ▶ There are no makeup exams. (You cannot take exams early)
- ▶ There are no makeup labs. (You cannot do lab experiments early)

Exam #1

Exam #2

Exam #3

Final Exam



Evaluation

- ▶ Grades are a straight percentage of the points you score to the points available.

- ▶ There is no curve.
- ▶ There is no extra credit.

- ▶ There are no minus grades.
- ▶ If you are in the top half of either the B or C range you will get a plus prefix.

(when campus policy allows)

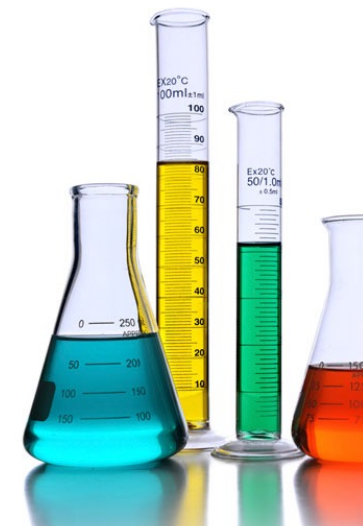
- ▶ Student progress reports will be provided after each exam (and are available on request).

240 pts	Homework (12 scores; 20 pts each)	24%
360 pts	Midterm Exams (3 exams; 120 pts each)	36%
200 pts	Final Exam (comprehensive; 200 pts)	20%
120 pts	Lab Experiments (best 8 scores; 15 pts each) (includes pre-lab & reports)	12%
60 pts	Lab Practical (60 pts)	6%
20 pts	Lab Safety	2%
1,000 pts		100%

Lecture 80%

Lab 20%

A	90 - 100 %
B	80 - 89 %
C	70 - 79 %
D	55 - 69 %



Evaluation

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Chem 50 – Midterm Progress Report

Full Name	Student, Allan	Points to date	<u>218.0</u>	Note: 90-100% = A 80-89% = B 70-79% = C 55-69% = D
Status	Adding	Possible to date	<u>245</u>	
GNumber	01234567	Percent to date	<u>91%</u>	
Major	Chemistry			Class Grade <div style="border: 2px solid black; width: 80px; height: 80px; margin: 0 auto;"></div>
FName	Rocky (Allan)	Section	21	
LName	Student	Bench	B	
Phone	415-555-1234	Locker	71	
eMail	a.student@gmail.com	Locker Combo	01-01-01	

Exams			Experiments & Reports			Homework / Quizzes		
Exam01	103.0	86%	Exp01	12	80%	HW01	19.0	95%
			Exp02	13	87%	HW02	18.0	90%
			Exp03	15	100%	HW03	18.0	90%
Other								
SftyQz	20	100%						



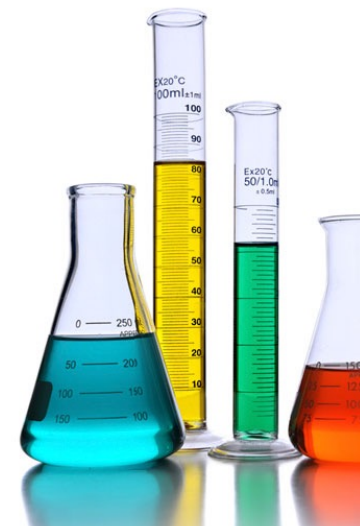
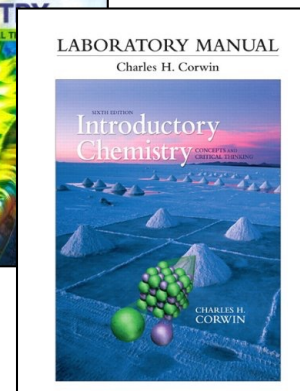
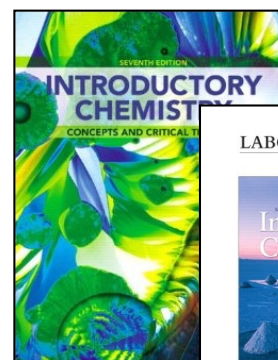
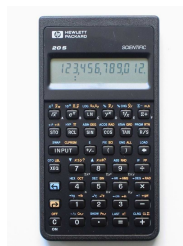
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- ▶ Introduction to Content
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Other Resources



Additional Resources

▶ Chem Website 50:

- ▶ The course syllabus, schedule, topics lists, study guides, worksheets, answer keys and other class resources can be found on the chemistry website for 50 at this URL:

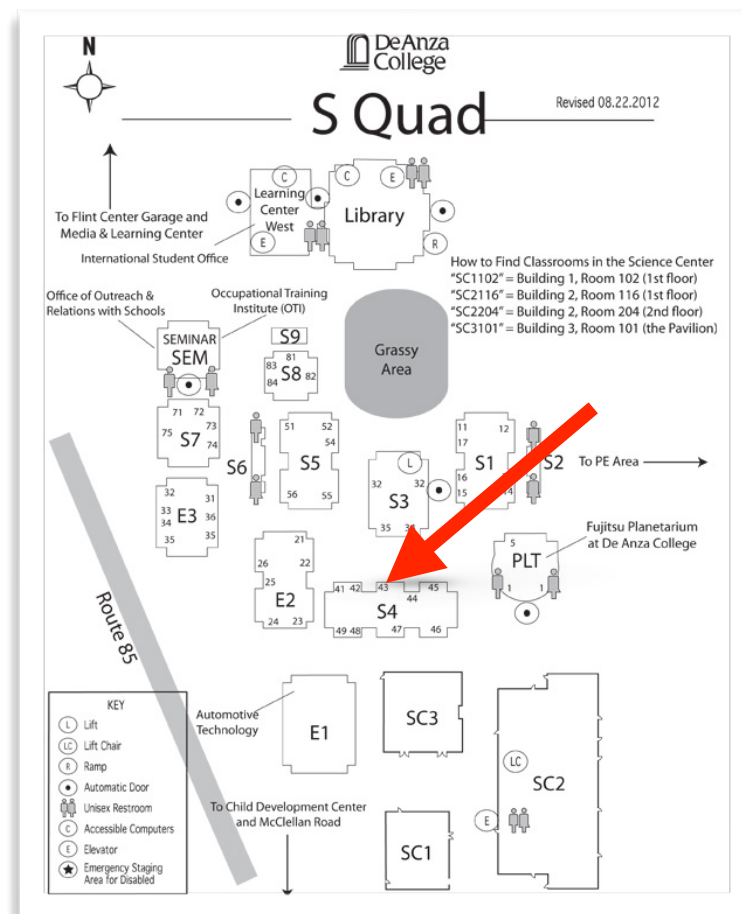
- ▶ <http://chem.ws/50>

▶ Topic Lists:

- ▶ A list of specifically what we intend to cover in lecture and lab is provided on the class website, organized by chapter of the class textbook.
- ▶ Additional topics may be added during the semester and not all will be tested for on in any given exam or assignment. Students are encouraged to use this topic list in preparing for lecture, reviewing chapters, exam preparation, and determining if this class meets the student's personal objectives in studying chemistry.

▶ Student Success Center:

- ▶ The Student Success Center offers workshops, tutoring, internet access and support for most De Anza classes.
 - ▶ Math, Science & Technology Resource Center: S43 / 408.864.8683
 - ▶ Academic Skills Center: ATC 302 / 408.864.8253
 - ▶ General Subject Tutoring: ATC 304 / 408.864.8682
 - ▶ Listening and Speaking Center: ATC 313 / 408.864.5385
 - ▶ Writing and Reading Center: ATC 309 / 408.864.5840
- ▶ <http://www.deanza.edu/studentsuccess>



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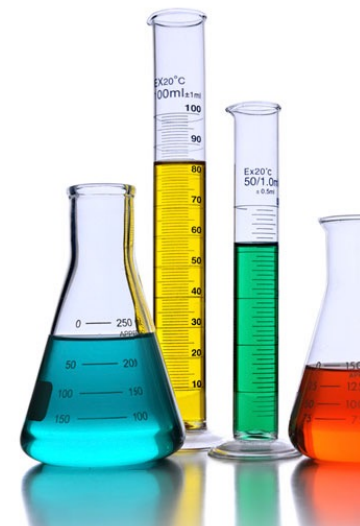
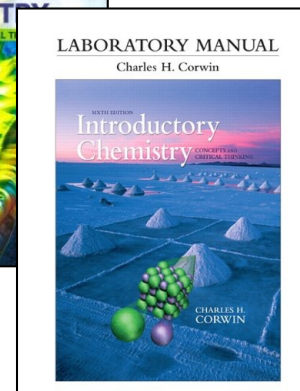
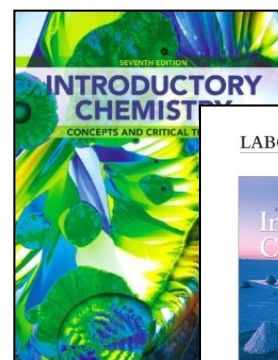
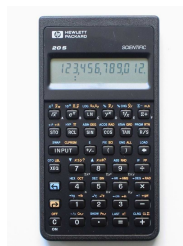


▶ Introduction to Content



▶ Getting started

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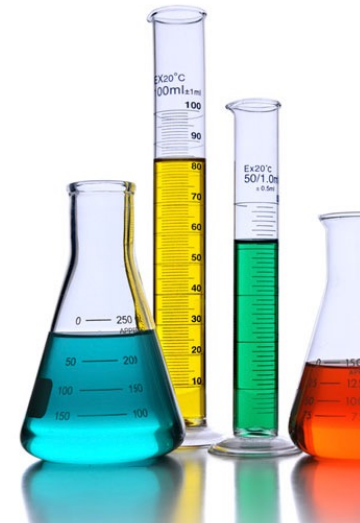


What is knowledge?

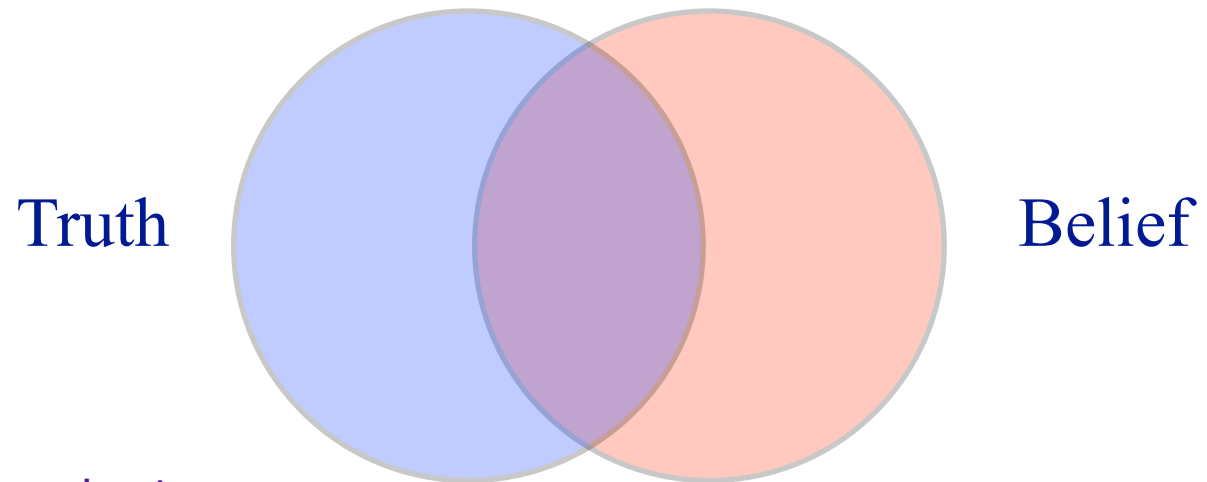
Truth



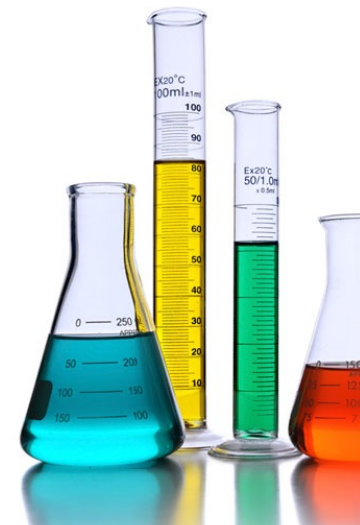
- ▶ **True** means being consistent with reality.
- ▶ **False** means being different than reality.
- ▶ Knowing how reality works is useful.
 - ▶ It let's us make predictions about how things will turn out.
 - ▶ Which means we can make effective plans.
- ▶ It's hard to know if you've found a truth.
- ▶ Just because something is consistent once doesn't mean it will always be.
- ▶ It's easier to know if something is false.
 - ▶ Once you see an inconsistency, you it's different than reality.



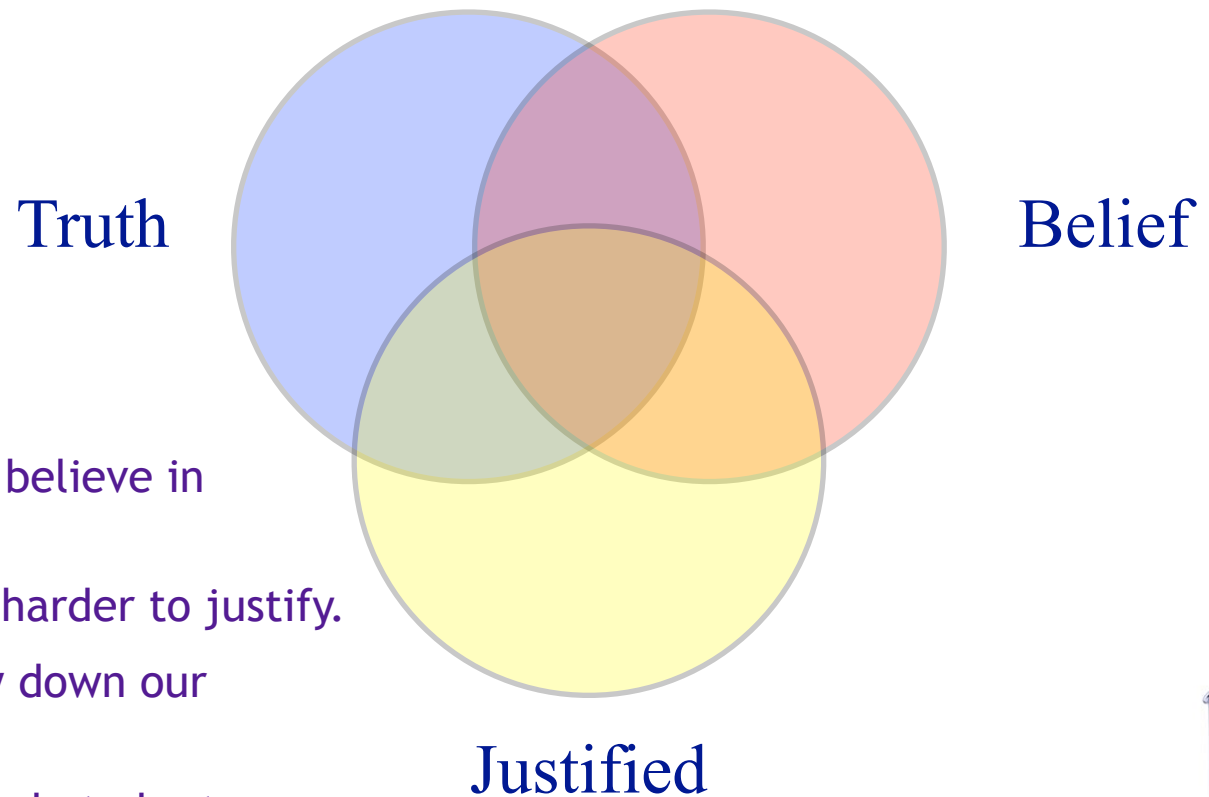
What is knowledge?



- ▶ **Believing** in something means having confidence in it.
- ▶ Not everything we believe in is true.
- ▶ Not everything that is true is believed.
- ▶ But our beliefs are more useful to us if they're true.
- ▶ Having confidence in things that are consistent with reality empowers us.
- ▶ People want to find that intersection.



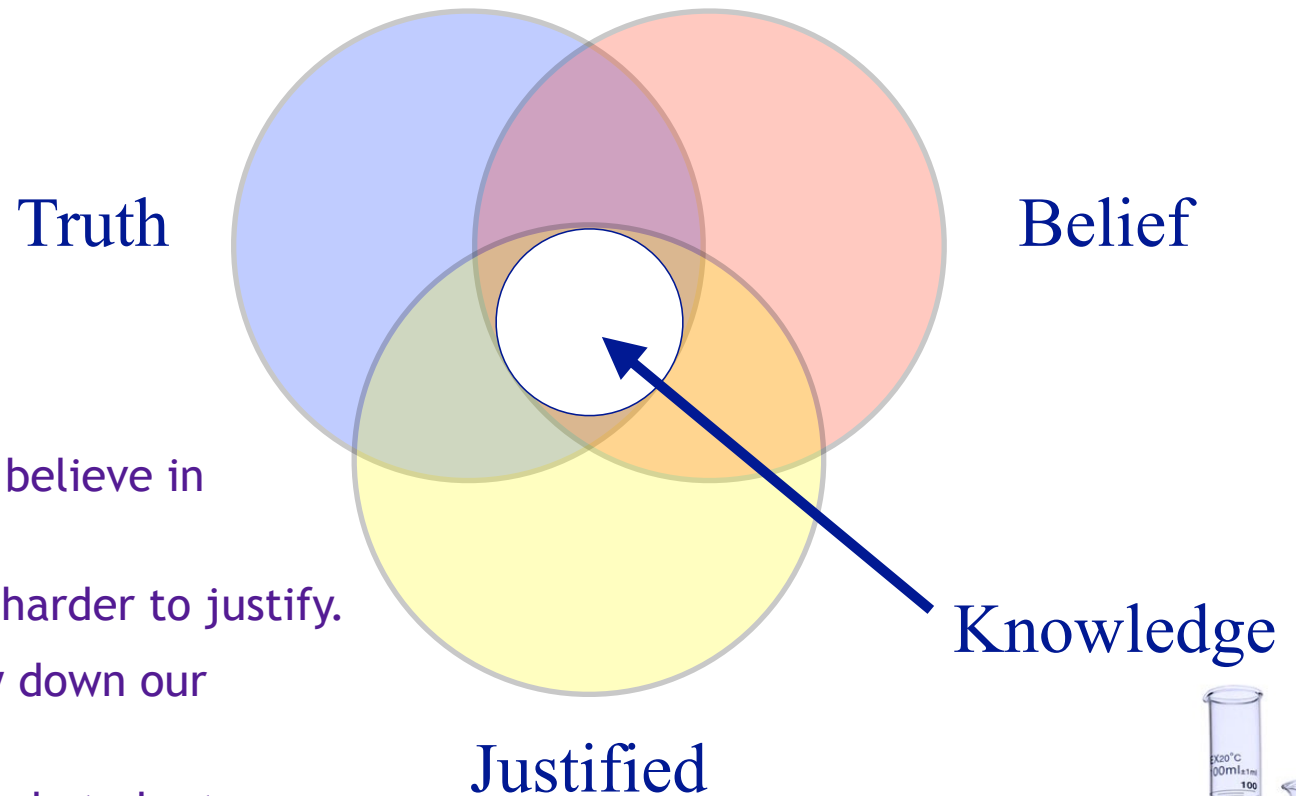
What is knowledge?



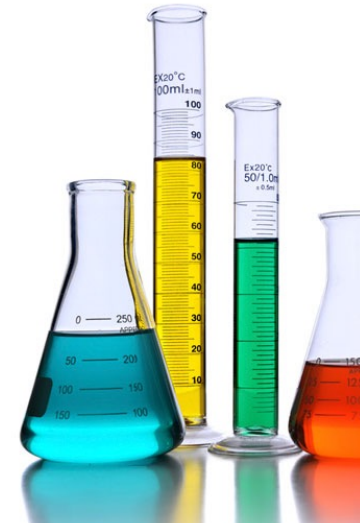
- ▶ **Justifications** are reasons to believe in something.
- ▶ Things that are not true are harder to justify.
- ▶ Justifications help us narrow down our beliefs.
- ▶ Justified beliefs are more likely to be true.



What is knowledge?



- ▶ **Justifications** are reasons to believe in something.
- ▶ Things that are not true are harder to justify.
- ▶ Justifications help us narrow down our beliefs.
- ▶ Justified beliefs are more likely to be true.
- ▶ **Knowledge** is a justified true belief.
- ▶ Knowing something means believing it, and having justifications for its truth.
- ▶ Science is one tool for justifying beliefs.

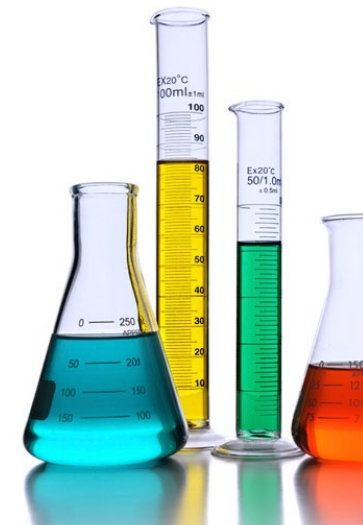
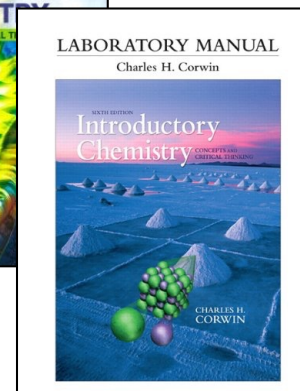
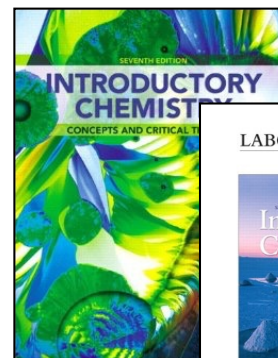
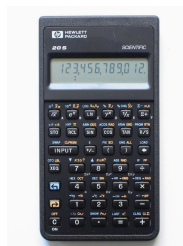


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What is science?

- ▶ Knowledge is a justified true belief.
- ▶ There are different ways to justify a belief.
- ▶ Science is a **method** of justifying beliefs.
- ▶ Science seeks to produce reliable explanations and use them to make effective predictions.
- ▶ It's an empirical method.
- ▶ **Empirical** means observable. That which can be experienced by others.
- ▶ If our justifications are empirical, we can share them.
- ▶ Other people can observe what we did and we can have shared, justified beliefs.
- ▶ That means the knowledge we acquire can grow beyond just us.
- ▶ It means the knowledge of Einstein and Newton shared with new generations, like yourself.



Scientific Method is empirical.

- ▶ **Observation:** The details of an experience that can be reproduced and confirmed by others.
(Data, Facts)
- ▶ **Hypothesis:** A tentative explanation of observations that provides a basis for further experimentation.
(Hypothesis must be disprovable to have value.)
- ▶ **Experiment:** A reproducible, designed experience that provides an opportunity to make further observations and disprove hypothesis.
(or gain support and confidence in our hypothesis.)
- ▶ **Theory:** “Well-established hypothesis.” An explanation of nature with considerable evidence or facts (observations) to support it.
- ▶ **Law:** Statement of natural phenomena to which no exceptions are known. A law is not an explanation.
(A summary of many consistent observations, without explanation.)

Observation

Hypothesis

Experiment

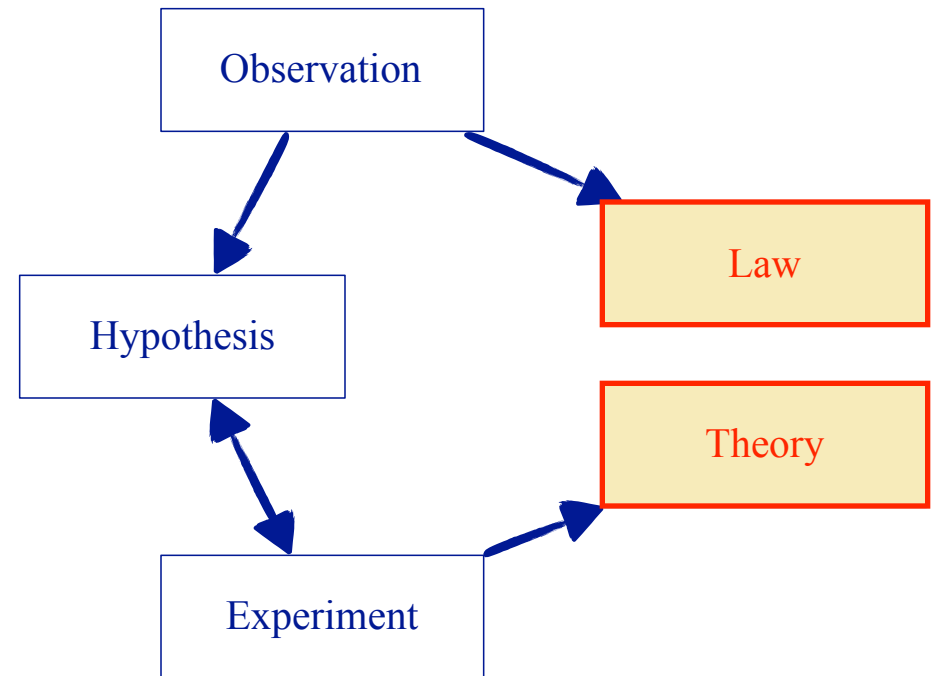
Law

Theory



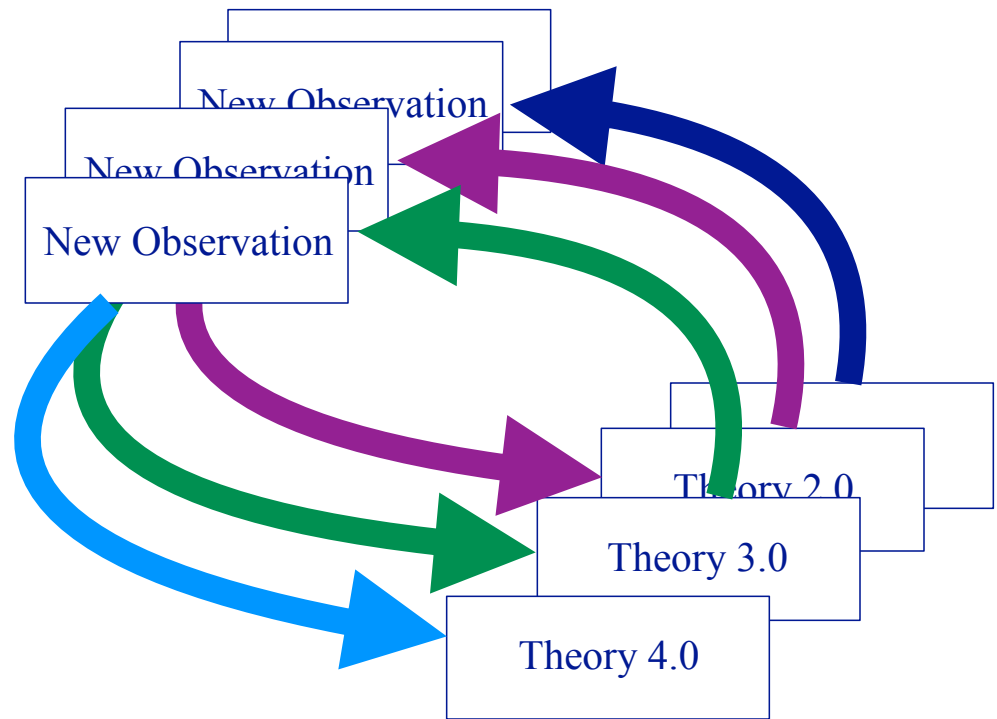
Scientific Method is a process.

- ▶ You always start with observations.
 - ▶ What do you know is true (real).
 - ▶ What you see, touch, hear, smell...
 - ▶ No interpretations, just observations.
- ▶ Only when you have enough data, enough observations, do you offer a tentative explanation, a hypothesis.
 - ▶ It's like a connect the dot game, let yourself see enough connections before you guess what the picture might be.
 - ▶ A hypothesis is a model for how things *might* work.
- ▶ Then you experiment.
 - ▶ You try and test that model, stretch it, break it, find it's limits so you know how much you can trust it.
 - ▶ When it holds, you test it more.
 - ▶ When it breaks, you fix it. You patch it up and offer a slightly better hypothesis.
- ▶ When you start to trust that explanation you call it a theory.
 - ▶ Theories are well established explanations.
 - ▶ Theories are reliable models.
 - ▶ Theories let us predict the future, successfully and with confidence.
- ▶ When we can't explain something, but it's showing to be true by many observations, we call it a law.
 - ▶ Laws let us predict the future, without knowing why.
 - ▶ Laws are patterns that seem to have no exceptions.
- ▶ Scientists don't make science, we use scientific theory to produce laws and theories.
 - ▶ Science is what we do.
 - ▶ Laws and theories are what we produce.



Science is never perfect or complete.

- ▶ Science is iterative.
 - ▶ It goes in cycles, bringing us closer to the truth each time, but never claiming to be the truth.
- ▶ It's never complete.
 - ▶ Science never claims to have all the answers.
 - ▶ All we try and do is produce useful models, reliable explanations.
 - ▶ Tools for predicting results.
 - ▶ We never prove theories.
 - ▶ We only disprove them ... so we can improve them.
- ▶ We make leaps and reach plateaus in knowledge.
 - ▶ Theories that gave us the steam engine, put us on the moon, the electric motor, the internet...
 - ▶ Science has produced great theories and important laws on which marvelous technologies are built.
 - ▶ But no theory is ever the end of the story.
 - ▶ We assume every theory has room to grow.
 - ▶ Each theory leads us to new observations, new hypothesis, new theories.
 - ▶ The more you learn, the more you realize there is out there to know.
 - ▶ Science requires the arrogance to believe you can know anything, and the humility to accept you will never know everything.



Questions...

What's the difference between a hypothesis and a theory?

Trust. A theory is a hypothesis we've decided to trust.

What's the difference between an observation and a law?

Frequency. An observation is something we've seen once, a law summarizes all the observations that have ever occurred.

What's the difference between an observation and a hypothesis?

What's the difference between a law and a theory?

Explanation. Hypothesis and theories attempt to tell us why, laws and observations just say what we've seen.

True and False:

Observations are facts/truths.



Interpreted observation are hypothesis.



A hypothesis is a fact/truth.



A proven hypothesis is a theory.



An established theory is a fact/truth.



A proven theory is a law.



A law is a fact/truth.

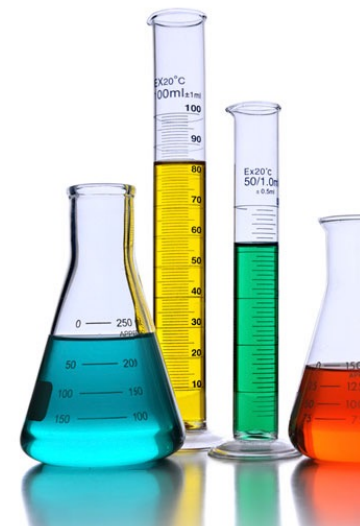
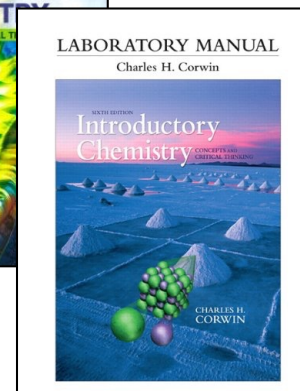
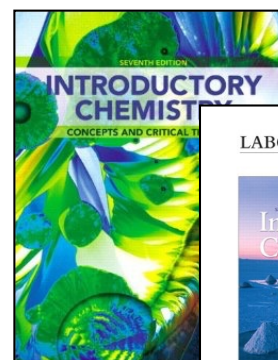
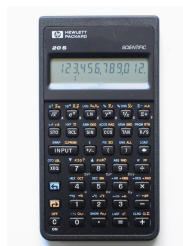


Class Introduction

- ▶ Are you in the right room?
- ▶ Instructor
- ▶ Requirements
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- ▶ Evaluation (Grades)
 - ▶ How to get an "A"
 - ▶ Reports
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- ▶ Other Resources



- ▶ Introduction to Content
 - ▶ Getting started
 - ▶ Knowledge
 - ▶ Science
 - ▶ Chemistry
 - ▶ Overview of Topics
 - ▶ What this class offers.



Getting Started

“The science of the composition, structure, properties and reactions of matter, especially of atomic and molecular systems.”

— Webster



Getting Started

“**The science** of the composition, structure, properties and reactions **of matter**, especially of atomic and molecular systems.”

— Webster



Chemistry Defined

The science of matter.



What is Matter?

Matter is anything that has mass and occupies space.

Wood

~~Sunlight~~

~~Heat~~

Water

~~Electricity~~

Air

Salt

People

Chemistry Defined

“The science of the composition, structure, properties and reactions of matter, especially of atomic and molecular systems.”

— Webster



Chemistry Defined

What is it made of?

How do the pieces fit together?

“The science of the **composition**, **structure**, **properties** and **reactions** of matter, especially of atomic and molecular systems.”

— Webster

What makes it unique?

How do you change it?

How do we answer these questions?



How do clocks work?

What is it made of?

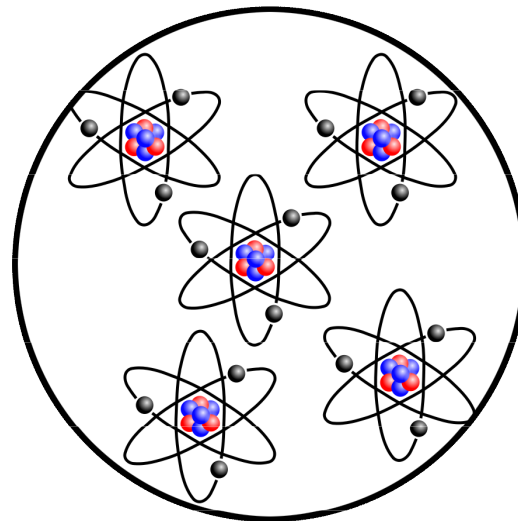
How do the pieces fit together?

What makes it unique?

How do you change it?



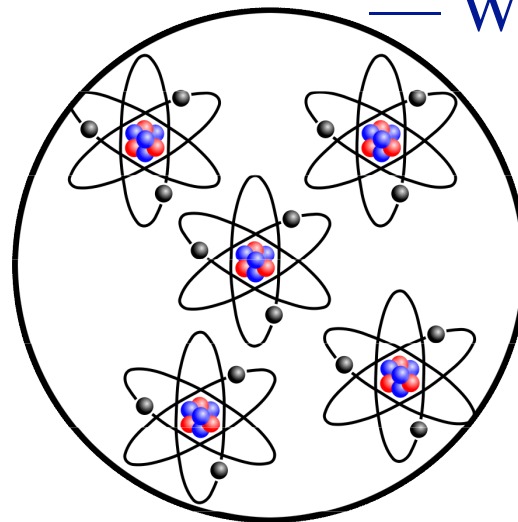
How do rocks work?



Chemistry Defined

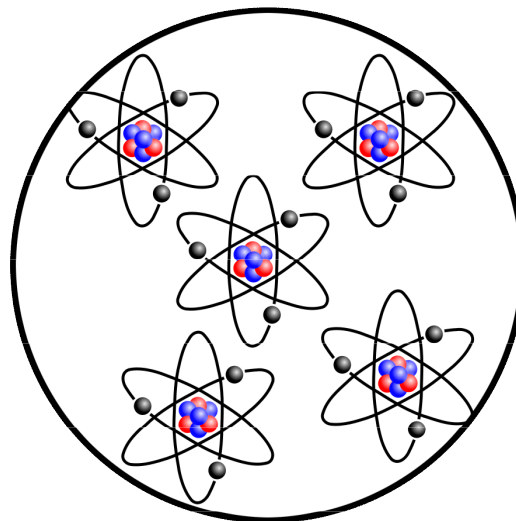
“The science of the composition, structure, properties and reactions of matter, especially of **atomic** and **molecular** systems.”

— Webster



Chemistry predicts & explains matter.

- ▶ You can divide all substances into smaller pieces of matter.
- ▶ The smallest pieces of a substance, that are still that substance, are atoms and molecules. (We'll just call them particles for now.)
 - ▶ This is atomic theory. The first theory of chemistry.
 - ▶ Chemists explore these small particles and through observation and experiment, offer reliable explanations for the reactivity and properties of the substances they compose.
- ▶ This semester, we will help you use scientific method to deduce the **composition** and understand the **structure** of the particles that make up all matter in the universe.
- ▶ Once you know a substances composition and structure, we will show you how to predict and explain many of the **properties** and **reactivity** of those substances.
 - ▶ Given similar white powders, you will be able to predict which:
 - ▶ Dissolves in water.
 - ▶ Floats in water.
 - ▶ Turns pink in water.
 - ▶ Burns in water.
 - ▶ Freezes water.
 - ▶ Changes into water.
- ▶ This is chemistry, the science of matter.



Class Goals (the chemistry we're going to tour)

- ▶ Intro & Measurement
 - ▶ The basics of science & chemistry.
 - ▶ Putting a number to what we know.
- ▶ Dimension (Units)
 - ▶ Giving that number context.
 - ▶ Conversions & Proofs (justifications)
- ▶ Matter & Energy
 - ▶ Sorting the 'stuff' in the world

Exam #1

- ▶ Atomic Theory
 - ▶ The first theory of chemistry
 - ▶ Getting to know the atom
- ▶ Periodicity (types of atoms)
 - ▶ Types of atoms
- ▶ Nomenclature
 - ▶ Giving stuff names.

Exam #2

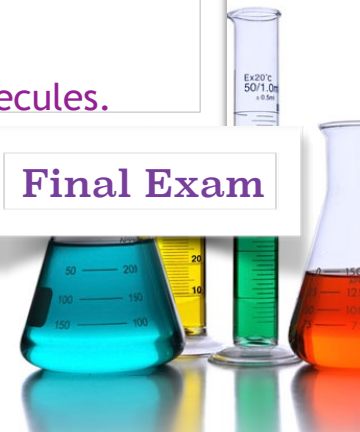
- ▶ Chemical Reactions
 - ▶ Transmutation
- ▶ Composition
 - ▶ What matter is made of.
 - ▶ Chemical Formulas.
- ▶ Stoichiometry
 - ▶ Predicting quantities in reactions.

Exam #3

- ▶ Solution Chemistry
 - ▶ Using solvents.
- ▶ Gas Laws
 - ▶ Working with the gas state.
- ▶ Bonding
 - ▶ The structure and shape of molecules.

The final is cumulative!

Final Exam

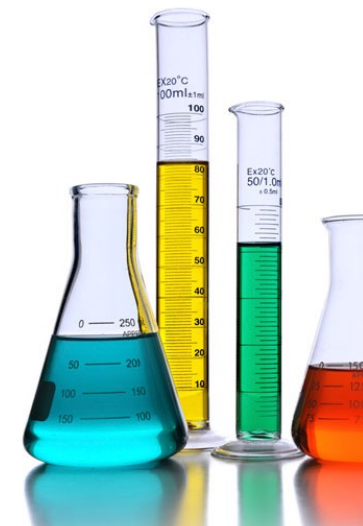
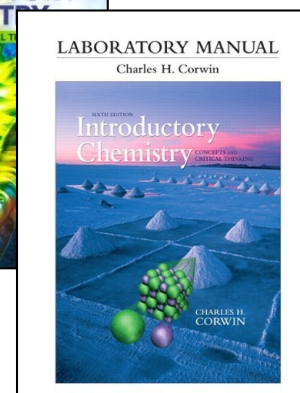
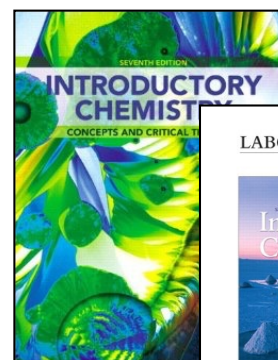
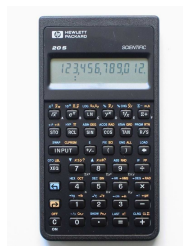


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Questions?

