Principles of Chemistry I

Instructor: Andrew W. Aspaas (you can call me Andy)
Email: andrew.aspaas@anokaramsey.edu

- **Course webpage:** http://webs.anokaramsey.edu/aspaas/1061
  - Blank notes (print and bring)
  - Completed notes after class
  - Audio/video
  - Syllabus/Handouts/Practice worksheets
- **D2L**
  - Login from course webpage or AR homepage
  - Discussion participation required - start by introducing yourself - at least 1 post per chapter for credit
  - Grades, lab report submission, etc.
- **Metnet Email:** sign up from link on webpage
- **MasteringChemistry** (access bundled w/ text or available from http://www.masteringchemistry.com)
- **Non-programmable calculator** for final exam

In your group, read the appropriate section of the syllabus, discuss it with your group members, and have one representative summarize it for the class.

1. Required and optional materials

2. Academic civility (respectful, responsible, rise to the challenge)

3. Lab

4. Homework, quizzes, and discussion boards

5. Exams

6. Studying

Think of something important to you - a hobby, a career plan, an event, etc. and consider how chemistry is related to it.

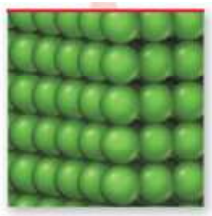
Beyond chemistry - scientific literacy:

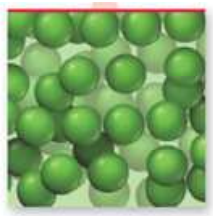
Why is it important that people learn about science in general?

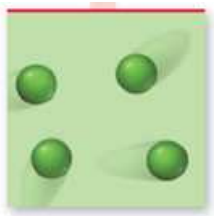
What are some important qualities of science that people should be aware of?

Matter has:

The physical states of matter:

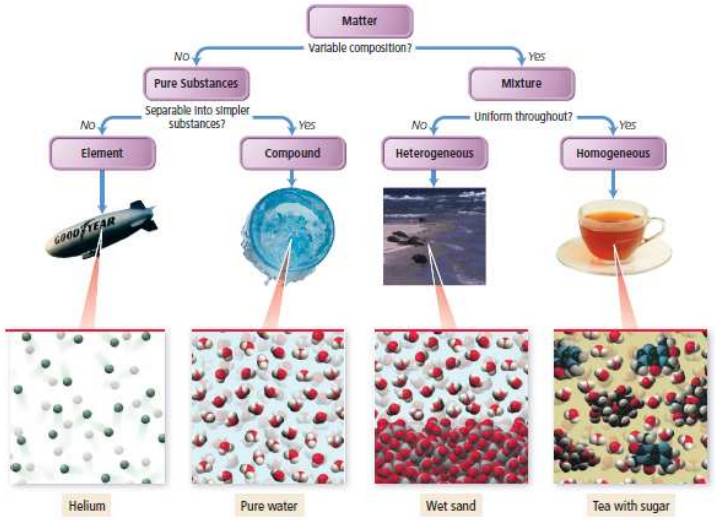






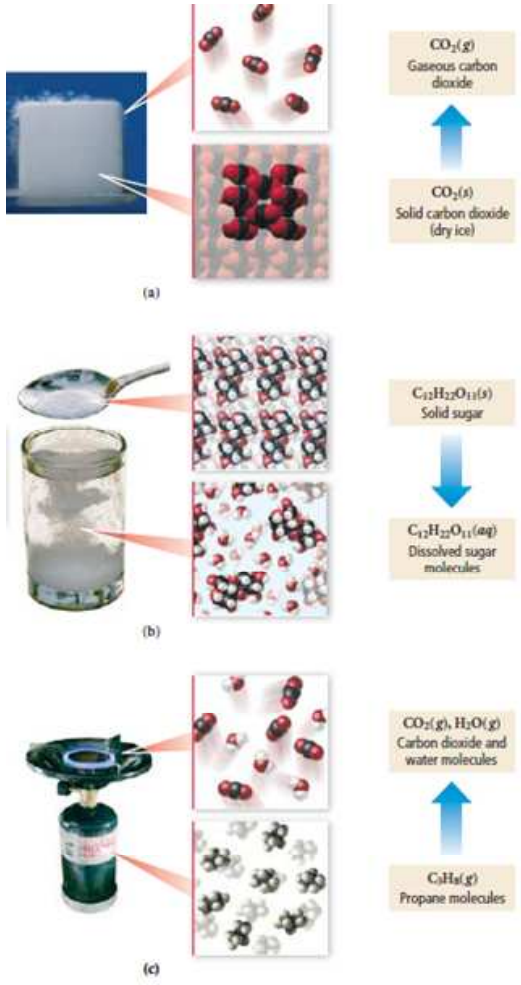
	Rigid/ Fluid?	Compressible?	Molecular view
Solid			
Liquid			
Gas			

Types of matter



sugar
iron
carbon dioxide
saltwater
gravel
Kool Aid powder
Mixed Kool Aid
vodka
tap water
deionized water

Physical and chemical changes



Work

Potential energy

Kinetic energy

Thermal energy

Chemical energy

SI Units:

Quantity	Unit	Symbol
length	meter	m
mass	kilogram	kg
time	second	s
temperature	kelvin	K

Temperature is the measure of:

Units: **K scale**

°C scale

Converting K and °C:

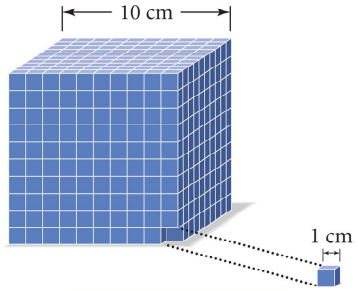
$$K = {}^{o}C + 273.15$$

°F scale:

$$^{o}F = \left(^{o}C \times \frac{9\ ^{o}F}{5\ ^{o}C}\right) + 32$$

Prefix	Symbol	Decimal Equivalent	Power of 10
mega-	M	1,000,000	Base x 10^{6}
kilo-	k	1,000	Base x 10^{3}
deci-	d	0.1	Base x 10^{-1}
centi-	c	0.01	Base x 10^{-2}
milli-	m	0.001	Base x 10^{-3}
micro-	µ or mc	0.000 001	Base x 10^{-6}
nano-	n	0.000 000 001	Base x 10^{-9}
pico	p	0.000 000 000 001	Base x 10^{-12}

Volume



A 10-cm cube contains 1000 1-cm cubes.

Density

D =

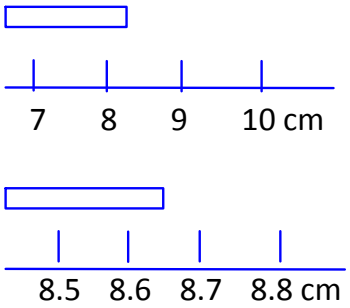
TABLE 1.4 The Density of Some Common Substances at 20 °C

Substance	Density (g/cm^3)
Charcoal (from oak)	0.57
Ethanol	0.789
Ice	0.917 (at 0 °C)
Water	1.00 (at 4 °C)
Sugar (sucrose)	1.58
Table salt (sodium chloride)	2.16
Glass	2.6
Aluminum	2.70
Titanium	4.51
Iron	7.86
Copper	8.96
Lead	11.4
Mercury	13.55
Gold	19.3
Platinum	21.4

Density is an **intensive property**

If an object has a mass of 14.3 g and a volume of 7.81 mL, what is its density in g/cm^3?

Reliability of measurements



Accuracy: "correctness"

Precision: "repeatability"

Significant figures

In a proper **measurement:**

Significant:
- All nonzero digits
- Trapped zeroes
- Trailing zeroes **IF** there's a decimal point

Not significant:
- Leading zeroes
- Trailing zeroes **IF** there's **NO** decimal point (assumption)

0.01020 cm

42,000 cm

42,000. cm

4.20×10^4 cm

Multiplying or dividing: Round answer to measurement with least number of **sig figs**

$$\frac{2.83\ \text{g}}{1.3\ \text{mL}} =$$

Adding or subtracting: Round answer to least number of **decimal places**

12.3 cm + 1.24 cm =

Combination calcs: only round **once** at the end

$$\frac{12.34\ \text{g} + 1.3\ \text{g}}{14.896\ \text{mL} - 2.45\ \text{mL}} =$$

By definition, 1 in = 2.54 cm (exactly)

Possible conversion factors:

How many centimeters are in 4.358 inches?

Express 148 µm in kilometers.

Express 0.0031 Mg in ng

Units raised to powers

How many cubic inches (in^3) are in 280. m^3?

Identifying conversion factors

A certain drug contains 124 mg active ingredient in 1.00 mL solution. If a patient needs 42.5 mg of the ingredient, how many microliters (µL) should be given?

Mercury has a density of 13.6 g/mL. What is the mass in milligrams of a 16.4 microliter droplet of mercury?