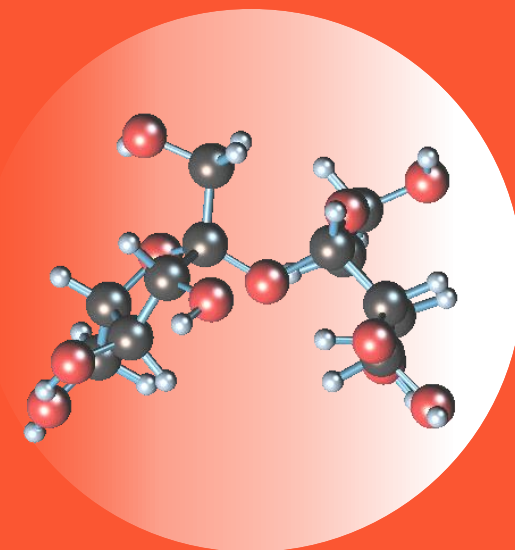


CHEM 242

Organic Chemistry Laboratory

Section AA

TA: Hao Nguyen



Introduction & NMR

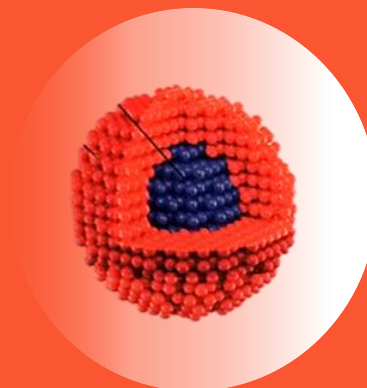
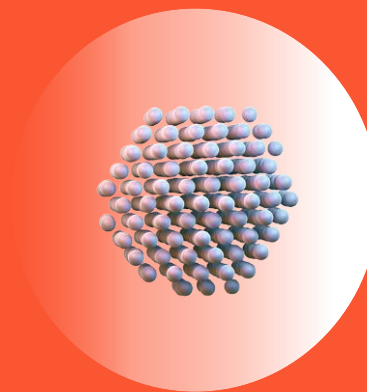
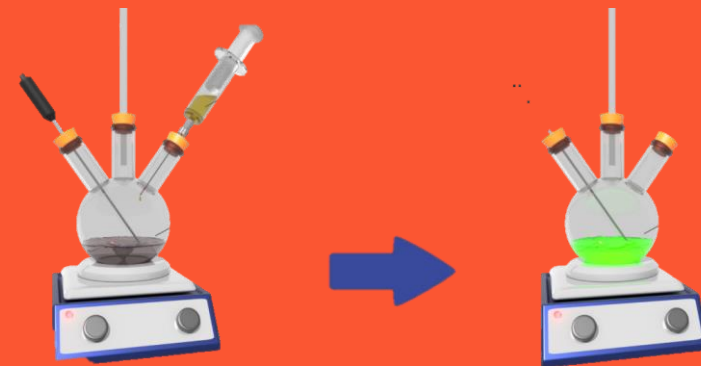
2017-2020



2020



TA: Hao Nguyen



Prepare for Chemistry Lab

Safety

Planning

Enthusiasm

A DAY IN THE LIFE OF A CHEMIST

Median Wage
\$74,470 per year



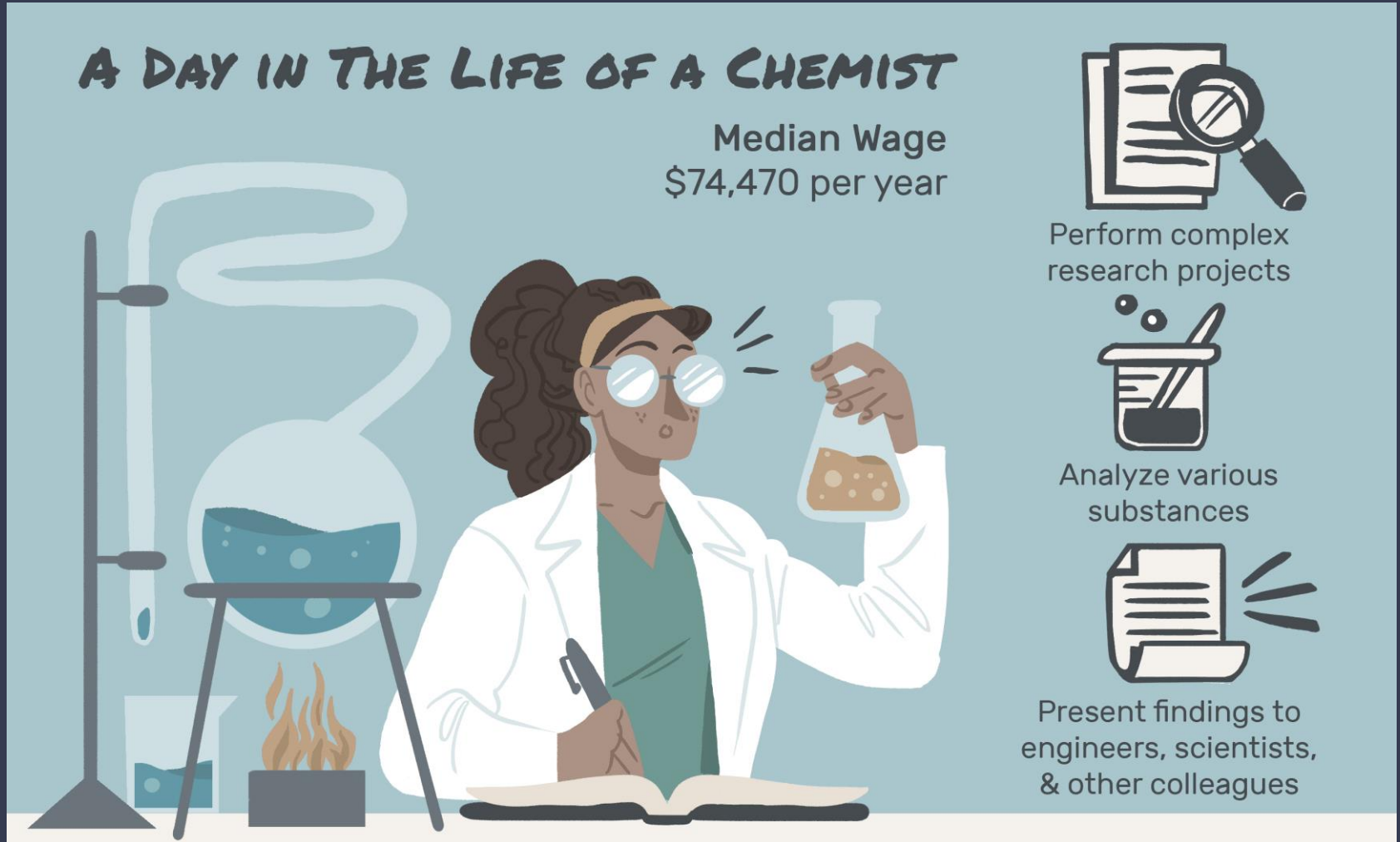
Perform complex
research projects



Analyze various
substances



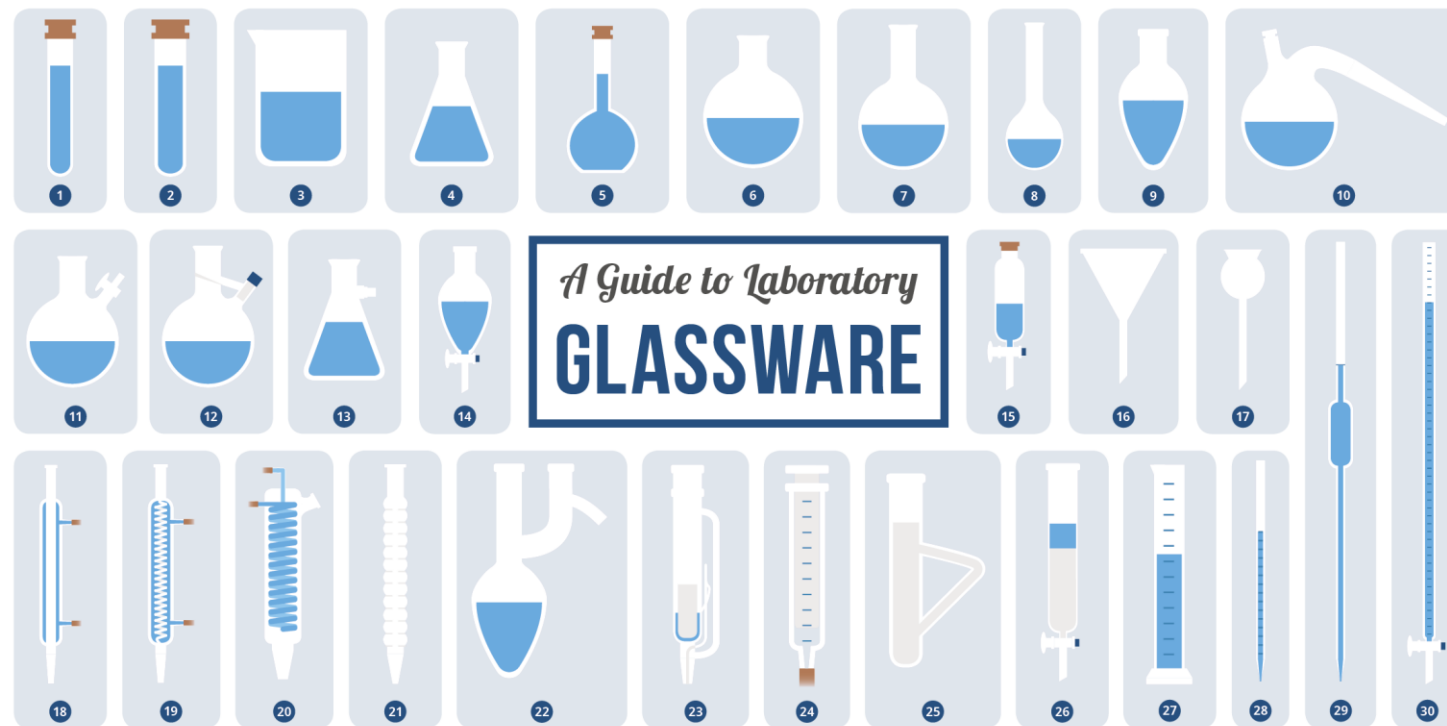
Present findings to
engineers, scientists,
& other colleagues



Glassware



Glassware



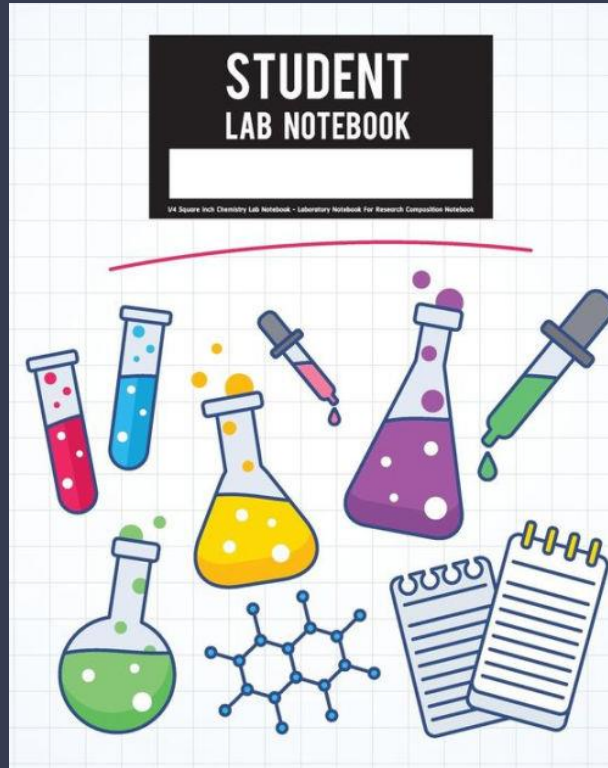
- | | | | | | |
|----------------------------|------------------------|----------------------|-------------------------|----------------------|--------------------------|
| 1 Test tube | 6 Round-bottomed flask | 11 Schlenk flask | 16 Filter funnel | 21 Distilling column | 26 Chromatography column |
| 2 Boiling Tube | 7 Florence flask | 12 Straus flask | 17 Thistle funnel | 22 Claisen flask | 27 Graduated cylinder |
| 3 Beaker | 8 Kjeldahl Flask | 13 Buchner Flask | 18 Liebig condenser | 23 Soxhlet extractor | 28 Graduated pipette |
| 4 Conical/Erlenmeyer flask | 9 Pear-shaped flask | 14 Separating funnel | 19 Graham condenser | 24 Gas syringe | 29 Volumetric pipette |
| 5 Volumetric flask | 10 Retort flask | 15 Dropping funnel | 20 Friedrichs condenser | 25 Thiele tube | 30 Burette |



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Notebook



https://bd3fe99d-5d75-4781-8757-74b6c56ff5f7.filesusr.com/ugd/a342ec_ef5b1b4fa5014c918997dadd98ea60a0.pdf

Disposal

How to Properly Dispose of Chemical Waste

Aqueous Waste (<40% Organic Chemicals)



1. **Acidic** (pH < 4)
2. **Neutral** (pH ~4-10)
3. **Basic** (pH > 10)

A Note on Labeling:

- Indicate the content in the disposal container
- Write out all chemical names
- If the content is a mixture of chemicals, indicate the major components and list the most hazardous component(s)

Organic (>40% Organic Chemicals)



1. **Non-chlorinated**
(e.g. THF, ethyl acetate, hexanes, toluene, methanol, etc.)
2. **Chlorinated**
(e.g. DCM, chloroform, chlorobenzene, etc.)
3. **Chemicals in a commercial bottle**
Undamaged bottle:
Dispose in original bottle (no label necessary)
Damaged bottle:
Arrange disposal with Chem Stores

Solid Waste

1. **Lightly Contaminated**

- No visible loose powders
- Collect in unlabeled green pails
- Empty into the solid waste drums on the 7th floor



Examples:

Gloves, Kimwipes, paper towels, empty vials/centrifuge tubes, etc.

2. **Chemical**

- Loose powders
- Heavily contaminated solid materials



Examples:

Used filter paper, unwanted samples, heavily contaminated gloves/kimwipes/paper towels, etc.

3. **Silica gel**

- Dispose in separate container
- May not be combined with other types of chemical wastes



4. **Chemicals in a commercial bottle**

Undamaged bottle:

Dispose in original bottle (no label necessary)

Damaged bottle:

Place in secondary container with a waste label



Special Cases

1. **Sharps**

(e.g. needles, razor blades, etc.)



2. **Inorganic Oxidizing**

- Place in a container with a disposal label



Examples:

Peroxides, chromates, etc.

3. **Violently Reactive**

- Contact Ken Greaves and Mike Dymarski

Examples:

LAH, nBu-Li, HF, Piranha, etc.

4. **Mercury Thermometers**

- Labeled separate puncture resistant container



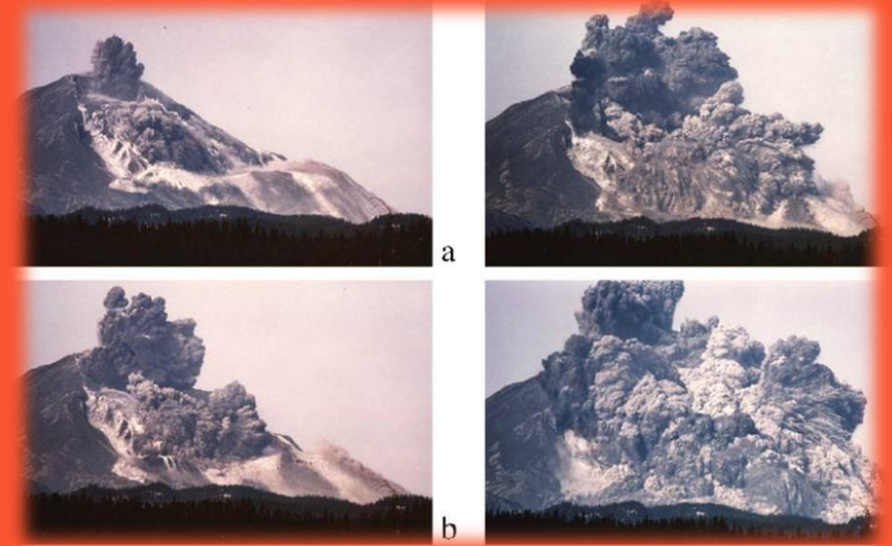
5. **Any uranium, thorium or mercury containing compounds**

- Contact Ken Greaves and Mike Dymarski

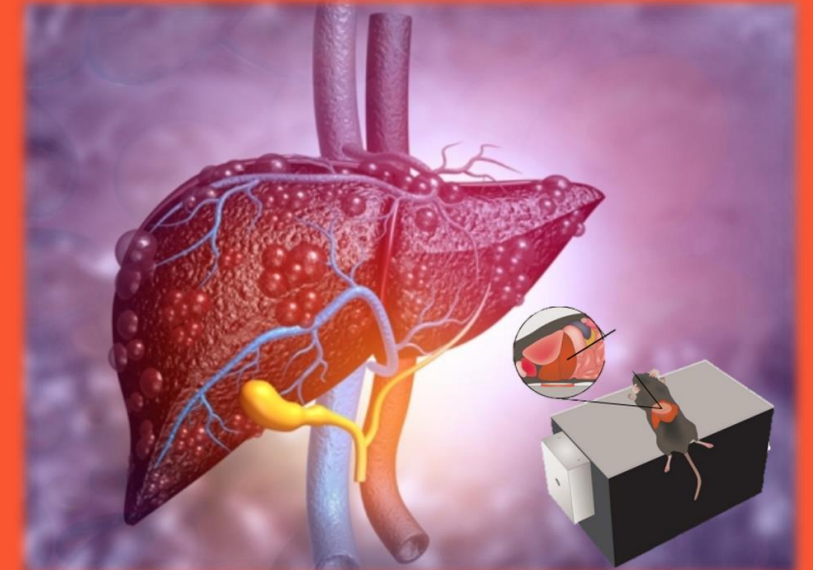
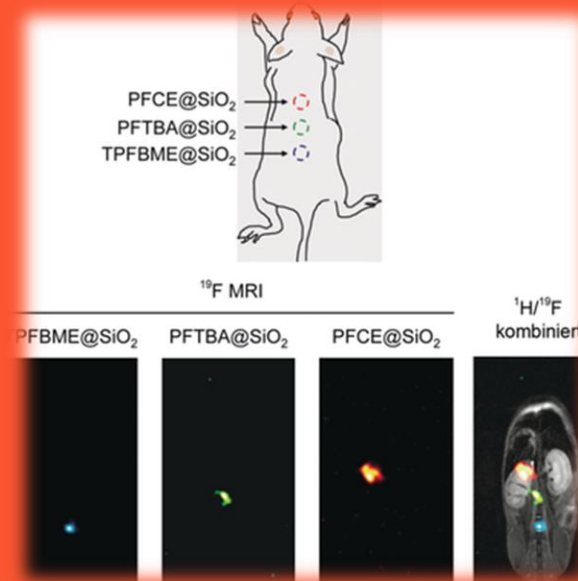
NMR



Analyzing volcanic crater contents



Detecting liver failure

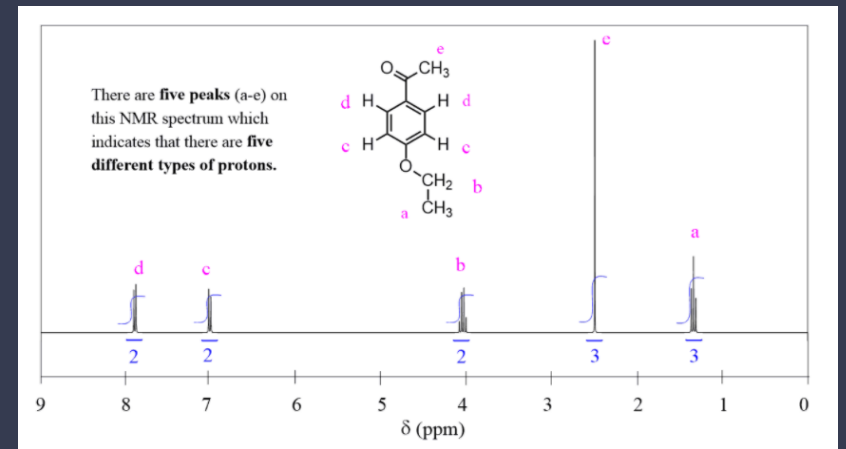
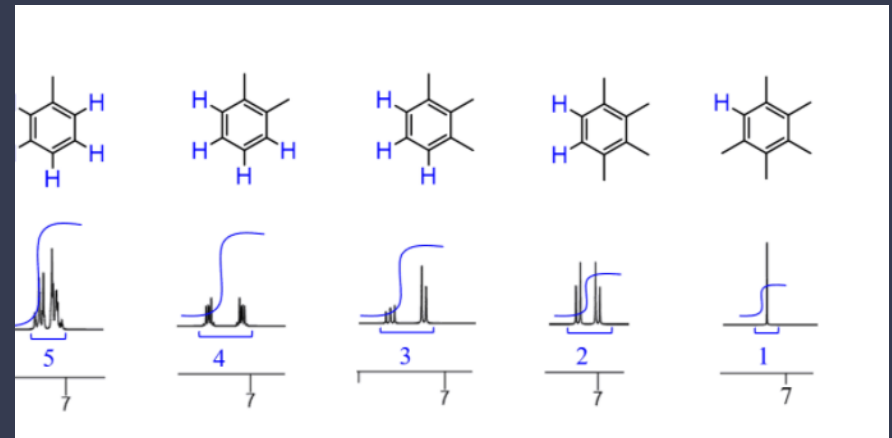
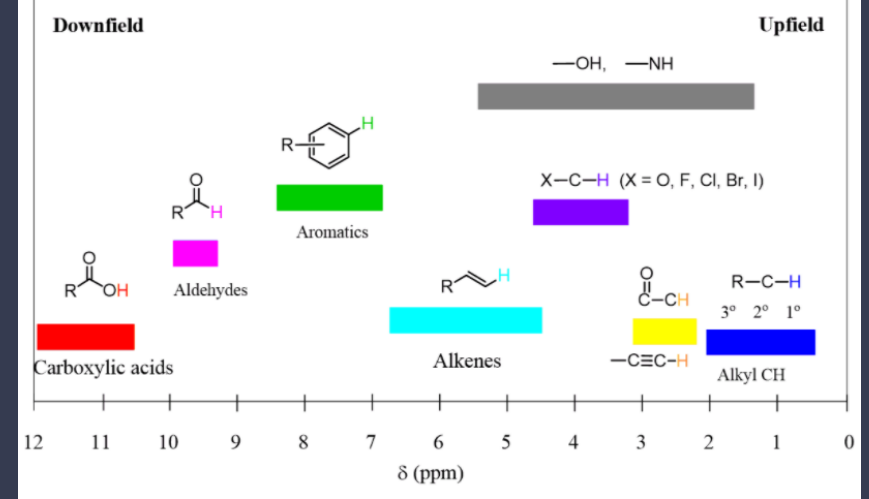


Analyzing ^1H -NMR spectra

Chemical Shifts

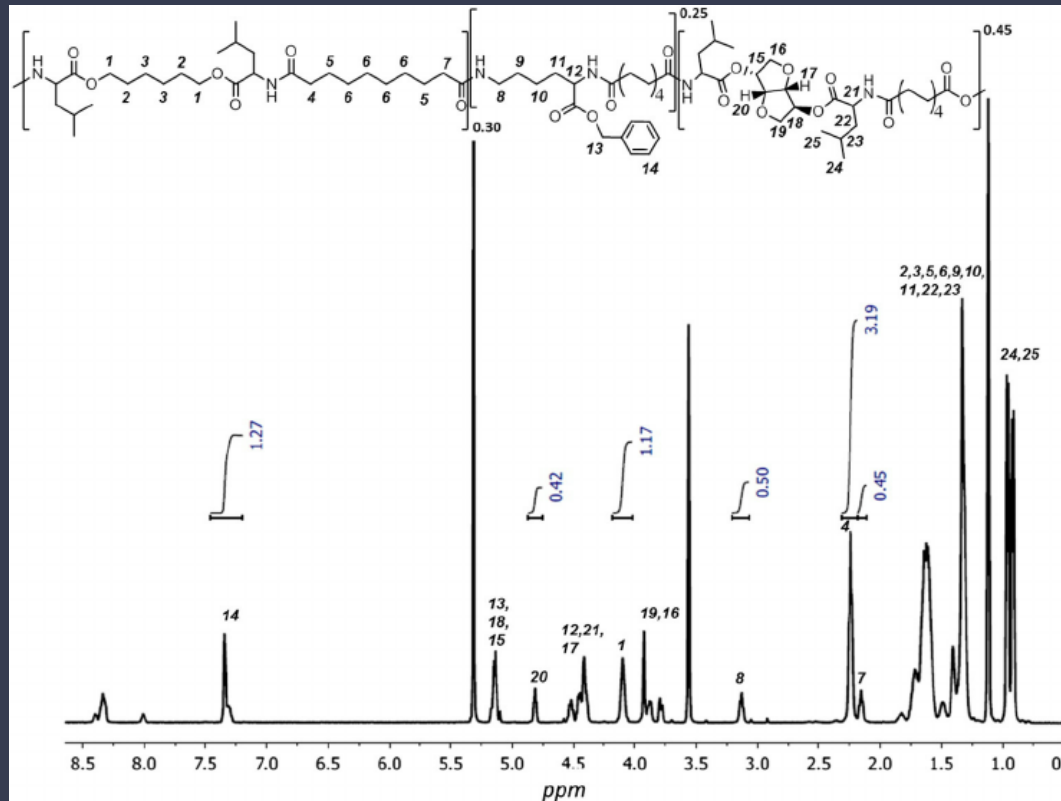
Splitting

Integration

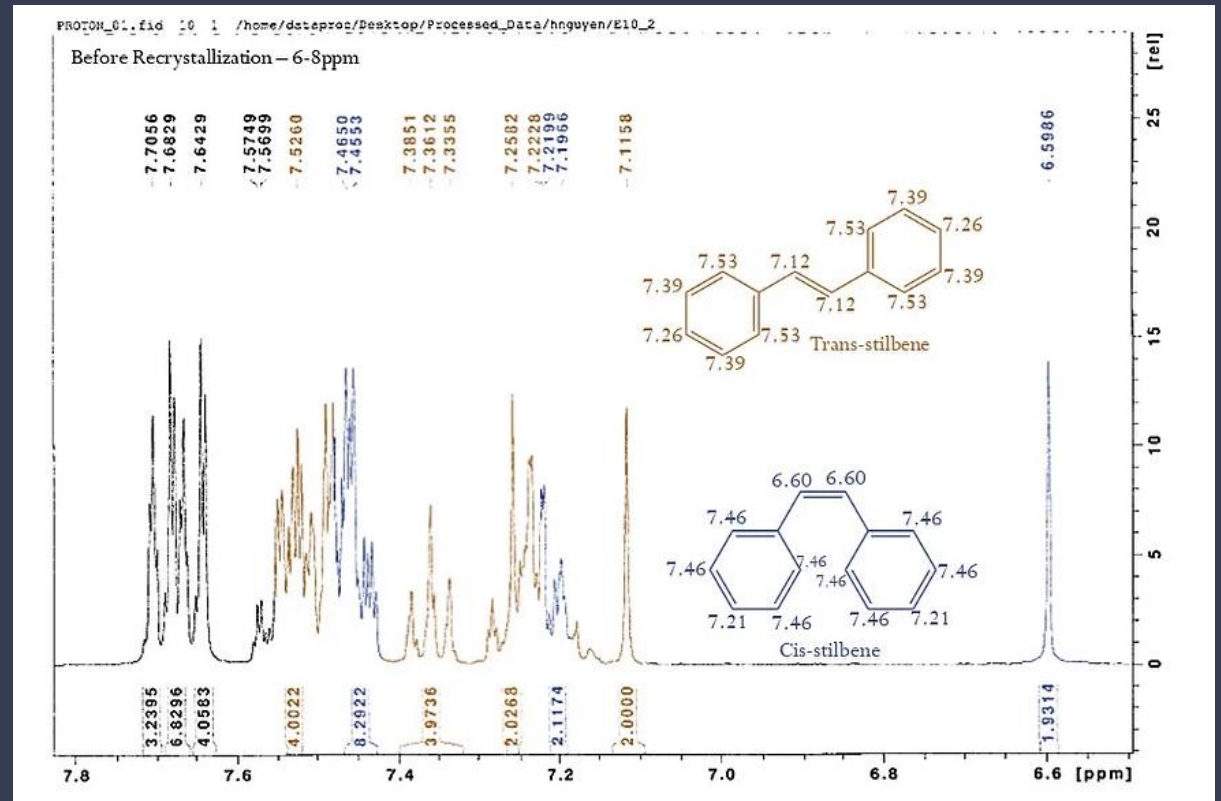


What do NMR spectra look like in real research?

Regional structure

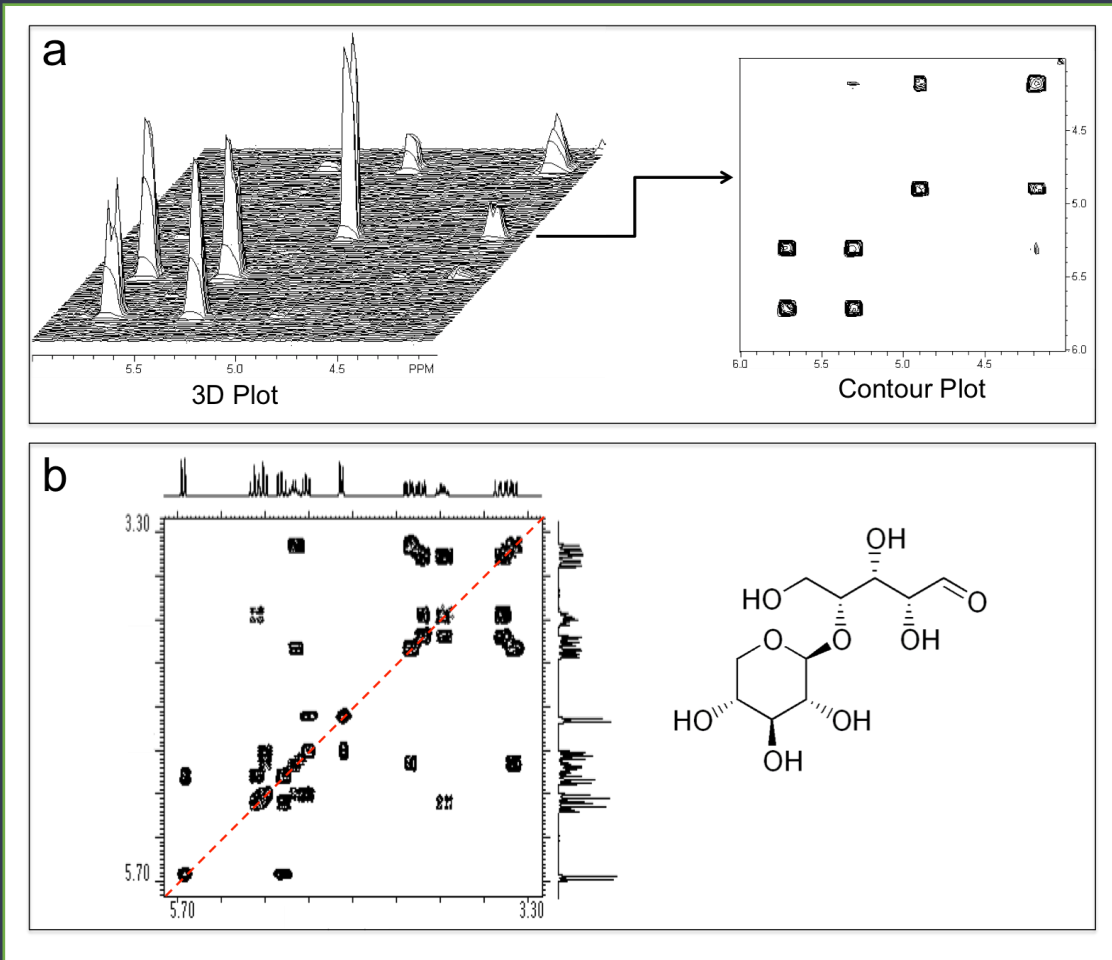


Ratio

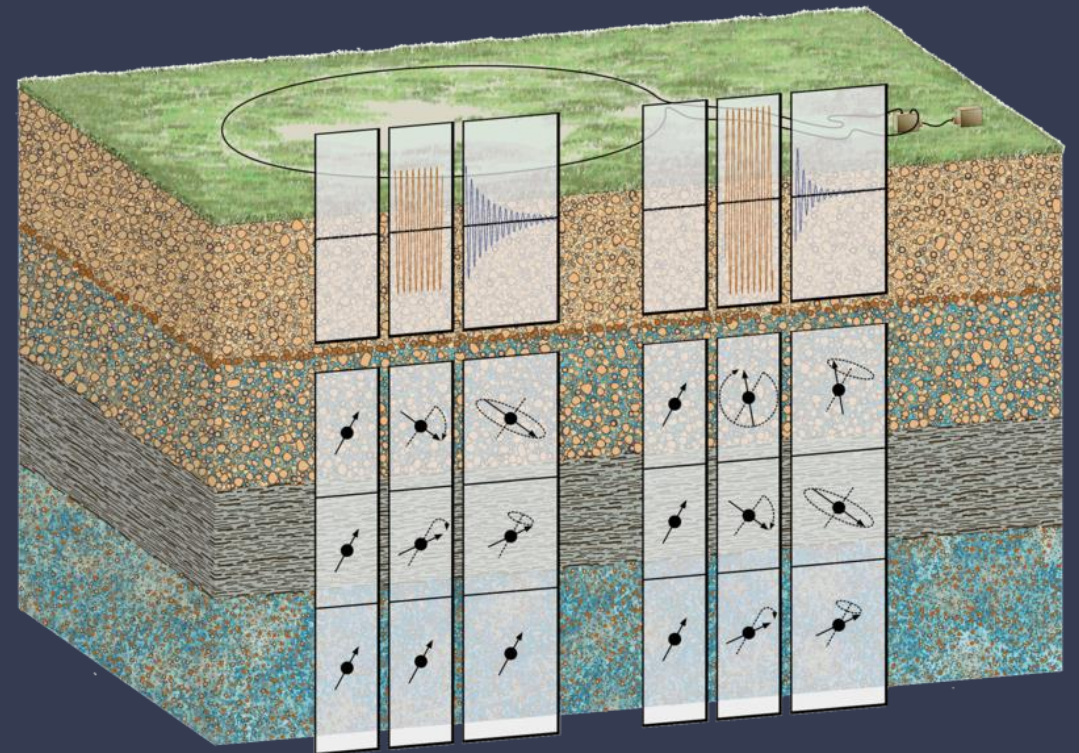


What do NMR spectra look like in real research?

COSY – 2D NMR



Magnetic Resonance Sounding



Reading list:

Using NMR to detect liver failure

<https://news.mit.edu/2020/fatty-liver-tissue-sensor-1130>

Surface NMR for volcano studies

<https://pubs.er.usgs.gov/publication/70156135>

2 dimensional NMR (COSY)

https://en.wikipedia.org/wiki/Two-dimensional_nuclear_magnetic_resonance_spectroscopy