

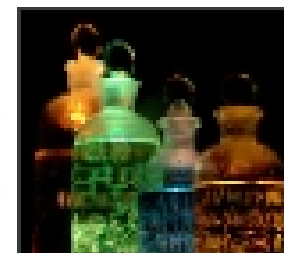
CHEMISTRY 142 B

Autumn 2013

- Motivation
- Syllabus Overview
- Measurements and Units
- Precision and Accuracy

What is Chemistry?

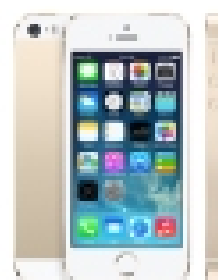
- The study of matter and how it changes
- Study of transformation
- Study of interactions between atoms and molecules



Modern Chemistry

LG's 55-inch curved OLED TV hits Germany for 8,999 euros this week

Information related to modern chemistry is available in many forms, including news articles, research papers, and educational resources. This image shows a news article about a new LG TV, illustrating the application of modern technology in everyday life.



Modern Chemistry

gadget calculator "Solar cells" (photovoltaics) convert light directly to electricity

Si photovoltaics

Tokyo Narita Airport (150 MW capacity)

Moscone Convention Center (SF) (675 MW capacity)

parking meters

"And Lord, we are especially thankful for nuclear power, the cleanest, safest energy source there is...except for solar, which is just a pipe dream." — Homer Simpson

Why are you taking Chem 142?

"I have to take chemistry, it's required for..."

"I like science, so I chose this class."

"My mom/dad handled my registration."

"I missed my registration deadline and this is what was left."

"I've always dreamt of being a chemist! All these chemicals and colors and explosions!"

What do chemists do?

- **Industry** - Develop new fuels, products, food additives, medicines, packaging, purification techniques...
- **Academia** - Do the basic research on new chemicals, new reactions, and new instruments necessary to bring new ideas to market.
- **Other** - Scientists are needed in patent law, clinical medicine, schools, etc.



Where do chemists work?



Maybe you don't want to be a chemist...

Even if this is the only chemistry course you ever take, you will still need to use chemistry to make informed decisions...

What kind of gas should I buy?

- Assumptions:
 - Gasoline is iso-octane (2,2,4-trimethylpentane, C_8H_{18})
 - Diesel is octane (C_8H_{18})
 - Ethanol is CH_3CH_2OH
- Calculate the heat of combustion using ΔH_f° values.
 - $C_8H_{18}(l) + 12.5 O_2(g) \rightarrow 8 CO_2(g) + 9 H_2O(l)$
 - $-259.3 \quad 0 \quad -393.5 \quad -285.8 \text{ (kJ/mol)}$
- Heat released per mole (iso-octane): 5,065 kJ
- Per liter (using density and molar mass):
 - iso-octane (gas): 38.5 MJ
 - Octane (diesel): 37.0 MJ
 - Ethanol: 23.4 MJ

Should I take 142?

- Here's what you should know **ALREADY**:
 - Math (algebra mostly, but know it well)
 - How to measure (units and significant figures)
 - A sense of scale of the universe
 - Some chemistry (if have not had any chemistry – ever – you should take CHEM 110)

The Basics

Course Instructor: Prof. Xiaodong Li, xli@uw.edu, SAG 305
Lab Instructor: Dr. Andrea Corbelli, acorbell@uw.edu, SAG 217

Course Website: <https://canvas.uw.edu>

Office Hours: By Appointment

Lecture: MWF 9:30-10:20 in KNS 130

Discussion sections with TAs: Tuesdays (see schedule)

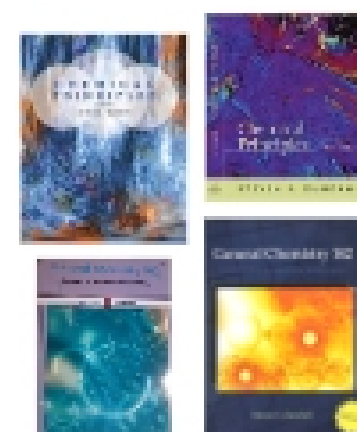
Labs: No lab or quiz this week

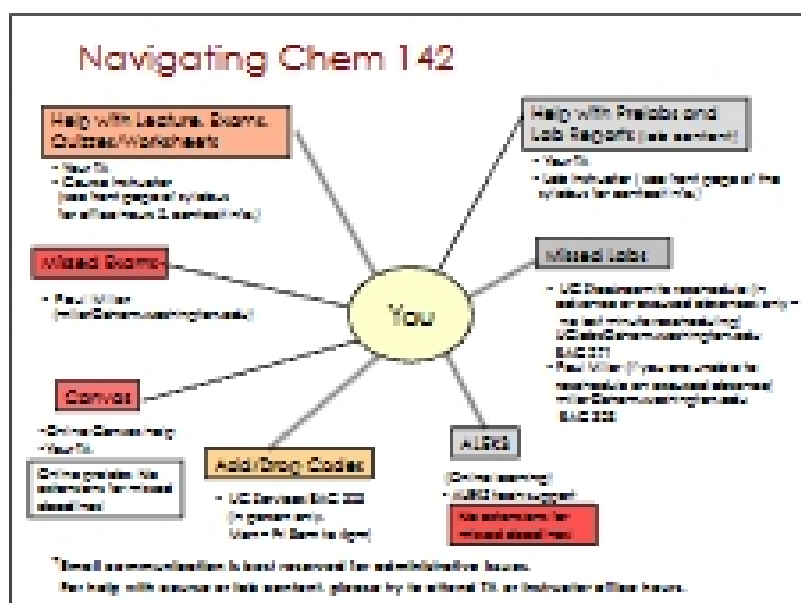
Labs start next week

→ Lab Safety Orientations first

Materials

- Textbook by Zumdahl... (7th edition)
- Chem 142 Lab Manual
- Lab Notebook
- Lab coat and goggles
- ALEKS access
- Scientific calculator





Learning Goals

In the first quarter of general (introductory) chemistry, we will focus on:

- Working with data (units, conversions, error)
- Atomic nature of matter
- Stoichiometry of reactions
- Behavior of gases
- Descriptions of equilibrium
- Applications of equilibria (acid/base and solubility)

Chemistry knowledge is cumulative!

Textbook Coverage

We'll cover the first seven chapters in "Chemical Principles"

- Ch. 1: Chemists and Chemistry
 - Ch. 2: Atoms, Molecules, and Ions (one section from 12.13)
 - Ch. 3: Stoichiometry: Mole-Mass Relationships in Chemical Systems
 - Ch. 4: Chemical Reactions and Solution Stoichiometry
 - Ch. 5: Gases and the Kinetic - Molecular Theory
 - Ch. 6: Chemical Equilibrium
 - Ch. 7: Acids and Bases
- Plus one section from Chapter 8 (8.3)

Weight of Course Components

Participation	10%
ALEKS (Homework)	10%
Laboratory	15%
2 midterm exams (45 min each)	40%
Final exam (1 hr 45 min)	25%
Total	100%

Lecture

- **Lecture and Discussion Section Etiquette.** Out of respect for your classmates, please observe the following rules:
 - Arrive on time. If an emergency causes you to arrive late, please enter quietly through the rear doors of the lecture hall/classroom.
 - Do not pack up your belongings before the end of class.
 - Keep side conversations to a minimum.
 - Keep your cell phone or pager on silent, and refrain from sending or reading text messages.
 - Do not provide or read materials that are unrelated to the lecture. This includes – but is not limited to – newspapers, books, magazines, and the Internet.
 - If you will be using a laptop and/or eating/drinking during the lecture, please sit in the back of seats at the far left of the classroom to prevent distractions to your neighbors and accommodate for anyone who may have a food allergy.

Discussion

- These are weekly sections led by your TA.
- You must arrive to discussion section within the first five minutes of the class period to obtain participation points. If you arrive later than that, you will still be able to complete a worksheet with your group, but the worksheet will not be accepted for participation credit.
- You will work on group-learning activities.
- Your grade for this component of the course is based solely on participation.
- Worksheets and keys will be available on the course website after the discussion sections are finished for the week.