


Lecture 1 CH101 A1 (MWF 9:05 am) Fall 2017 Copyright © 2017 Dan Dill dan@bu.edu

**[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



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Lecture 1 CH101 A1 (MWF 9:05 am)  
 Wednesday, September 6, 2017

For today ...

- Review of some course details
- How many atoms could be packed in SCI/109?
- Liquid volume of gas particles in SCI/109?


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

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## CH101 General Chemistry 1 overview

- [quantum.bu.edu/courses/ch101-fall-2017](http://quantum.bu.edu/courses/ch101-fall-2017)
- Dan Dill (and Binyomin Abrams and Rosina Georgiadis)
- Piazza forum: [piazza.com/bu/fall2017/ch101fall2017](http://piazza.com/bu/fall2017/ch101fall2017)
- Office hours in SCI/200B (Atrium Area); see [quantum.bu.edu/courses/ch101-fall-2017/help.html](http://quantum.bu.edu/courses/ch101-fall-2017/help.html); me TW 4 pm



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## 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.


All together now, let's put our phones in **airplane mode**, and then **put them away!**

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## When things start


- Labs start **week after next**
- Lab lectures (pre-labs) start **next week**
- Discussions start **this week** (tomorrow and Friday)

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## Exams

- Exam 1, Monday, October 2, 6:30–8:30 pm
- Exam 2, Monday, October 30, 6:30–8:30 pm
- Exam 3 Monday, November 20, 6:30–8:30 pm
- Lab exam, Monday, December 11, 6:30–8:30 pm
- Final exam on Tuesday, December 19, 6–8 pm


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## No makeup exams! Missed exams count as 0

**Exam 3: Monday, November 20, 6:30–8:30 pm only!**

**Final exam: Tuesday, December 19, 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 (with your class schedule)**

[nbassina@bu.edu](mailto:nbassina@bu.edu), Room SCI/270A, **Wednesday (today) 1–3 pm**

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

[golger@bu.edu](mailto:golger@bu.edu), Room SCI/270C, **Wednesday (today) 1–3 pm**



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## Goal is to do our best

How to approach our course?

- Each lecture: **Review, rewrite, fill in gaps** (annotated online), making sure all is clear.
- Use **worked examples in text** for detailed practice.
- Use **text index** to locate material about which you have questions.
- **Complete each week's discussion plan over the weekend**, bringing what is unclear to study groups and office hours.



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## 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 two problems.



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



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

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

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

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?

Let's make an initial guesstimate (no "wrong" answer!)




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### Liquid volume of the air in SCI/109

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?

Volume of room & density of air → mass of air  
Mass of air & density of liquid air → volume of liquid air

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### Liquid volume of the air in SCI/109

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?

Volume of room & density of air → mass of air  
**Density of air at 20 °C is 1.2041 kg/m<sup>3</sup> (Google)**

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### Liquid volume of the air in SCI/109

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?

Volume of room & density of air → mass of air  
Density of air at 20 °C is 1.2041 kg/m<sup>3</sup> (Google)  
Mass of air ≈ **2400 kg**

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