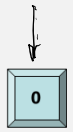
[TP] Which of the following contains the smallest number of atoms? For now, just make an educated guess.

19% 1. 187 g of liquid mercury, Hg
20% 2. 1400 u of uranium, U
25% 3. $6 \times 10^{24}$ atoms of sodium, Na
36% 4. 2 mol of hydrogen gas, $H_2$

TurningPoint Session ID
613829 //

61 of 187

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# Lecture 1 CH131 Fall 2020

Thursday, September 3, 2020

- Course overview
- Academic conduct
- What we will cover and how to master it
- Dimensional analysis and significant figures

Begin Ch1: The atom in modern chemistry
- Periodic table: Master key to chemistry

Next: Isotopes → atomic weight; Chemist's dozen: The mole; Example problems; Ch 2: Chemical formulas, equations, and reaction yields

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## Course overview

The course is given by

Lecture: Dan Dill (dan@bu.edu)

Discussion: Matt Rotondaro (mattroto@bu.edu) and Reilly Brown (rosadche@bu.edu)

Lab: Alex Golger (golger@bu.edu)

Matt: TR 10am
Reilly: T 2:30pm
W 9:00am

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## Website and Blackboard

The course syllabus website is

http://genchem.bu.edu/ch131-fall-2020/

The course Blackboard is "CH131 Fall 2020" at https://learn.bu.edu

This course is given entirely online, using Zoom and links to all Zoom meetings are at the "Zoom links" tab on Blackboard.

How to access the Zoom links is detailed at

http://genchem.bu.edu/ch131-fall-2020/syllabus.html#online

https://bostonu.zoom.us

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## Lectures

Lectures are Tuesday nd Thursday 8-9:15am (GMT-4)

The first lecture is today.

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## Discussions

Discussions are Monday, Tuesday, or Wednesday

The first discussion is Tuesday, September 8.

Next Monday's discussions will meet tomorrow, Friday, September 4:

B1: 2:20 -1:10pm GMT-4 (with Reilly)

B2: 1:25 - 2:15pm GMT-4 (with Reilly)

B3: 2:00 -2:50pm GMT-4 (with Matt)

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## Labs

Lab detail is provided in

"Lab content" section of our course on Blackboard

The first lab lecture is Tuesday, September 8, 12:30am GMT-4

The first online lab is the week of September 14

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## Quizzes and final exam

There will be five lecture quizzes, on

Thursdays, beginning September 17, 8:00-9:15am GMT-4

The final exam date and time has yet to be determined by the registrar

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## Course grade

Course grade is based on your overall course score

http://genchem.bu.edu/ch131-fall-2020/syllabus.html#grading

| Contribution to overall course score | |
|---|---|
| Quizzes (lowest score dropped) | 50% |
| Final exam | 20% |
| Lab | 15% |
| Lecture participation | 10% |
| Discussion participation | 5% |

Your scores for each part of the course will always be available to you on Blackboard, at https://learn.bu.edu

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## Lecture participation

Questions asked during each lecture are answered using the

TurningPoint mobile app

To receive credit, you must have an account using your bu.edu email address and have purchased a subscription,

http://genchem.bu.edu/ch131-fall-2020/syllabus.html#materials

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## Office hours

Discussion: Please see the "Zoom links" section of Blackboard for office hour times and Zoom links.

Lecture: Please email me at dan@bu.edu times you would find convenient and I will then select times accordingly.

Reilly: Tues 2:30pm
Wed 9:00am

Matt: Tues 10:00am
Thurs 10:00am

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## Other questions?

Please refer to the course website

http://genchem.bu.edu/ch131-fall-2020/

and the Piazza discussion forum

https://piazza.com/bu/fall2020/ch131fall2020/

Questions of a personal or private nature to dan@bu.edu

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## Academic conduct

You are bound by the provisions of the Academic Conduct Code,

http://genchem.bu.edu/ch131-fall-2020/syllabus.html#academicConduct

It is the responsibility of every student to be aware of the Academic Conduct Code's contents and to abide by its provisions.

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## Academic conduct

The shift to online assessment required by to COVID-19 pandemic means that if you decide to cheat, no one will prevent you.

On all assessments, if you use the internet, chat, messaging, video calls, Chegg, and similar resources, you are cheating; please do not do so.

If it is determined that you have cheated, it will be treated with zero tolerance.

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## What we will learn

We will cover portions of the chapters 1—3 and 9—17 and related problems of Oxtoby et al., 8e

The required assigned problems are at

http://genchem.bu.edu/ch131-fall-2020/syllabus.html#lecture

Your singular focus should be to master them.

The better you do so, the better you will do in this course.

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## How to approach our course

- The royal road to success is completing each assigned problem, http://genchem.bu.edu/ch131-summer-1-2020/syllabus.html#lecture
- Do the problems following the lecture schedule. For example, all chapter 1 and appendix A problems should be completed before the second lecture.
- Use worked examples in text for detailed guidance and practice.
- Record your problem solutions in your problem notebook, in full detail, including units at each step.
- Some assigned problems or similar will be on each quiz.

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## Let's begin

Essential in solving problems in this course is dimensional analysis and proper accounting for significant figures.

Let's illustrate these with the following problem.



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## Time, distance, and speed

Google says the speed of light (in a vacuum) is 299 792 458 m/s.

Google says the star Betelgeuse is 700 ly (light years) from Earth.

How far away is Betelgeuse, in km (kilometers)?

$$1\ \text{ly} = \frac{299792458\ \text{m}}{\text{s}} \times \frac{3600\ \text{s}}{\text{hr}} \times \frac{24\ \text{hr}}{\text{day}} \times \frac{365.25\ \text{day}}{\text{yr}} \times 1\ \text{yr}$$

$$= 9.4607 \times 10^{15}\ \text{m}$$



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## Time, distance, and speed

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## Time, distance, and speed

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See https://en.wikipedia.org/wiki/Light-year as a check.



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## Time, distance, and speed

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$$\text{distance} = 700\ \text{ly} \times \frac{9.4607 \times 10^{15}\ \text{m}}{\text{ly}} \times \frac{\text{km}}{1000\ \text{m}}$$

700 = 7 × 10²
700. = 7.00 × 10²
× 6 6 → 7



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## Time, distance, and speed

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$$\text{distance} = 700\ \text{ly} \times \frac{9.4607 \times 10^{15}\ \text{m}}{\text{ly}} \times \frac{\text{km}}{1000\ \text{m}} = 7 \times 10^{15}\ \text{km}$$

① multiplication, division
② addition, subtraction
③ log, antilog.



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Periodic table: The Rosetta Stone to chemistry



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PERIODIC TABLE OF THE ELEMENTS

20.1797 g

22 Ne
21 Ne
20 Ne





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## Periodic table: The master key to chemistry

A ← mass number
X ← chemical symbol
Z ← atomic number

Z = # of protons = # electrons
A = # of protons + # neutrons
= Z + N
N = A − Z

17
Cl
Chlorine
35.453

electron cloud



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Isotopes → atomic weight



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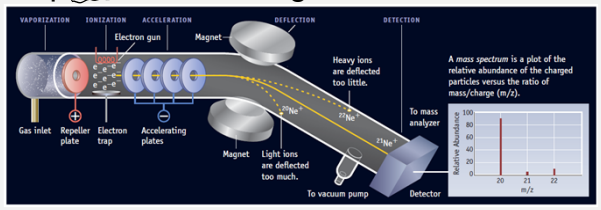
## Mass spectrometer "weighs" atoms




Strip away an electron, accelerate positive ions, and then deflect them in a magnetic field.

$^{20}_{10}Ne$ $^{21}_{10}Ne$ $^{22}_{10}Ne$



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