

Science Afternoon at NIST –
Water, Water Everywhere: How Can We Understand It?
given by Dr. Chandler Becker on Wednesday, March 16, 2011

Chandler is a Materials Research Engineer in the Metallurgy Division in the Material Measurement Laboratory of NIST.

http://www.nist.gov/mml/metallurgy/thermodynamics_kinetics/chandler_becker.cfm

Additional Resources:

1) The slides are attached as a PDF - I just tried a couple of links and they work!

2) Dick Calvert and his son Will were with us this evening. Dick mentioned working with Dave Ross on detection of kRas proteins using Gradient Elution Moving Boundary Electrophoresis; I've attached a recent paper on that technique which Dave Ross invented and which we here at NIST are finding multiple ways to use.

3) Here are some good links to internet resources about water from 3D molecular designs (the people who make the water kit)

<http://www.flixxy.com/water-drop.htm> video of a water drop in slow motion with an explanation of why the water drops 'bounce'

http://ngm.nationalgeographic.com/ngm/0405/resources_who.html National Geographic - Ties that Bind: article about hydrogen bonds and how those give water some of its stranger properties

<http://ga.water.usgs.gov/edu/capillaryaction.html> Capillary action demo with celery and red food coloring; lots of other water resources at USGS

4) And I was thinking more about what I used to do with water when I taught. Here's a few I remember; let me know if you'd like more explanation:

- Effect of static electricity on water flow: show with flow of water and balloon rubbed on hair.
- Challenge participants to float a paperclip on a glass of water (use clear plastic cups); have some cups of water contaminated with dish detergent (dot on bottom of cup so you can remember which is which!).
- Convection demo with babyfood jars and hot/cold water: put food coloring in cold water
- Electrolysis of water: http://www.energyquest.ca.gov/projects/split_h2o.html
- Brownian motion:
<http://www.physics.emory.edu/~weeks/squishy/BrownianMotionLab.html>

5) You might not be aware, but this is apparently the [International Year of Chemistry](#).

'Chemistry Now' Video Series Brings Science to Students

http://blogs.edweek.org/edweek/curriculum/2011/01/new_video_series_chemistry_now.html

January 24, 2011

To help celebrate, NBC Learn, the educational arm of NBC News, and the National Science Foundation have teamed up to launch a weekly online video series targeting teachers and students. The videos aim to uncover and explain the science of common physical objects and the changes they undergo each day, according to a [press release](#) on the initiative.

Topics in the "Chemistry Now" series will include the chemistry behind cheeseburgers and chocolate, soap and plastics. The series will also highlight the lives and work of scientists "on the frontiers of 21st century chemistry," the announcement says.

The videos, available [online](#) for free, will be matched with lesson plans from the [National Science Teachers Association](#).

First lesson is on water!

6) We used a modeling kit from 3D Molecular Designs
<http://www.3dmoleculardesigns.com>

Note that commercial equipment, instruments, or materials identified in our program material or on this website are only meant as examples to specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor imply that the materials or equipment are necessarily the best available for the purpose

7) Here are some pictures from that evening:



Dr. Chandler Becker began by talking about her background and the work she does at NIST. The picture in the slide is from her graduate work in which she studied the interface between the two materials shown.



After an introduction to computer simulations and the need for physical models also, teachers put together physical models of water and investigate their usefulness.



One of the best things about attending a Science Afternoon at NIST is the opportunity to try out new activities and materials that can be used in the classroom, that are directly related to research in the lab. The Science Afternoons bring a blend of research and hands-on activities, and are designed to connect scientists and engineers in the laboratory with teachers and students in the classroom.



This time we had a group of three teachers from the same middle school, which makes possible sharing the resources across grades and classrooms and increases the impact.



Another advantage of the Science Afternoons is the opportunity to spend time one-on-one with NIST scientists, who are eager to share what they know with the educational community. Many NIST scientists are involved in educational outreach activities, such as Adventures in Science (<http://montgomery.umd.edu/AdventureInScience/index.cfm>), a program for children ages 8-14 held on Saturday mornings at NIST October through March and led by NIST scientists, including Chandler.