

C₃ BONDS

VOLUME 4, ISSUE 1

FALL 2005, YEAR 2



C₃ Welcomes Back Another Year 2 Group to the Program!

After experiencing a fantastic Year 1 project during the 2004-05 academic year, the C₃ team enthusiastically welcomed the following teachers back to the Louisiana Tech University campus to begin the subsequent Year 2 component of the National Science Foundation funded professional development project:



- Donna Alford, Downsville Elementary School**
- Linda Bates, El Dorado High School**
- Stacy Campbell, Ruston High School**
- Danna Chavanne, Broadmoor Middle Lab School**
- Kyle Duhon, El Dorado High School**
- Natalie Fox, C.E. Byrd High School**
- Courtney Gary, Southwood High School**
- Leslie Jones, West Monroe High School**
- Tonya Jones, Carencro High School**
- Anne Kilbourn, Parkway High School**
- Christina Menard, Abbeville High School**
- Karen Merritt, North Caddo Magnet High School**
- Carol Pabst, Huntington High School**
- Farrell Pollard, Jacksonville Middle School**
- Priscilla Savannah, Broadmoor Middle Lab School**
- Evelyn Scott, Bernice High School**
- Jay Wilson, Joaquin High School**

The group spent the first two weeks of June engaged in studies that remained focused around concepts connected to the Hindenburg disaster. Topics included accuracy/precision, solutions, conductivity, acids/bases, physical and chemical changes, molarity/molality, and colligative properties among others. In addition, emphasis was placed on the history of science and key figures involved in the development of scientific information.



Participants engaged in hands-on/minds-on learning experi-

ences that involved use of the scientific method, experimental design, process skills, and inquiry. National and state science reform efforts were discussed as project staff modeled standards-based instructional and assessment strategies; participants engaged in cooperative learning, learning cycle, teaching through inquiry, effective questioning, molecular level drawings, demonstration assessments, card sorts, concept maps, and carousels.

The teachers now face the challenge of implementing what they learned over the summer into their classes during the upcoming academic year. All indications are that everyone is off to an excellent start and each participant's hard work, dedication, and enthusiasm are not only evident, but really paying off. Thank you Year 2 folks!



DO YOU SEE WHAT YOUR STUDENTS SEE?

Watch your thoughts, they become your words

Watch your words, they become your actions

Watch your actions, they become your habits,

Watch your habits, they become your character,

Watch your character, it becomes your destiny.



The most important thing you can give someone is a **CHANCE.**

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LEADING WITH THE LEARNING CYCLE



The C₃ Team is proud to salute the superb job its participants have done with implementation of the learning cycle. One of the major goals for the project was to focus on effective implementation of the learning cycle while developing strong conceptual knowledge. The teacher testimonials verify that the effort is paying off for them and their students. **Leslie Jones, West Monroe High School**, shares that she tries to incorporate the learning cycle into everything she teaches. And while she used to think it was really difficult to do, now it just seems to come naturally. **Christina Menard, Abbeville High School**, admits that at first, she found it difficult because it forced her to rethink years and years of teaching practice and planning. However, she now reports that she “gets it” and is much more aware of how she presents information, always careful to give all students a common experience to grow from. And according to her, that’s like opening up a window on a cool, sunny October day! **Anne Kilbourn, Parkway High School**, indicates that she has modified and used almost every learning cycle lesson that was shared in C₃ and is even sharing them with her colleagues. She especially loves the layout of the lessons and the fact that they involve all students in one way or another. **Courtney Gary,**



Southwood High School, isn’t wasting any time as a first year teacher and has been implementing the learning cycle from scratch in her Biology classes. Her experience in C₃ gave her the tools to do that! **Priscilla Savannah, Broadmoor Middle Laboratory School**, indicates that while writing a learning cycle lesson does take a lot of time, thinking, planning, and preparation, she understands its importance. She has already observed how the learning cycle improves her students’ learning so she is concentrating on it more and more as a means of improving her instruction and teaching techniques. **Carol Pabst, Huntington High School**, states that while the learning cycle with card sorts, concept maps, demonstration assessments, and performance assessments doesn’t add up to necessarily the “easiest” way to teach science, it is definitely the most meaningful way to teach it. She shares that it has allowed her multiple opportunities to assess student mastery while addressing the need for differentiation. And that seems to sum it up! **Danna Chavanne, Broadmoor Middle Laboratory School**, shares that she likes the learning cycle because it has allowed her to relinquish the role of primary “information giver” and turn more responsibility over to the students. Thanks to our C₃ teachers for working so hard at something that works!



C₃ Gets Back on the Board!



C₃ teachers are once again engaged in a highly interactive on-line learning community through Louisiana Tech’s Blackboard system. Used as a communication tool, the online component of the program serves as a means of support for the C₃ teachers as they work toward fully implementing the learning experiences and strategies shared during the summer program. In addition, it is highly effective as a means of maintaining the sense of community that was established during the summer program and facilitating the on-going instruction of the group. The Year 2 participants have already jumped in and are burning up the keyboards! The first assign-

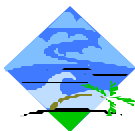


ment focuses on their growth with the learning cycle and more than 50% of the group is already engaged online. The first assignment will wrap up October 27 with the second topic posted by the end of the month. Our next discussion will deal with each teacher’s collegial coaching experiences. Cathi Cox, Program Site Coordinator, appreciates the excellent job the teacher’s have done with the electronic learning community and challenges Year 2 not to let Year 1 show them up! Visit the Tech Blackboard site at <<http://blackboard.latech.edu>> to continue the discussion, support, resources, and FUN!



LSTA Falls Victim to Louisiana’s Hurricane Season

While C₃ was once again delighted to offer the opportunity for its teachers to attend and participate in the Louisiana Science Teachers Association Convention, the 2005 meeting had to be canceled due to the devastation and rebuilding associated with Hurricanes Katrina and Rita. The annual conference, entitled “*Science: Jumpdrive to Tomorrow*”, was scheduled for November 10-12 in Lafayette, Louisiana; The C₃ group would have met along with other short courses offered the first day with breakout sessions and workshops following on the next two days. All C₃ teachers are now reminded to cancel hotel reservations in Lafayette,



ette, as well as any professional leave plans that had been made in order to attend this typically outstanding meeting. The group should also remember that there will be two other opportunities to get together as we move into 2006—the second workshop of the academic year as well as the big C₃ Final Reunion slated for spring. And while we hate that we missed the chance to enjoy our time in Louisiana’s Cajun Country, we extend our best wishes to all those who have been affected by the storms and are struggling to put their lives back together. Thanks to everyone for their understanding concerning the change of plans and we look forward to seeing you all again just as soon as possible!



REMEMBERING THE REFLECTIVE REUNION



Year 2 C₃ participants kicked off the academic year program with a special one day session held on the Louisiana Tech campus Saturday, July 30, 2005. Facilitated by Program Coordinator, Cathi Cox, the morning began with a series of experiences that allowed the group to "get back in the groove" after being apart for more than a month. Good news was shared, lots of laughs were had, and within very little time, the group was back in the rhythm it so effectively established during the summer institute.

Before leaving the course in June, the teachers were once again challenged to develop a project that utilized the learning cycle and focused on a content unit from the physical sciences that would be covered in their classroom during the 2005-06 school year. The pro-



ject was to include learning experiences that engaged the student, allowed an exploration phase, developed concepts, had an application component and assessment. During the morning of the workshop, Cathi and C₃ alumnus and current CATALYST staff member Missy Wooley guided the teachers as they individually presented their project to the group while discussing how it could be implemented. In addition, each participant made copies of their project for everyone else in the group so that each teacher was able to return to the classroom with almost twenty new ideas and strategies to reflect on when planning throughout the academic year.



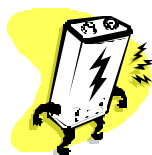
Following lunch, the group gathered to discuss the details of the academic year

ELECTRIFYING ELECTROCHEMISTRY EXPLORATIONS!

The Year 2 C₃ gang assembled for its first full academic year weekend workshop on October 1–2, 2005, to engage in Electrifying Electrochemistry Explorations. Gathering once again from across three states, the group welcomed back those who had missed the Reflective Reunion, while missing those unable to attend because of Hurricane Rita's impact. Following the typical revelry that initiates a C₃ event, the final Learning Cycle Lessons from the previous meeting were shared along with news of note from the kick-off of the new school year. Then the workshop officially got underway with a candy bar relay that featured Chemistry jokes and riddles plus plenty of chocolate. With



the participants' typical energy and sense of humor driving things, the entire session followed the learning cycle and included the following learning experiences: Investigating Zinc Reactions, A Redox Reaction Carousel, Electrifying Experiences With Fruit, Relative Reactivities of Metals, Making Chemicals From Electricity, Investigating the Corrosion of Iron, Galvanic Cell Construction, and Electrochemistry Card Sorts. Teachers worked in cooperative groups of three as they explored the concepts and developed standards based teaching strategies. The C₃ team appreciates the effort and time that the following



teachers provided to make the weekend session such a success:

- Donna Alford, Downsville Elementary School**
- Linda Bates, El Dorado High School**
- Stacy Campbell, Ruston High School**
- Danna Chavanne, Broadmoor Middle Lab School**
- Kyle Duhon, El Dorado High School**
- Natalie Fox, C.E. Byrd High School**
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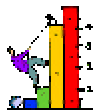
SUPER JOB EVERYONE!!



SPOTLIGHT ON C₃ SUCCESS



Linda Bates, El Dorado High School, challenged her students to develop experiments then express the results using table-top graphs. She shares that it is really exciting to observe the students' growth from the beginning of school with their graphing techniques! Next will be writing detailed procedures for an experiment with toy cars—wonderful! . . . **Jay Wilson, Joaquin High School**, reports that C₃ is all over both his chemistry and integrated classes. He has successfully used cards to organize lab groups, implemented



the accuracy and precision experience, fully implemented the physical/chemical change learning cycle lesson that he developed, and is using nothing but cooperative groups for all classroom activities. Excellent! . . . **Tonya Jones, Caren-cro High School**, implemented her graph boards with freshman students and shares that it was a huge success—you could have heard a pin drop in the room! In addition, she reports more effective use of learning logs and says that her students look like "little scientists" as they eagerly work daily. Fantastic! . . . **Stacy Campbell, Ruston High School**, states that she incorporated a "big" six station carousel about lab safety and equipment. Students practiced using graduated cylinders, balances, filtering, Bunsen burners, mortar and pestles, and hot plates. And



while it wasn't a minor thing to set up, it lasted over several days and everyone gained so much from it. Super! . . . **Courtney Gary, South-wood High School**, used the physical/chemical change carousel along with several demonstra-tions. In addition, she had been able to work card sorts into her planning. Great! . . . **Leslie Jones, West Monroe High School**, has also gotten in on card sorts and carousels. She shares that this has helped



tremendously with prep time as well as the amount of materials needed. Plus, the students love it! Awesome! . . . **Priscilla Savannah, Broad-moor Middle Laboratory School**, successfully implemented the learning cycle lesson she de-veloped on the human body. She shares that the lesson culminated with the students con-structing models of elements found in the hu-man body and presenting them to the class. Wonderful! . . . **Kyle Duhon, El Dorado High School**, had his students write the instructions for how to properly make a peanut butter and jelly sandwich when working with them on how to write a detailed procedure. And his classes developed table-top graphs as well. Super! . . . **Anne Kilbourn, Parkway High**



groups to develop safety rules which were shared in newsprint presentations. Plus, she says that labs are running much more smoothly with the "tray system" in place. Super! . . . **Evelyn Scott, Bernice High School**, had her students complete molecular level drawings during a study of the gas laws. Groups were given scenarios before developing drawings that reflected what was occurring at the molecular level. Fantastic! . . . **Carol Pabst, Huntington High School**, reports that she has been able to implement C₃ from day one this year. Students stay in cooperative groups with a lab box of materials ready to go. Not only has this saved her enormous amounts of time, it's made this her best year yet. Wonder-ful! . . . **Donna Alford, Downsville Elementary School**, has had her students collecting and sharing data through many different experiments, as well as creating many posters to reinforce and clarify their thoughts and understanding. A measurement carousel was a big hit as the students worked with different types of balances, rulers, graduated cylinders, and beakers. And a card sort wrapped it all up. Terrific! . . . As usual, the C₃ teachers continue to shine, as do their students. And as usual, we are proud of you!



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School, reports that the "Reaction in a Bag" was a huge hit with her students. In addition, they love doing the carousels and then comparing the results from group to group. She also shares that it has been wonderful to watch the students develop their skills when completing molecular level drawings. It really has them THINKING! Fantastic! . . . **Natalie Fox, C.E. Byrd High School**, had her students complete "Top 5 Lab Safety Posters" along with "Rules For Cooperative Groups to Live By" presentations. Both sets of posters were displayed around her room and she reports that it has made HUGE difference in the stu-dents' attitudes toward one another as well as following all rules. She shares that "Making Your Mark" was effective in bringing home the point about writing good procedures. Plus, she used the classification of matter card sort as a preassessment and states that it really showed where she needed to go with her instruction. Ex-cellent! . . . **Karen Merritt, North Caddo Magnet High School**, shares that her physical science classes are turning into "Junior C₃ Programs!" Card sorts are easily transferred into concept maps, "Reaction in a Bag" was a huge hit, and the stu-dents are loving carousels. And it's only the beginning. Good job!! . . . **Danna Chavanne, Broadmoor Middle Labo-ratory School**, used the Safety Cartoon to prompt student



groups to develop safety rules which were shared in newsprint presentations. Plus, she says that labs are running much more smoothly with the "tray system" in place. Super! . . . **Evelyn Scott, Bernice High School**, had her students complete molecular level drawings during a study of the gas laws. Groups were given scenarios before developing drawings that reflected what was occurring at the molecular level. Fantastic! . . . **Carol Pabst, Huntington High School**, reports that she has been able to implement C₃ from day one this year. Students stay in cooperative groups with a lab box of materials ready to go. Not only has this saved her enormous amounts of time, it's made this her best year yet. Wonder-ful! . . . **Donna Alford, Downsville Elementary School**, has had her students collecting and sharing data through many different experiments, as well as creating many posters to reinforce and clarify their thoughts and understanding. A measurement carousel was a big hit as the students worked with different types of balances, rulers, graduated cylinders, and beakers. And a card sort wrapped it all up. Terrific! . . . As usual, the C₃ teachers continue to shine, as do their students. And as usual, we are proud of you!



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C₃ Teachers Pave the Way With Professional Development

In addition to working hard in C₃, many of our teachers have been involved in additional professional development opportunities. **Karen Merritt, North Caddo Magnet High School**, finished up her C₃ experience at Tech then went to LSU for



their presentation of the Year 1 program. And if that wasn't enough, she was right back at Tech for its first installment of CLUE Capers, a Forensics workshop.



Both **Linda Bates** and **Kyle Duhon, El Dorado High School**, participated in CATALyST's Super Summer Sampler, a three day integrated math and science workshop. And all three are already implementing what they learned into their classrooms. Way to go!



SHOOTING FOR THE STARS!

Danna Chavanne, Broadmoor Middle Magnet School, had her students participate in a live web-cast with NASA's primary scientist for the Mars rovers, Spirit and Infinity. Her students had the opportunity to ask questions while engaged in a discussion with him. No doubt this was not only exciting, but extremely educational for everyone involved. And who knows, it could be the birth of **Danna's** own "Rocket Boys!"



SHARING THE WEALTH . . .

Word has it that lots of folks have reported using the safety learning cycle lesson plan that **Leslie Jones, West Monroe High School**, developed as her C₃ project. In fact, it seems that many of the lessons developed for the Reflective Reunion are being put to use in lots of C₃ classrooms. Nice work everyone! . . . **Tonya Jones, Carencro High School**, reports that the **CHS** Physical Science team has been meeting weekly to discuss ways to incorporate the new curriculum and it has been wonderful. Why? Because lots of material from C₃ has made its way into the mix because it's a perfect fit. Fantastic! We appreciate everyone not only taking C₃ to heart, but sharing it as well. That is EXCELLENT NEWS!!!



THE STORK REPORT

Stacy Campbell, Ruston High School, has begun the final countdown for the arrival of her latest bundle of joy. Due in November, **Stacy** plans to work as far into November as possible before staying home through the holidays with the baby. Then as we get one here, we



await a spring arrival for **Leslie Jones, West Monroe High School**. Due in April, **Leslie** also plans to work right up to the blessed event before enjoying the newest **Jones** over the summer. C₃ extends its best wishes to both ladies and it delighted to share in their joy!



BRINGING THE MONEY IN . . .

Congratulations to **Priscilla Savannah, Broadmoor Middle Laboratory School**, for applying for and receiving an Alliance for Education Grant in the amount of \$1000. **Priscilla** will use the funds to purchase software designed to teach life science concepts, benchmarks, and GLEs. Excellent! In addition **Linda Bates, El Dorado High School**, is awaiting positive news from the CSI grant committee and we wish her the very best luck with this!



WHAT A DIFFERENCE YOU MAKE!!

For the first time, **Stacy Campbell, Ruston High School**, is teaching science in a room with laboratory facilities. And while she did an amazing job of implementing C₃ and other standards based strategies and assessments last year, she has really been able to run with it this year. And it has paid off!



Stacy was the recipient of high praise from the parents of her students, making her hard work truly worthwhile. Because while it was her first time to teach in a lab setting, it was the first time that these students have ever liked science. In fact, not only are the students loving science, they admit to actually learning while being challenged! And when the parents visited the classroom, they could see why. With evidence of C₃ all around, the parents looked up the C₃ team to not only offer further praise, but thanks as well. Nice going, **Stacy**—you made us ALL look good!!



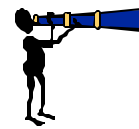
THROUGH THE YEARS . . . Leslie Jones, West Monroe High School, has created a HUGE timeline in her classroom and her students helped! After researching scientists, students created note cards with their most famous accomplishments and then added them to the timeline. It's been such a success that former students are complaining that they didn't get to do a timeline. AWESOME!!!



C₃ CLASSROOM OBSERVATIONS UNDERWAY!!



With the 2005-06 academic year in full swing, C₃ also has its first round of classroom visits and observations moving ahead at full steam. Program Coordinator Cathi Cox is steadily working through Louisiana, Arkansas, and Texas (the states represented) in order to visit each teacher participant at least once during the first semester. And the evidence is there—the Year 2 C₃ folks are doing an excellent job!! Each teacher has been challenged to use the learning cycle regularly and consistently, with evidence of its implementation available for Cathi when she arrives. To date, the group is 100% with its efforts and the entire C₃ team salutes the participants for their dedication and hard work. And with less than half the group remaining on the schedule before Thanksgiving, Cathi looks forward to continuing this exciting part of the academic year in order to see what other amazing things these outstanding teachers are doing! So, be watching carefully—chances are the Jeep is headed your way SOON!! Keep up the good work everyone—you're doing a tremendous job!!



MOLE MADNESS: OCTOBER 23

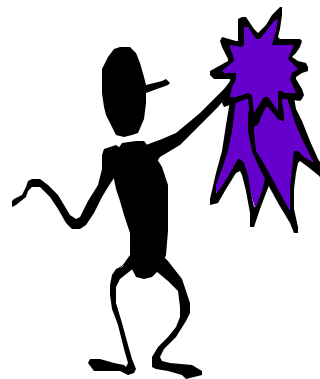
(observed either before or after!)



Did you and your students plan anything special for Mole Day, 2005? C₃ would like to know! Let Cathi know how you and your classes celebrated Mole Day and you could win a **fabulous** prize. Just post your submission on Blackboard by October 31, 2005. And don't forget to share all the festive details; your plan may be copied by others next year!

KEEP THEM IN MIND!!!! Remember that we have two BRAND new teachers in the field: **Courtney Gary, Southwood High School,** and **Kyle Duhon, El Dorado High School.** Keep the good karma flowing their way!!

**“TO GIVE ANYTHING
LESS THAN YOUR
BEST IS TO
SACRIFICE THE
GIFT.”**



Steve Prefontaine
(World Class Runner)

THE TOP 10 STEPS TO SUCCESS

1. Try
2. Try again
3. Try once more
4. Try it a little differently
5. Try it again tomorrow
6. Try and ask for help
7. Try to find someone who's done it
8. Try to determine what's not working
9. Try to determine what is working
10. Just keep trying!



**HAPPY
HALLOWEEN
FROM YOUR C₃
GHOSTS AND GOBLINS!!**



BULLETIN BOARD

Toyota TAPESTRY Grant Program - The program awards 50 grants of up to \$10,000 each and a minimum of 20 "mini-grants" of \$2,500 each to K-12 science teachers. Interested teachers should propose innovative science projects that can be implemented in their school or school district over a one-year period. Toyota TAPESTRY projects demonstrate creativity, involve risk-taking, possess a visionary quality, and model a novel way of presenting science. The deadline is January 19, 2006. More: <http://www.nsta.org/programs/tapestry/>

Let's say you want to explain the Ideal Gas Law ($PV=nRT$) in a way that your kids will not only remember it but UNDERSTAND it! You'd probably create some sort of hands-on simulation. And, if you were techno savvy, you might even create a virtual simulation and post it online in Blackboard, WebCT, or your course Web site. <http://www.merlot.org/>

But what if you didn't have the time or know-how to create your own online learning tool or simulation? Well, that's where MERLOT comes in. MERLOT -- the Multimedia Educational Resource for Learning and Online Teaching -- is a free, peer-reviewed collection of over 13,000 different online learning tools and simulations developed (mostly) by college professors around the world. MERLOT is designed primarily for faculty and students of higher education, but there is much in MERLOT's archives that will appeal to early teenage students as well. So don't let all the "higher ed" stuff scare you away from what is a WONDERFUL educational resource. You can browse MERLOT's collection by subject area -- Arts, Business, Education, Humanities, Mathematics, Science and Technology, and Social Sciences -- but a better place to start might be the 2005 MERLOT awards page at http://taste.merlot.org/catalog/awards/awards_2005.htm

This website has lots of wonderful, short videos. Most have no sound, but they do have a split screen with the information beside the video. http://chemed.chem.purdue.edu/demos/Movie_index.html

Rubistar is a free, online, rubric-creating tool designed to help educators who want to use rubrics in the classroom but don't have the time to develop them from scratch. The site isn't flashy, but it is actually quite helpful. <http://rubistar.4teachers.org/>

The site offers pre-slugged rubrics for a variety of activities, and you can use pull-down lists to order the categories you wish to assess. Visit Rubistar's free tutorial to see how it all works. You can find it at <http://rubistar.4teachers.org/newtutorial/tutorial.shtml>

Here's an awesome website with science songs your students will love. It features the musical group Scientific Jam and while most of the songs are biology related, you will also find other disciplines as well. Check out the 'Sound Travels in Waves' and the 'Roy G. Biv' songs along with lots of others and let the music PLAY!

<http://www.scientificjam.com/scijamsongs/songs.html>

Need a cool web site for sponge questions and brain teasers? Visit www.usaweekend.com, click on "Frame Games" (this gives you the puzzles for this week), then click on "Visit the Archives" (this give you all the puzzles for the past few years). Students love these puzzles and it might give you a chance to complete the necessary "first of class" paperwork that everyone dreads so much!

Check out the "Bank of Chemistry Questions and Problems" as a helpful tool in your classroom instruction and evaluations. Use the following information:

Web site: www.boshf.org/chembank

User Name: chemistry_teacher

Password: 1025gm

Follow three basic steps to use the program:

- 1) Download (from the Web server to your computer)
- 2) Copy (highlight the questions you choose for a test)
- 3) Paste (put questions together on the word processor to make your customized test).

If you wish, many of the multiple choice questions can be converted to short free response questions by simply omitting the multiple choices below these questions.

Japan Fulbright Memorial Fund

The deadline for the 2006 JFMF competition is December 10, 2005. This year up to 600 distinguished elementary and secondary school educators will be selected for the three week exchange in Japan. Those interested may apply via the online application at www.jie.org/jfmf. To request more information, additional materials, or if you have any questions, please contact 1-888-527-2636 or jfmf@jie.org.

Check out www.science-house.org and discover the exciting world of Formulas Poker!

Look for Countertop Chemistry Experiment 26 and see how students can practice writing chemical formulas in a fun and challenging game.

This fall, high school students and teachers are going to get a taste of NASA astronaut training. Would you like to join them? You can, by taking an Electronic Field Trip. http://science.nasa.gov/headlines/y2005/12aug_eft.htm?list158661

The SouthCentral Girls Collaborative Project (SCGCP) brings together organizations in Arkansas, Louisiana, New Mexico, Oklahoma, and Texas that are committed to informing and motivating girls to pursue careers in science, technology, engineering, and mathematics (STEM). <http://www.tcet.unt.edu/scgcp/home/>

Alka-Seltzer Rockets



Exploring Rocket Launch Through Process Skills and the Scientific Method

Overview

This learning experience incorporates the scientific method, chemistry, and physical science. Students must determine the best “recipe” for launching alka-seltzer rockets the greatest distance. Exploring the possibilities gives the students opportunities to practice observing, communicating, measuring, inferring, predicting, controlling variables, and collecting and analyzing data.

Background

The independent variable is the one that is changed on purpose—this is the variable that the experimenter actually manipulates throughout the investigation. It causes the change that will be measured. That change is called the dependent variable—this is the variable that responds and is measured. The constants are kept the same throughout the entire experiment.

The solid antacid tablet has two ingredients that do not react with each other when they are solid: citric acid and sodium bicarbonate. However, both of these ingredients dissolve in water and when they do a chemical reaction takes place between them. Carbon dioxide gas is produced.

During the learning experience, the carbon dioxide is trapped inside the film canister. As the carbon dioxide produced increases, the pressure inside the canister builds until the force pops the lid and launches the “rocket.”

Getting Started:

1. Prepare the PVC rocket launchers using the instructions provided.
2. Purchase fresh alka seltzer tablets if needed; tablets that have been subjected to the air for long periods of time should not be used.
3. Gather the remaining materials needed for the group investigations.
4. Copy student instruction sheets and data sheets.
5. Review the follow up questions to be used when facilitating the discussion.
6. Determine how the investigation will be best implemented in the classroom—will everyone do the same test first then each group conduct a separate test, will each group begin with separate tests, etc.
7. Identify an appropriate space for the rocket launch to take place.
8. If further content other than the scientific method is to be developed, review concepts and organize the most effective connection to the investigation.

Materials Needed Per Group:

Effervescing tablets (any brand will work)	Clear film canister
Graduated cylinder	Water
Hot pot (or other source for warm water)	Thermometer
Meter stick (or metric measuring tape)	Rocket launcher (1" PVC elbow)
Student instruction sheets	Safety goggles
Learning logs	Graph boards or paper (optional)

Procedure:

1. Assemble students into cooperative groups.
2. Demonstrate the rocket launcher without providing any information; have the students record observations and explanations in their learning logs.
3. Facilitate a discussion of what occurred using student input and reflections; guide students toward listing what factors could impact the "rocket" performance.
4. Post a list on the board of the combination of factors that could cause a rocket to travel the greatest distance.
5. Assign each group a specific factor or variable to test.
6. Using the student sheets as a guide, discuss the procedure to follow; encourage students to make notes in their learning logs as needed.
7. Have materials managers gather the supplies for the investigation; point out the appropriate place for the rocket launch to take place.
8. Assign a time limit for the investigation to be completed; if time allows, encourage students to test another variable in an effort to increase the distance their rocket will travel.
9. At the completion of the investigation, have each group share its results; facilitate a discussion and develop content as needed.

Safety Notes:

Students should be instructed to wear their safety goggles. There should be a designated area for launching the rockets. The rockets must never be aimed at another student or group. Solutions may be washed down the drain.

Teacher Notes:

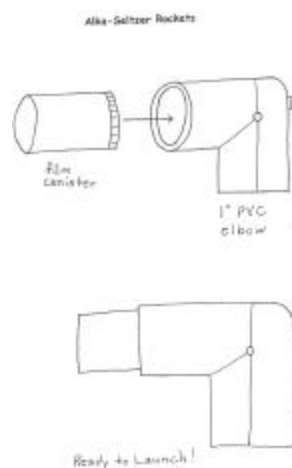
The challenge for students is to find the combination of factors that will cause the rocket to travel the greatest distance. Variables to test include: amount of water in the rocket, temperature of the water, size of the tablet (whole, half, etc.), tablet in one piece or crushed, and angle of launch.

It is recommended that teachers demonstrate how to correctly launch the film canister rockets by doing the following:

- Place an alka seltzer tablet and water in a film canister
- Snap on the lid
- Load the rocket, cap first, into the PVC elbow
- Point the rocket away from students
- Wait for the blast-off

Student data can be graphed and shared as well. Following the completion of the rocket launch, student graphs can be used in a whole group carousel; each group then analyzes the data shown in each graph and forms conclusions prior to the sharing of results and the discussion that follows.

In addition, students can be encouraged to construct their own data table in their learning log rather than use the prepared sheet.



Alka-Seltzer Rockets

Student Sheet



Materials:

- Alka-Seltzer tablets (any brand will work)
- Clear film canister
- Graduated cylinder
- Water
- Hot pot (or other warm water source)
- Thermometer
- 1" PVC elbow
- Meter stick

Instructions: Your group's task is to determine the combination of factors that will launch your rocket the greatest distance. Decide which variable your group will test and the steps you will take. Repeat the test 3 times to get an average. If time permits, you may then change another variable to try to increase your distance even more.

Describe Your Experiment:
(include your data chart and measurements)

A PROCESS SKILLS CHECKBRIK

Assessing the Integration of Process Skills Into Planned Learning Experiences



Basic Process Skills

- _____ OBSERVING (gathering data using all senses, frequently extended with instruments)
- _____ CLASSIFYING (grouping into categories sharing common characteristics)
- _____ USING NUMBERS (quantifying data and manipulating the numbers, including metric and scientific notation)
- _____ COMMUNICATING (presenting observations, ideas, and results verbally, in writing, and with pictures and graphs)
- _____ MEASURING (accurately quantifying length, area, volume, weight, time, and temperature)
- _____ INFERRING (making tentative explanations based on observations)
- _____ PREDICTING (using past observations and measurements to predict future observations)
- _____ USING SPACE/TIME RELATIONSHIPS (describing spatial relationships and their change with time, including shapes, symmetry, time, velocity)

Integrated Process Skills

- _____ FORMULATING HYPOTHESES (making educated guesses about what the outcome will be)
- _____ CONTROLLING VARIABLES (keeping all influences constant except the one being tested)
- _____ EXPERIMENTING FORMULATING MODELS (employing all of the other skills to solve a problem creating a mental or physical model of a process or event)
- _____ INTERPRETING DATA (making sense of observations made)
- _____ DEFINING OPERATIONALLY (creating a working definition)