[TP] If all of the air in SCI/109 were condensed to liquid, how many 5-gallon containers would be required to hold the liquid air?
This is just an initial guesstimate ( no "wrong" answer! )

20% 1. Much less than 1
20% 2. About 1
20% 3. About 5
20% 4. About 10
20% 5. Much more than 10



# Lecture 1 CH101 A1 (MWF 9 am)

Wednesday, September 7, 2016

For today ...

- Review of some course details
- Air in SCI/109

Next lecture: Continue ch2: Atomic mass unit u; isotopes → atomic weight; Chemist's dozen: The mole



## CH101 General Chemistry 1 overview

- quantum.bu.edu/courses/ch101-fall-2016
- Dan Dill (and Binyomin Abrams and Rosina Georgiadis)
- My office hours Tuesday and Wednesday, 4–5 pm in SCI/200B Atrium Area (see item 10 at http://www.bu.edu/today/2016/tips-for-new-students-on-campus/ !)





## No electronic devices

Except for your calculator and clicker, we require that no electronic devices (cell phones, computers, tablets, etc.) may be used in lectures, discussions, and labs.

We do this to help you get the greatest benefit you are able to during classes

## When things start

- Labs start week after next
- Lab lectures start next week
- Discussions start this week

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## Exams

- Exam 1, Monday, September 26, 5:15–7 pm
- Exam 2, Tuesday, October 31, 5:15–7 pm
- Exam 3 Monday, November 21, 5:15–7 pm
- Lab exam, Monday, December 12, 5:15–7 pm
- Final exam on Tuesday, December 20, 6–8 pm

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## No makeup exams! Missed exams count as 0

Exam 3: Monday, November 21, 5:15–7 pm only!

Final exam: Tuesday, December 20, 6–8 pm only!

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## Academic conduct

You are bound by the provisions of the academic conduct code,

http://goo.gl/k78iy

We treat cheating with zero tolerance.

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## Scheduling questions

For discussion, please contact Natalya Bassina

nbassina@bu.edu, Room SCI/270A, Wednesday (today) 1–5 pm

For pre-lab lecture and lab, please contact Alex Golger

golger@bu.edu, Room SCI/270C, Thursday (tomorrow) 2–4 pm





## Goal is to do our best

How to approach our course?

- Review, rewrite, fill in each lecture (annotated online), making sure all is clear.
- Use worked examples in text for detailed practice.
- Complete each week's discussion plan over the weekend, bringing what is unclear to study groups and office hours.





## How to approach calculations

A key skill you will develop in this course is understanding what is needed to be done, and then carefully carrying it out.

Let's illustrate this by working through the two problems.





## How many atoms could be packed in SCI/109?

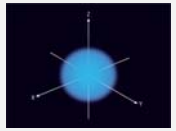
The stuff of our world is made of atoms

Really small: $\approx 10^{-8}$ cm diameter (http://en.wikipedia.org/wiki/Atomic_radius)

Assume tightly packed (like a solid or a liquid)

Assume atoms are cubes, $10^{-8}$ cm on a side

Assume SCI/109 is 10 m wide, 5 m high, 40 m deep





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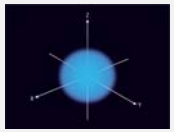

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(http://en.wikipedia.org/wiki/Atomic_radius)

Assume tightly packed (like a solid or a liquid)

Assume atoms are cubes, $10^{-8}$ cm on a side

Assume SCI/109 is 10 m wide, 5 m high, 40 m deep

Answer: $2 \times 10^{+33}$ atoms





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## Liquid volume of the air in SCI/109

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Volume of room & density of air → mass of air

Mass of air & density of liquid air → volume of liquid air





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Mass of air = 2408 kg





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Mass of air & density of liquid air → volume of liquid air

Air composition by mass is
75.5% $N_2$, 23.2% $O_2$, and 1.3% Ar (Google)

Liquid densities are
0.808 g/cm$^3$ $N_2$, 1.141 g/cm$^3$ $O_2$, 1.3954 g/cm$^3$ Ar (Google)

To keep the calculation simple, let's assume air density is about 1 g/cm$^3$





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