Reading for CHEM 105
→ try to keep ahead of the course
→ reading a little at a time may help
→ take notes, write down questions
→ Review your Qs after lecture, ask
→ Check Learning Goals

Homework
→ Required Format Handout
  → Goal is to improve learning & promote reusability of work
  → Some points off for rules/format
    ▶ Engineering required
    ▶ Nursing → “clarity”

HW Due Dates

- per syllabus: Monday after we finish a unit.
  e.g. ① we finish Unit 1 today
       ▶ HW (6 problems) due next Monday
  ② we should finish Unit M next Monday
       ▶ HW due on Monday, Oct 7
  ③ we should also finish units A & Q next week.
      ▶ These are also due Oct 7
There are many problems to do (ugh!)
- start early
- pre-read book for lecture
  - mastering material leads to easier HW time understanding
- Chem 100 is 5 credits
  as a rule, spend 1-4 hours outside of class per week, per credit
  ⇒ 5-20 hours per week!

Early Chemists

- 100 AD → Greek Philosophers: study the world through reason
- 1500 AD → Alchemists
  - tried to "change less valued substances into precious ones"
  - matter strives toward perfection
  - turn lead into gold (paint a lead rock)

Accomplishments
- chemical methods for distillation, percolation, extraction
- developed culture of observation & experimentation
- confused everyone else.

"The Alchemist" by Paulo Coelho
Old Chemists (cont.)

- Alchemists: Explain Burning
  - Burn wood $\rightarrow$ Ash, heat, smoke
    - What happened to missing weight?
      - Loss of phlogiston
      - Related to the force & purity of an object
      - Explains lost mass
  - Burn candle under a jar?
    - Burns for awhile, goes out
    - Burns longer, goes out
      - Air must absorb phlogiston, flame dies when air is full
  - Burn phosphorus
    - Ash weighs more
- if phosphorus ash is heavier, what about phlogiston?
  \[ \text{theory is bad} \]
  \[ \text{Hg evidence too} \]

- we now know that burning is:

\[ \text{fuel} + \text{O}_2 \rightarrow \text{CO}_2 + \text{ash} \]

(oxygen from air)

**Scientific Method**

- Lavoisier's work involve a theory \[ \rightarrow \text{are we sure?} \]
  - an experiment \[ \rightarrow \text{did it work?} \]
  - new theory \[ \rightarrow \text{new test} \]

- Who memorized the "Scientific Method"?
- official sci. method?

**Simple Version**

- Observation

  \[ \text{Hypothesis} \]
  \[ \text{Theory} \]
  \[ \text{Law} \]

- Skepticism
  - Testing
  - Revising
Draw pictures in your notes for the following:

Draw the element Hydrogen as a capital H. Draw Oxygen as a capital O. Water the chemical compound (dangerous - drowning hazard) consists of two hydrogen atoms and one oxygen atom. Use a line connection two atoms to show that they stick together.

Picture 1: Oxygen is in the center and the two hydrogens stick to it in a V shape.
Picture 2: Since the water "molecule" (the 3 atoms) can move around, it might be upside down or sideways without changing how it works.

Sometimes we represent the atoms as balls (or circles on paper) with the letter from above. The oxygen atom is bigger than the hydrogen atom.

Picture 3: Redraw water using the new representation (balls/circles).

Review how it worked out:
  Compare what you drew with what I draw.
  Have you done this before?
  Which way would be fastest to write?