SAMPLE HANDS-ON WORKSHOPS

Preparing a hands on workshop for girls who attend EYH Conferences can be a difficult task. It is made more difficult by not knowing what a "hands-on" activity really is, and not having experience teaching young women. The following sample hands-on workshops are designed to assist you with your preparation.

Workshop title: Chemixtures and Chemysteries
Career: Chemist

In this activity, the students will be mixing a mystery liquid (cabbage juice) with mystery powder (citric acid and baking soda) to see what happens.

Supplies: baking soda, citric acid, large zipper bags, small zipper bag, red cabbage juice (to make: boil a few purple cabbage leaves in a liter of water for 5 minutes, discard leaves, refrigerate or freeze until needed), goggles, paper and pencils to record observations.

I. **Introduction and Career Definition:** "Hello, my name is Dr. Elly Mentz. I am a Chemist. Today, we are going to practice a bit of science detective work. But, before we dive in, I would like us to talk a little about how I became a chemist and what exactly chemists do at work. My interest in chemistry started in my high school chemistry class, when we did our first lab experiment. I remember thinking is was exciting because I got to try different things and learn from my choices. Now, I work in a laboratory at NASA."

II. **Defining Career:** "I've introduced myself and my job, why don't we try to come up with a definition for what a chemist is. [Write down answers and student ideas on chalkboard] Good, those are great definitions. When asked, I sometimes describe a chemist as [give a definition you like]. Now, I want to hear some ideas about what a chemist does at work. [Write down about 5 responses.] This is great. I do some of these things [point to list] and I also [elaborates with job specifics]."

. III. **Hands-on activity:** "OK, one quick thing before we start. I would like one of you from each pair to fold your paper in half. We will be performing two experiments and need to record our observations separately. At the top on the left side write 'Mystery Liquid' on the right side write 'Water.' Now, we are ready to be chemdetectives!"

"Begin by putting on your goggles. One of you will be recorder for this first half of our experiment, then you will switch. I want both of you to make observations for both parts of the experiment. Let's start by making a few now. Why don't you and your partner take a minute or two and record a few observations about the mystery liquid and the powder: smells, colors, whether the liquid is warm or cold."

[Waits a minute for them to write down observations.]

"Now, carefully open the small bag with the purple liquid inside. Have your partner open one of the large bags. Gently set the small bag of mystery liquid into the large bag and seal the large bag shut. Turn the bag over so the powder and liquid mix. Record all the changes in color, small volume, whether the liquid is warm or cold…write down anything and everything!"

[Allow them time to notice the transformation!]

"Wow! That was exciting! I am going to write some of your observations here on the chalkboard. Someone tell me something they noticed before the materials were mixed? [Takes some of these from the group]. OK, how about observations made during the reaction? What about after things calmed down? Do we have any guesses about what the mystery liquid might be? What about what the powder might be?" [Students might guess the liquid is vinegar and the powder is baking soda.]

"Now, trade jobs, if you recorded last time, now you will perform the experiment and your partner will write notes. We will repeat the experiment as before but; this time use the bag of water. Remember to be careful setting it onto the larger bag. We want to try and copy our experiment exactly so we can learn from it."

[Waits a moment for the girls to perform the experiment with water.]

"Can I have your attention? I want to get your observations to write up here. Who wants to tell me what they noticed. Someone else, did you notice that too? Now does anyone have a new guess about what the mystery liquid is? How about the powder did this experiment tell us anything about that?"

IV. **Closing:** [Allows for some guessing about the substances before revealing their identity.] "OK, I promise not to keep you in suspense any longer. The purple mystery liquid is actually cabbage water. I boiled a few purple cabbage leaves in water. So, the reaction wasn't cause by a liquid acid and a dry base mixing as in a vinegar and baking soda volcano. It was actually caused when we wet a dry acid and a dry base. The reaction was ready to go in the bag; all it needed was water to allow it to get going. In this case the dry acid and base were baking soda and citric acid. In place of citric acid we could have used tartaric acid (cream of tarter) or crushed vitamin C tablets. So, if you want to show your friends how to do this, you might already have the ingredients at home.

I hope you enjoyed being chemdetectives. Of all the parts o my job, performing experiments and analyzing results, like we did today, are two of the best!"

Workshop title: Let's Make Slime or Ooey, Gooey Polymers
Career: Chemist

Supplies per pair of students: Tablespoon, Popsicle sticks or coffee stir sticks, paper towels, Borax, 1-cut measure, two plastic containers (1-cut yogurt containers work well, if used, you can omit measuring water and just fill water near the top), white glue, goggles, cold water, plastic bags to take slime home in, food coloring (this can be shared by all)

If the students are divided into groups larger than two, remember to provide supplies and allow time for each girl to make slime.

I. **Introduction:** "Hello, my name is Dr. Carol Carbonian Mentz. I am a Chemist. When I was eleven I got a lab set for my birthday. I loved playing with it, but it wasn't until high school chemistry that I thought about it as a career. Now I work in an Arco laboratory. Today I would like to share with you something fun you can do with chemistry."

II. **Defining Career:** "Before we start our experiment, let's talk a bit about chemists. What do you think a chemist is? [Write down about five ideas from the students on a chalkboard.] Good, those are great definitions. A chemist is a person who studies the composition and structure of substances and the changes they undergo.

Now, what do you think a chemist does everyday? [points out on the board]. I also [continues with some things she does at work]."

III. **Hands-on activity:** "Now that you know some of the things I do as a chemist, let's do something that involves chemistry!

In front of each pair of you is some glue, a white powder called borax, water, two empty containers, a mixing stick and goggles. Notice now, the texture, consistency and smell of all of these ingredients. The exciting part about experiments is watching how things change when a chemical reaction occurs. So, to get stated, I would like one person from each team to pour 1 cup of water into one of the containers. Now, your lab partner will add 1 spoonful of Borax. Stir with the mixing stick for about 3 minutes, to dissolve the Borax. While you are stirring, I will come around to answer any questions you might have.

(after 3 mins) OK, you can stop stirring. Don't worry if there are some grains at the bottom of your cup. Now, one of you pour 4 spoonfuls of glue into the second container. Bring it to the front of the room here and add 2 or 3 drops of color.

(after color) Stir the glue to mix in the color. Now, one of you measure 1 spoonful of the Borax/water.

Here is the fun part. Stick your fingers in there and mush it around. Notice what happens to the mixture because we will be talking about that later."

Let the girls mix the goo for about a minute to really get it to a slimy state. “All right, I can see that you are all natural-born chemists! Before we talk about what just happened, I would like each group to make another batch of slime. But, to see what effect Borax has, we will now mix one more spoonful of Borax into our Borax/water. Stir that up for a few minutes to dissolve it.”

“Now, repeat the procedure. That means, take out the goo-ball and put it into the plastic bag while you make a new batch. Remember, 4 spoonfuls of glue for 1 spoonful of Borax/water. But, this time add the 2-3 drops of color to the spoonful of Borax/water.