***Charles Mahler’s Hands-on Activities, Immaculata Week 2013***

Glue and food color with detergent hands-on activity.

1. We carefully put a thin layer of Elmer’s Glue in the bottom of a 2 ounce “jello shot cup”, but you can use plastic plates.
2. Next add a few small drops of food coloring in the center of the glue, trying not to overlap drops (in small cups, it is easy to add too much color)
3. Finally add a small amount of dish soap to the center of the glue and watch the colors slowly mix and swirl. We let a small drop of soap fall from a toothpick, I have read a Q-tip dipped in dish soap also works. Let the glue dry (usually takes a few days). Once dry, it looks like a tie-dyed ornament.
4. Can also do this using milk instead of glue – the swirling is much faster in milk.

Gloop (Glue-p) hands-on activity

1. Dilute Elmer’s glue in water in a 1:1 ratio (mix equal amounts of glue and water). Stir / mix well (I made 1 gallon of the mixture from ½ gallon glue plus ½ gallon water, mixed well and let sit overnight).
2. Put 4 spoonfuls of the diluted glue in a plastic cup.
3. You can add food coloring to the diluted glue if you want to make colored gloop.
4. Make Borax water in an 1:8 ratio (mix 1 part borax with 8 parts water). I just make a saturated Borax solution – I add somewhat more Borax than needed to the water, mix very well and let sit overnight. If the solution is saturated, there will be Borax crystals visible in the bottom of the container.
5. Stir the glue solution rapidly and add 2 spoonfuls of the borax solution to it. A glob forms that can be played with. (If you want a bigger gloop blob, use more glue and borax water in a 2:1 ratio).
6. Any extra liquid, the cup, and the spoon can be thrown away in a trash can with a good trash bag. If you want, you can pour the extra liquid into a second cup for disposal. This can be flushed down the toilet.
7. The gloop can get into carpet and fabric so be careful playing with it. Store in a Ziploc bag.

***Charles Mahler’s Chemistry Demonstrations, Immaculata Week 2013***

Silver Tree: Hang a piece of copper wire from a support (glass stirring rod or toothpick) into a beaker with dilute silver nitrate solution in it. Over time the wire darkens and then has silver “whiskers” growing on it, while the solution goes from colorless to blue (from the Cu2+ ions).

Cu (s) + 2 AgNO3 (aq) 🡪 Cu(NO3)2 (aq) + 2 Ag (s) OR, showing the ions in solution

Cu (s) + 2 Ag+ (aq) + 2 NO3- (aq) 🡪 Cu (aq) + 2 NO3- (aq) + 2 Ag (s) OR, focusing on metals

Cu (s) + 2 Ag+ (aq) 🡪 Cu2+ (aq) + 2 Ag (s)

Potato Clock / Potato Battery:

I used a store-bought “potato clock”, though I dropped it on the way into the building and the LCD clock no longer worked. Home-made examples can be made which use pennies and aluminum foil and other fruits and vegetables.

Exploding Pringle’s Can:

For the first several groups I did this in person, then the tank I had ran out of hydrogen and I showed a video instead. In the exploding Pringles can demonstration, burning hydrogen gas with oxygen from the air makes water. The flame burns steadily at first above the lid, then as it enters the can through the hole, a radical reaction leads to the loud explosion. This is an oxidation-reduction (or redox) reaction, where hydrogen is oxidized (each H goes from 0 to +1) and oxygen is reduced (0 to -2).

2 H2 (g) + O2 (g) 🡪 2 H2O (l)

Elephant’s Toothpaste demo (decomposing hydrogen peroxide) I use a large graduated cylinder and first put about 25 mL of 30% hydrogen peroxide in the bottom. I then add a few squirts of dish soap (make sure it mixes with the peroxide at the bottom). For stripes I put four drops of food coloring down the sides of the cylinder. Finally I add about 1 gram of potassium iodide catalyst dissolved in about 20 mL of water. This catalyzes the decomposition reaction, the soap catches the oxygen bubbles, the food coloring adds stripes as the foam shoots up out of the cylinder. While 30% hydrogen peroxide is only available from chemical supply companies and will cause burns if you get it on your skin, a teacher said 6% hydrogen peroxide, which is available from beauty salon suppliers, also works. I have read (but not tested) that yeast and iron filings will also work as catalysts. At Immaculata we tried the reaction with 3% hydrogen peroxide (available in drug and grocery stores). It worked but slowly and with much less foam / bubbles.