

Bubbleology – The Science of Bubbles

An eager group of twelve 3rd-5th graders from Candor Elementary school participated in an after school program this spring titled “The Science of Bubbles”. The program was initiated by fourth grade teacher Tanya Mlodzinski and outreach coordinator Lora Hine who worked together last year to host the after school “Atoms for Kids” program at Candor. The Laboratory for Elementary-Particle Physics at Cornell University has sponsored both programs. The “Science of Bubbles” class was modeled after the GEMS program and met with students once a week for five weeks.

Each day of the course was devoted to a different concept relating to the topic of bubbles. During the first session, students shared bubble making recipes and created bubbles using glycerin, detergent, water and their hands as tools. Bubble shapes were discussed and students shared insights on bubble making techniques. Based on this exercise, students were asked to bring an item from their house for the following session that they thought would create bubbles. The next week the students brought in an assortment of implements, including cheese graters, tongs, sieves, clothespins and chopsticks that were tested in order to discover what shaped objects can be used to blow bubbles. From observations taken during this activity, students were asked to draw a design for what they believed would be the Ultimate Bubble Maker.

The following week students conducted a series of investigations to explore surface tension and how it relates to bubble formation. Students added pennies to a full cup of water to witness the effects of surface tension. Each cup of water could hold many more pennies than hypothesized by students. Why? To quote one student’s observation: “The water forms a dome on the top of the glass and stays there without spilling over”. Atoms in the water “hold on” to one another and finally let go when too many pennies are added. Students also witnessed how detergent breaks the surface tension of the water by sprinkling pepper over the surface of the water and sticking their detergent covered finger in the center of the cup.

Students learned about controlled and experimental variables in the next activity when they determined which brand of detergent produces the largest diameter bubble. Using Dawn, Sunlight and Palmolive detergents, each student used a straw to blow a single bubble onto the surface of the table. When the bubble popped, it left behind a measurable film and the students recorded its diameter. After repeating trials for each detergent, individual and class averages were calculated. Class results determined that Dawn detergent blows the biggest bubbles.

The last session was a chance for students to discover some rather unique properties of bubbles. The question posed to them was to determine how many bubbles would directly surround and contact an individual bubble before it became unstable and popped. Using two clear sheets of acrylic, students worked in teams to blow bubbles between the sheets – squeezing the bubbles together to form honeycomb bubble shapes, which enabled

students to easily count the number of bubble “sides”. This dedicated group of students found that the greatest number of bubbles that can surround a single bubble was eight.

The closing activity, which was undoubtedly the favorite activity of the majority of the students, was observing the effects of dry ice on bubble formation and behavior. Blown bubbles would float down towards the dry ice, but when they approached the container of dry ice placed on the floor, the bubbles would hover and reverse their direction in attempt to escape the dry ice! Some of the smaller bubbles were unable to escape the dry ice and fell onto its surface, quickly forming observable frozen spheres. After completing the dry ice experiment, students poured bubble solution into the container of dry ice to see what would happen. The container was quickly placed into the sink, and as shown in the below photograph, dry ice is truly the Ultimate Bubble Maker!

What did students learn during the Bubbles class? Here are some direct quotes:

I learned...

“...how to blow really big bubbles.” (Patrick)

“...the best detergent for blowing bubbles is Dawn.” (Damien)

“...what a hypothesis is.” (Alicia)

“...a little about surface tension” (Ali)

“...that atoms hold bugs on the water.” (Sarah)

“...how to measure bubbles.” (Brad)

“...how to divide.” (Ben)

“...how fun science is!” (Sarah)