Meeting Videos and Handouts from March 2011

INSTRUCTIONS ON PRINTING DOCUMENTS - after opening a document click the "File" button in the blue task bar under "Google docs" - e-mail me if you have any trouble. Janelle Hollingshead (jlarendt@cps.edu)

A big thanks goes out to Paul Brant for hosting the 6th Annual Demo Night March 3rd 2011 at North Central College.

Janelle Hollingshead from Lane Tech High School: (jlarendt@cps.edu)

- I presented my class blog that I am very proud of. (Click here to see my blog) It has helped me keep in close contact with parents and students and it only takes about 5 minutes a day to update. I post announcements, worksheets, notes, and instructional videos. If you visit my blog scroll down and click on the various links under "categories" This is the part that keeps the blog organized. Also look to the top and click on the tabs I have. If you would like to build one for yourself then e-mail me and I will walk you through it. (Click for instruction on how to build a blog) Every teacher should have one and I promise you it is EASY!

Branson Lawrence, Illinois Math and Science Academy

Branson shared with us the "Knock your socks off apparatus kit which makes a Carbide Cannon (Click here for handout)

(Picture1 - preparing the carbide) (Picture 2 - preparing the sock) (Picture 3 - attaching carbide in the bottom to the tube) (Picture 4 - all set to go)

- Quoted from the Flinn handout - "Use this apparatus to construct a safe "carbide cannon" - the projectile is a sock! The carbide cannon is an exciting yet controlled way to demonstrate the reaction of calcium carbide with water and the explosive nature of acetylene." There is a lot of safety information that go along with this apparatus so I don't feel comfortable summarizing how to do it.
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- Video of the carbide Cannon

- Click here to order the Carbide Cannon

Lee Marek UIC Department of Chemistry SEL: (lmarek@fnal.gov)

http://www.chem.uic.edu/marek/

Lee presented a thaumatrope which is a toy which shows how cis and trans isomers effect vision. (Click here for the entire handout)

(Click here for a video) (Picture 1 - Persistence of vision) (Picture 2 - noble gas in a buckyball)

Summary:

- “A thaumatrope is a toy that was popular in Victorian times. A disk or card with a picture on each side is attached to two pieces of string. When the strings are twirled quickly between the fingers the two pictures appear to combine into a single image due to persistence of vision. While the thaumatrope is spinning, the first image (front side) is seen by the eyes and a signal is sent to your brain. A fraction of a second later the second image (back side) is seen by the eyes and that signal is also sent to your brain. The first image, however, is still in the brain when the second arrives. Image one is an afterimage. An afterimage is thought to persist for approximately one twenty-fifth of a second on the retina, the light sensing tissue in your eye. Your brain sees both pictures as one picture putting the two pictures together.

- Now for the chemistry part: Your retina contains millions of molecules of retinal, $C_{20}H_{28}O$, incorporated in a protein. Retinal has *trans* and*cis* isomers- see page attachment diagrams. Light reflected from one side of the paper thaumatrope hits the *cis*-retinal molecules in one area of your retina and is quickly converted to the *trans* form while triggering an image in your brain. The *trans*-retinal form persist for a fraction of a second as the other side of the paper comes into view. Light reflected from the new side hits a different part of the retina, repeating the process. The persistence of one image while the other appears creates an illusion as if all three words "persistence of vision" were together. Your brain perceived this motion as a blending of the images. This is the same process that occurs when you watch movies, flip through flipbooks, or watch television.

- In the handout he has instructions on how to build two thaumatropes.......one that shows a noble gas in a buckyball!

Sue Bober, Schaumberg High School

Sue presented a fun polar vs nonpolar art project, a poly density bottle, and salting out (Click here for Mission Immiscible activity)

- Marbling paper is a fun art project that shows characteristics of polar and non polar substances. First fill a tray with non polar shaving cream. Then put some polar food dye on the shaving cream and take a knife to cut through the shaving cream. Finally, put on some polar paper on top. You will see that the polar food dye sticks to the paper but the shaving cream does not. Click here to see a video of how to marble paper using shaving cream (Click here for the hand out)

(Picture1 - setting up the shaving cream) (Picture 2 - final product)

- Next Sue presented a poly density bottle. (click here for the poly densitry bottle handout) This is from the hand out - When a 1 L bottle is shaken, the blue and white beads mix within the liquid as expected. However, when allowed to settle the beads separate, white at the top and blue at the bottom. Shortly, the two separated colored beads slowly come together until they meet in the center of the liquid, which on top of blue. It is curious to see beads floating half way in a liquid. The mixing and separating can be observed over and over.....for the explanation see the handout. Basically when the salt water and alcohol mix the density changes so that the white beads are less dense then the solution and the blue beads are more sense. When the salt water pushes out the alcohol the alcohol is less sense then the white beads and the salt water is more dense then the blue beads.....the beads end up back in the middle. Click here to see a video of the poly density bottle (Picture 1and Picture 2 of Sue with visual aids showing the polarity of alcohol and water and why they can mix)

- Click here to order the poly density bottle (Picture after Sue shook up the poly density bottle)

- The last things Sue presented was something she called "salting out." This is from the hand-out - "While water and isopropyl alcohol are quite soluble together adding salt causes the two substances to separate into distinct layers. By adding methyl red indicator to the water the layers of salt water and alcohol become even more apparent!....if the two layers are not distinct then add more salt."

(Picture of salting out demonstration) (Picture of Sue acting out how salt likes to be with water instead of alcohol...notice the POLAR bears)

- You can get the cool magnetic water molecules from here. (Carolina's web-site)

Janelle Hollingshead, Lane Tech High School

Janelle used liquid nitrogen to cool down gases to 77K. As a result she created liquid oxygen, liquid methane, and solid carbon dioxide. The nitrogen, hydrogen, and helium stayed a gas. (Click here for the handout) (If you have any questions about how to set up this demo, if you liked this demo, if you have any ideas on how to make it better, or you have created a better handout e-mail me atjlarendt@cps.edu)

- This demonstration involves cooling down gases until some can turn into liquids or solids. You get to create liquid oxygen, liquid methane, and solid carbon dioxide. I use this demonstration to teach students about intermolecular forces (London Dispersion interactions) by observing boiling points of various gases. (helium, hydrogen, oxygen, carbon dioxide, nitrogen, and methane.) Explanation - As you increase the molecular weight of a substance (increasing the number of electrons) you start to generate more of these spontaneous temporary partial dipoles which increases the dispersion forces and therefore the boiling point" This is why helium (2e), hydrogen (2e), and nitrogen (14e) have relatively low boiling points and oxygen (16e), methane (16e), and carbon dioxide (16e) have high boiling points. These weak bonds only start to stick to each other when you cool the gas down to 77K causing the molecules to slowly pass by each other. You can first have your students look at the graph provided in the handout and predict which gases will turn into a liquid, solid, or stay a gas. Then start to talk about london dispersion forces and how non-polar molecules can be attracted to each other when electrons spontaneously and temporarily unevenly distributed.

- See what she did with liquid oxygen for fun! (Video) See what she did with liquid methane for fun! (Video) See what she did with solid carbon dioxide for fun (Video)

Joel Weiner, Evanston Township High School: (weinerj@eths.k12.il.us) (http://sp.eths.k12.il.us/weinerj/default.aspx)

Joel presented a density of gas demo that involves suspended bubbles (Click here for entire handout) (Picture 1) (Picture 2) (Picture 3)

- Density of gases demo: The CO2 produced in the reaction (baking soda + vinegar) is denser than air, and so stays in the jar. It does not diffuse out. Using drugstore soap bubble solution (or any other soap bubble solution), student blows bubbles over the jar. Another student slides the jar around so that it stays under the bubble as it begins to descend. When the bubble hits the CO2, it bounces up a bit, and then stays suspended on top of the CO2. Since the CO2 is not visible, it looks like it is suspended in air. (Video - Thanks Joel!)

Therese Youel, Cary-Grove High School

Therese presented ninja toothpicks (Click here for the entire handout) (Pictures)

- "From the handout - Water forms round beads on the wax paper due to its surface tension, and its lack of attraction for the wax paper. The clean end of the toothpick is able to attract the water droplets enough to drag them around and not break them, making it possible to make all sorts of fun patterns and motions with the droplets. Eventually, when students invert their toothpicks the soap breaks the surface tension, the water will not stay beaded any longer, and the activity is over." Video of Ninja toothpicks

Karl Craddock and Rebecca O'Dette, William Fremd High School

Karl created a great big bubble! (Click here for the entire handout) (Picture)

- "Glycerin is added to increase the time the bubble lasts. It does not actually make the bubble "bigger" but actually slows the dehydration process of the bubble. The chemical structure, C3H5(OH)3, allows for three hydrogen bonding sites with the soap bubble water molecules. This delays the evaporation rate of the water, thus allowing the bubble to stay together....his handout also explains the rainbow color seen in a bubble. (Picture - of Karl getting in the middle of the bath tub to try and make a bubble around him.)
- Video of Karl trying to make a bubble.....sorry this is the best I got because this is pretty much when my camera died but you can get the general idea.....maybe Karl can make a better video for me :)

Rebecca O'Dette presented the flaming vapor ramp:(Click here for handout) (Picture)

- Basically Rebecca showed that hexane is more dense then air by pouring the hexane gas (NOT THE LIQUID) down a ramp towards a candle. When the hexane hit the candle it caught on fire and was awesome! Be careful to pull away the flask that contains the hexane before the flame goes all the way up the ramp of your flask will also catch on fire.
- Video of the flaming ramp (Rebecca sorry my camera died....it would be great to have a video of you doing the demonstration so up load one to "you tube" if you have the time. No pressure)

Irene Cesa, Flinn Scientific

Irene shared the "Sodium Spectrum" (Click here for handout) (Picture)

- Quoted from the Flinn document - "The Sodium Spectrum" is a novel variation that is much safer to perform than the standard sodium demonstration of simply dropping a small piece of alkali metal into a beaker. It also demonstrates the colorful spectrum of colors possible with acid-base indicators." The basic idea is to put 200 mL of water in a graduated cylinder, add an indicator, and then add 200mL of oil. Once the sodium is dropped into the solution it will sink through the oil, react with the water to create hydrogen bubbles, float to the top of the oil due to the bubbles, when it reaches the top the bubbles will pop, and the sodium will sink back down through to the oil in order to react with the water again. As it bounces from the water to the oil it causes the water to become basic and the indicator begins to change color. It is really pretty. You can set up more then one cylinder to show the colors of different indicators as the sodium slowly turns the water basic. It is a slowed down reaction of sodium with water.

- You can view this demonstration as a part of one of Flinn's e-leaning videos....this is the link to a preview of the video where you can see a little of the demonstration....click on the package preview for "Acid-Base Indicators" (Click here for the e-learning video pre-view)

Mike Heinz, Niles West High School

- **Mike began by sharing "The surprising line" (Click here for handout)** From the hand out - Using this method to precipitate lead (II) iodide and lead (II) chromate allows students to analyze the process occurring. They can follow the dissolution, the migration of ions (related to size), and the precipitation reaction. You basically add KI to one side of a petri dish full of water and lead (II) nitrate to the other side. Students will be able to see that KI will dissolve faster. Then both substances travel through the water to the middle and you see the precipitate eventually form in the form of a line down the middle of the petri dish. Mike talked about how you can talk about the diffusion of ions in a solution as well as the precipitate reaction.Video of the surprising line (shows how to set it up but it doesn't show the best results) (Picture) This video shows better results for the surprising line. (Picture of Mike Hienz doing the experiment)

- **Mike made a really really small Christmas tree!** I can't find a video of the small Christmas tree sorry. Mike took a tiny piece of copper, put it on a slide, and then put that underneath a microscope. After that he added a drop of silver nitrate and, using an attached video cam, we were able to see the silver crystals grow. It looked like a Christmas tree! (Picture 1) (Picture 2) (Picture 3)

Glenn Lid, Proviso East High School (not finished..this one will take a while)

- I am still working on his video. Glenn presented a video he created from a video conference he was able to have between his students and a man in Japan who was a Hiroshima survivor. This will take a while to get on the site i think.

Paul Brandt, North Central College

Paul Brandt presented "Fountain Effect with Ammonia, Hydrogen Chloride, and Indicators (Click here for the hand out) (Picture 1) (Picture 2) (Picture 3)

- Video of a multiple ammonia fountain!

- It is hard to explain a multiple ammonia fountain unless you understand a single ammonia fountain. I am going to explain a single ammonia fountain and you can read Paul's handout to learn how a multiple ammonia fountain works. If you do not have the equipment to build a multiple ammonia fountain you might be able to build a single ammonia fountain. Watch the following videos before your read my explanation as it is hard to explain unless you know what it looks like.
- Videos of single ammonia fountains. (Video 1) (Video 2) (Video 3)
- (Paul please write a better explanation if you have one.) Basically a small amount of water is injected into an inverted flask filled with ammonia gas. The ammonia gas readily dissolves into the water creating a vacuum (lower pressure) in the flask. Another tube

connects the flask with a beaker of water and as the pressure in the flask lowers the atmosphere will push the water from the beaker into the flask. If you add an indicator to the water you will see a color change in the flask as ammonia is basic.