

Chemical Structures Lab

Dr. Timothy Dransfield

Phone: 7-6143

E-mail: timothy.dransfield@umb.edu

Office: S-1-085

Course web page:

<http://alpha.chem.umb.edu/chemistry/ch379>

Lecture S-1-089

Thursday: 12:30-1:45

Labs: S-2-41

Thursday: 2:00-5:00

Office hours: Tuesday, 10-11:30

Introductions:

Names

Majors

Hometown

Something you *learned* this summer

Chemical Structures Lab

What does that mean?

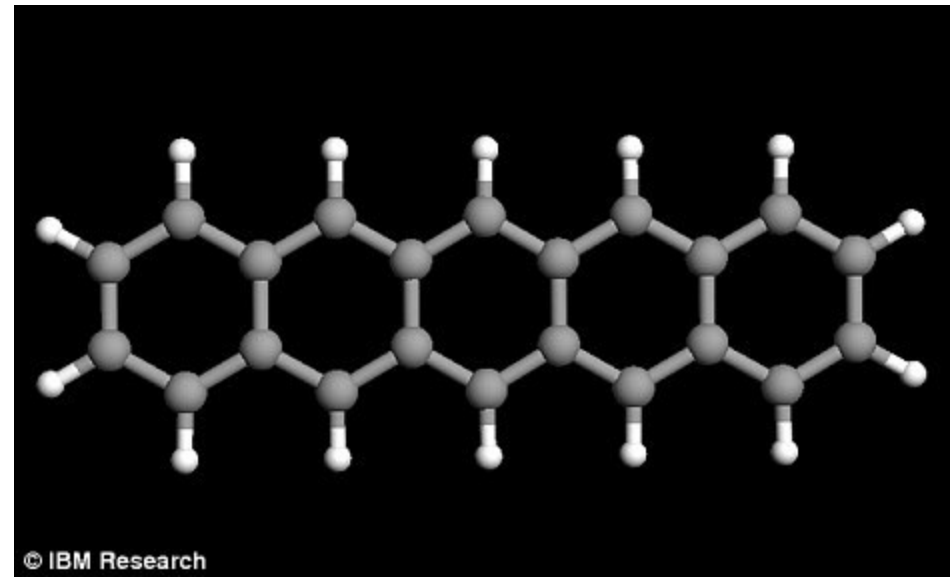
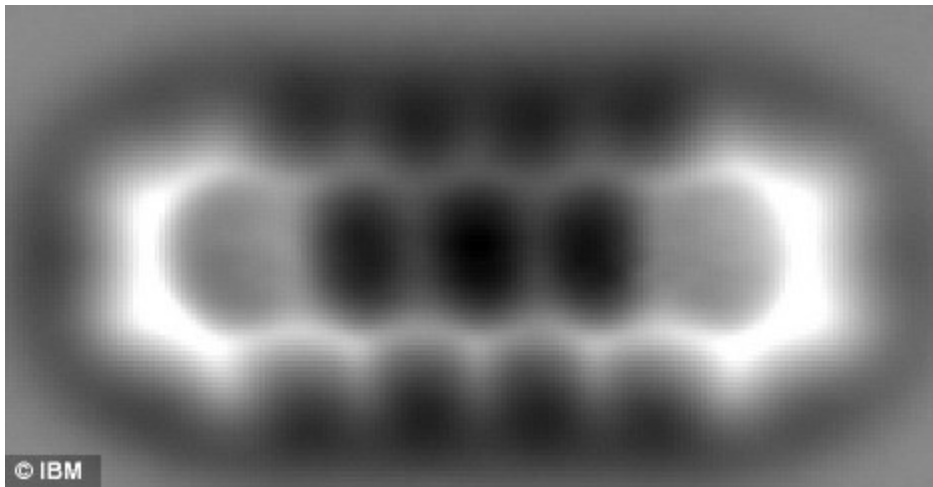
Single molecule, one million times smaller than a grain of sand, pictured for first time

Read more: <http://www.dailymail.co.uk/sciencetech/article-1209726/Single-molecule-million-times-smaller-grain-sand-pictured-time.html#ixzz0QWY4Z8As>

Scientists from IBM used an atomic force microscope (AFM) to reveal the chemical bonds within a molecule.

The researchers focused on a single molecule of pentacene, which is commonly used in solar cells.

HOW THE HECK DID THEY DO THAT?!?



Objective #1: To provide hands-on experimental work to support the very *strange* material you'll be learning about in Chem 369

What's strange about it?

'Quantum Teleportation' Beams Information Farther Than Ever Before

- In the recent experiment, all three photons started out on the island of La Palma, one of the Canary Islands off the coast of Spain. One of the entangled photons was then sent through the air 89 miles to the Canary Island of Tenerife. Since the particles were entangled, when a measurement was made of the quantum states of the two particles on La Palma, it affected the particle on Tenerife, too, allowing the first particle to essentially be recreated in a new location without traversing the distance.

Objective #1: To provide hands-on experimental work to support the very *strange* material you'll be learning about in Chem 369

What's strange about it?

Objective #2: To teach you the spectroscopic techniques that research chemists use every day

UV-Vis, IR, Raman, NMR

Objective #3: To *continue to* learn to write like scientists

- Introduce/Review the components and formatting of a peer-reviewed journal article
- Develop the skills needed to communicate scientific discovery to your peers and to the community

Before the laboratory

- Review the theoretical concepts involved in the experiment
- Be familiar with the experimental procedures ***before coming to lab. This will usually require readings from the textbook AND a course handout***
- Bring your lab notebook
- Most experiments will be done in small groups taking turns on the instruments

After Laboratory

- Analyze YOUR data carefully with proper tools (e.g. software)
- Finish and hand in your report on time.
- See the syllabus for the proper format and some general guidelines
- Lab reports are graded out of 25 points, and are due 2 weeks after the experiment (with a few exceptions for holidays). *Late reports will be penalized 1 point, plus 1 additional point for every 24 hours after the due date.* **Reports will not be accepted more than one week after the original due date.**

Grading

~75% of your grade will be based on your lab reports

~25% of your grade will be based on weekly quizzes due before the labs

Quizzes

Each week that we have an experiment, we will also have a “quiz”

The quizzes will be posted online the Friday before the experiment

They will be due before lecture on Thursday

You will not be allowed to enter the lab and begin your experiment without turning in your quiz!

Quizzes

Each quiz will consist of 2 questions

The first question will be related to the **theory** of the experiment that you will be performing that day

The second question will be related to the **calculations** you should have begun for the previous experiment

Lab Reports

For this class, the most important components of the report are the introduction and the discussion

In 314, we based our discussions around these questions:

If you don't know the correct answer, how do you assess error?

How do you know when you're right?

How do you know when you're wrong?

How do you know ***why*** you're wrong?

In **this** course, it's very difficult to do the experiment wrong

Lab Reports

If you don't know the correct answer, how do you assess error?

How do you know when you're right?

How do you know when you're wrong?

How do you know *why* you're wrong?

In **this** course, it's very difficult to do the experiment wrong

Sometimes you're right... but the theory doesn't quite match your data.

In this course, your job is to figure out when the failings are in the experiment, when they're in the calculations... and when they're in the theory

THIS IS HARD

Logistics

Most weeks, there is only one instrument for the class to share.

We will take turns using the apparatus for about an hour at a time, in groups of 2-3.

This means that you are **not** in the lab for most of the scheduled time...

... But with 14 students in the course, it also means that some of you will be here *later* than the scheduled end time.

We will sign up for experiment slots, and we will do our best to accommodate students with fixed conflicts.

For labs 1+2, everyone will be in lab at the same time

Logistics

There is no lab this week, and thus no quiz

The first experiment is scheduled for next week, and involves learning to use the simplest of spectrometers.

Before coming to lecture next week, please read the pdf on Use of a Spectrometer, and also textbook pp. 618-634(8ed)/676-693(7ed)/663-79(6ed).