

Activity Name: The Scale of Atoms - for high school chemistry **Date:** 6/20/08

Design Team: Justin Louie

Content Goals:

- Students will be able to describe the size of an atom and a nucleus relative to other common objects
- Students will be able to convert scientific notation to a decimal and different units of measurement

Process Goals:

- Students will be able to make observations through measurements
- Students will be able to compare and contrast the sizes of different objects

Attitudinal Goals:

- Appreciate the scale at which Chemistry operates and begin thinking about how we know what we know about matter
- Feel free to explore methods and ideas and revisit and revise them

Science Standards:

- Investigation and Experimentation
1.a. Select and use appropriate tools and technology...to perform tests, collect data, analyze relationships, and display data

Prior Knowledge Assumed

- familiarity with rulers and how they should be read
- familiarity with how to measure objects and what scale can/should be used

Lesson Outline: What the students do

1. Show rulers (metersticks and 12 in rulers) --> discuss what they are and how they are used
 - a. Have students measure various objects of very different sizes. Do not have a discussion about units --> let students try out measuring for themselves
 - b. Have a discussion about how students measured their objects and how they recorded it --> this can be used as an assessment regarding students' prior knowledge on measuring using rulers. Have students do conversion WS.
2. Have students participate in card sort to the best of their ability
 - a. Show some videos to give a better sense of scale.
 - i. blue diamond cutting video
 - ii. scale video/flash (Cells Alive How Big? or Strange Matter Exhibit Zoom In --> discuss arrangement of atoms
 - b. Have students revise their card sort and discuss results
 - c. Possible follow-up --> How do we view/visualize atoms at these sizes? Discuss STM

Describe how the activity components achieve your goals:

- Students will use and apply what they know about rulers and measuring to record some observations and will revisit those measurements and the methods they used to do it
- Students will compare different objects --> from humans all the way to atoms and particles

Assessment methods:

- Conversions WS = note how students made original measurements and how they changed them
- Arrangement of scale cards before and after --> written on a WS

When would you integrate this into your curriculum?

- In the beginning of the year to help students develop quantitative measuring skills and conversion skills