Labs and recitations will begin during the week of August 23rd.

Before lab,
1) read the introduction and Exp. 1 in the lab manual.
2) get your safety eyewear and “chemistry lock”.
3) get your apron (if you want one).

You will not be allowed to work in lab without safety eyewear and closed shoes.

The first homework assignment has been posted on the WEBpage.
The pages listed are taken from the textbook.
Answers for the assignment are due on Monday, August 23rd.
Show you work and put your name and section designation on your paper.
HW papers will be returned to you in recitation.
QUESTION?

If you divide copper foil over and over again, what will you find when you can’t divide any more?

Democritus: You will find an atom of copper.

Other Greek philosophers:

Eventually, you will find the basic elements of all matter:
Earth, Air, Fire, and Water
Dalton’s Atomic Theory

1. All matter is composed of solid, indivisible atoms.

2. All atoms of a given element have the same properties (shape, color, mass, etc).

3. Each element has its own characteristic atoms (i.e., atoms of nitrogen differ from atoms of oxygen in terms of shape, color mass, etc).

4. Atoms can not be created or destroyed. An atom of one element cannot be changed into an atom of another element.

5. The formation of a compound from its elements occurs when atoms of different elements combine to form molecules (i.e., the smallest particle of an element is an atom; the smallest particle of a compound is a molecule).
Why did Dalton postulate the existence of atoms?

1. Law of Conservation of Mass

   The total mass of the products of a reaction equals the total mass of the reactants.

2. Law of Definite Proportion

   All samples of a pure compound contain the same elements in the same proportion, by mass.
Although Dalton accepted the validity of these “laws”, many people did not.

Dalton needed to demonstrate that he was correct.

He needed to find the characteristic masses of the elements.

Relating mass-mass data to atomic masses:

Fourteen grams of a colorless, odorless, poisonous, gaseous compound of carbon and oxygen contain:

8.0 g of oxygen and 6.0 g of carbon

Twenty two grams of another colorless, odorless, gaseous compound of carbon and oxygen contains:

16.0 g of oxygen and 6.0 g of carbon
Nine grams of a colorless, odorless, liquid compound of oxygen and hydrogen contains:

8.0 g of oxygen and 1.0 g of hydrogen

Electrolysis of water always yields two volumes of hydrogen for every one volume of water.
Avogadro’s Hypothesis: Equal volumes of gas contain equal numbers of particles if the volumes are measured under the same conditions of temperature and pressure.

Law of Combining Volumes: When two gases react, the volumes that combine (if measured at the same temperature and pressure) do so in the ratio of small whole numbers. There is also a whole number ratio between the volumes of product gas and the volumes of each reactant gas.
Shortcomings with Dalton’s Theory

1. Dalton had no way to predict which elements would combine with one another or what the likely formulas of their compounds would be.

2. Dalton could not accept the idea that atoms of the same type would combine into molecules.

3. Dalton could not explain why some compounds do not obey the Law of Definite Proportion.

4. Dalton would not have been able to explain the existence of “non-molecular” compounds.

5. Dalton did not consider that the properties of a compound might be affected by factors other than the number and type of the elements that were combined in its molecules.