

C₃ BONDS

VOLUME 3, ISSUE 1

FALL 2004, YEAR 2



C₃ Welcomes Back Another Year 2 Group to the Program!

After experiencing a fantastic Year 1 project during the 2003-04 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:



- Chris Baker, Choudrant High School**
- Jimmie Bond, Rayville High School**
- Andrew Coleman, Northwood High School**
- Lamar Cranston, Pinecrest Middle School**
- Steve Gann, Airline High School**
- Chris Hightower, Summerfield High School**
- Michelle Hopkins, Ruston High School**
- David Hough, Weston High School**
- Melvin Landry, Woodlawn High School**
- Tommy McFarland, Woodlawn Junior High School**
- Judy Madden, Bossier High School**
- Christina Riley, Breaux Bridge High School**
- Nola Schmidt, Nacogdoches High School**
- Mike Strange, El Dorado High School**
- Trish Tidwell, Dan F. Long Middle School**
- Cindy Tolliver, Airline High School**
- Michelle Underwood, Chatham Jasper Henderson High School**
- Oretha Whitley, Lincoln Elementary School**
- Michelle Woodruff, Huntington High School**

The group spent the last 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 experiences that involved use of the scientific method, experimental design, process skills, and in-

quiry. 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. In addition, they will be working with colleagues within their schools and districts as their focus shifts toward sharing what they have learned in the project. 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!



AS THE YEAR TWO GROUP BEGINS THE ALL IMPORTANT TASK OF COLLEGIAL COACHING, HERE ARE SOME IMPORTANT THINGS TO WATCH . . .



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. **Tommy McFarland, Woodlawn Junior High School**, shares "Last year I had never purposely designed a lesson with the learning cycle in mind; now after a year of experience and being able to, I feel comfortable with the method and having all the great ideas provided by C₃; it just seems like the only way to teach. My students love my class. One told me just last week that she finally understood a concept that she had been hearing about for 3 or 4 years. I personally know the feeling." **Michelle Woodruff, Huntington High School**, adds "It made me want to be creative in my lessons, and I believe that is truly paying off. I even had the principal mention at a faculty meeting how parents had contacted him about me during the back to school night and that was great!" **Christina Riley, Breaux Bridge High School**, reports that "I really feel that I am ready to charge forward with national Board Certification with the help of the C₃ class and the learning cycle. I know I am a better teacher now than I was a year ago from watching students thinking critically and learning." From **Chris Hightower, Summerfield High School**, we hear "I am definitely using the learning cycle more now because I have been through so many good examples. The most beneficial part has been all of the



different ways to teach material and that the learner does the work This way we remember it much better. As the saying goes we remember 90% of what we DO!" **Michelle Hopkins, Ruston High School**, shares "It has helped me by providing a variety of resources to pull from in order to have things that match each area of the learning cycle. It has also given me the courage to try new things that I normally would not have tried. Plus, by implementing the learning cycle I know exactly where I have been and exactly where I am going with my lesson. **Nola Schmidt, Nacogdoches High School**, indicates that "the most beneficial outcome of the learning cycle in my classroom is student involvement/engagement." while **Andrew Coleman, Northwood High School** contributes "This year, instead of forcing things to fit in certain categories in order to say that I had a learning cycle lesson, I was able to actually sit back, think about the students needs, and actually develop "complete" lessons to better help them learn. It gives my teaching a focus. Instead of planning just for a day or two, or even for just a specific topic, I am able to plan ahead and actually know and understand the direction I am wanting my students to go." **Cindy Tolliver, Airline High School**, says "The exposure to the learning cycle has given me a clear path to follow to be sure all the bases are covered." **Judy Madden, Bossier High School**, simply states "I find myself in a whirlwind 90% of the time trying to incorporate every activity we received in the binders for my students. Everything is so good and applicable." And that seems to sum it up! Thanks to our C₃ teachers for working so hard at something



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 key-



boards! The first assignment 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!



C₃ WILL BE LOVIN' LAFAYETTE!

C₃ is delighted to once again be able to offer the opportunity for its teachers to attend and participate in the 2004 Louisiana Science Teachers Association Convention, "Sharing the Wonder of Louisiana's Wetlands". Lafayette, October 28-30, 2004, short courses will be offered the first day with breakout sessions and workshops following on the next two days. All C₃ teachers will be provided registration, two nights hotel stay, and a travel allotment in an effort to facilitate their attendance at this typically outstanding meeting. The CATALYST staff will offer a short course on Thursday morning entitled "Water Quality Quandary: Field



Trip in a Box," with the annual C₃ workshop following that afternoon. Both C₃ groups, Years 1 and 2, will meet together on Thursday, the 28th, for a mandatory session from 1:00-4:00 in the Maple Room of the Hilton Towers. It should be an exciting time of professional development as well as lots of fun for everyone involved as we experience the tastes and sounds found only in the heart of Cajun Country. We look forward to having the entire C₃ family together during this time and remind everyone to register and make room reservations ASAP in order to be ready when the convention begins. For more information, contact Cathi immediately and get ready for a road trip!



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, August 16, 2004. Facilitated by Program Coordinator, Cathi Cox, the morning began with a series of leadership experiences that set the stage for each participant's role as a collegial coach. After engaging in the typical opening revelry, the teachers worked together through a critical thinking exercise, before being guided through an overview of the academic year collegial coaching program. The response to the collegial coaching challenge was overwhelming as each participant eagerly signed on. In addition, the group went through a refresher ses-



sion for Blackboard, the online learning community used during the academic year. By the end of the morning session, the group had strengthened its bond and resolve with a renewed dedication for the tasks ahead.



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 2004-05 school year. The project was to include learning experiences that engaged the student, allowed an exploration phase, developed concepts, had an application component and assessment. During 3 hours of the workshop, Project Co-



ELECTRIFYING ELECTROCHEMISTRY EXPLORATIONS!

The Year 2 C₃ gang gathered for its first full academic year weekend workshop on September 25-26, 2004, to engage in Electrifying Electrochemistry. Beginning with a candy bar relay that featured Chemistry jokes and riddles plus plenty of chocolate, the participants got things kicked off with their typical energy and sense of humor. 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. During the last day of the workshop, the teachers enjoyed an informal time of reflective sharing about their collegial coaching efforts as the school year got underway. The C₃ team appreciates the effort and time that the following teachers provided to make the weekend session such a success:



Chris Baker, Choudrant High School

Andrew Coleman, Northwood High School

Lamar Cranston, Pinecrest Middle School

Steve Gann, Airline High School

Chris Hightower, Summerfield High School

Michelle Hopkins, Ruston High School

David Hough, Weston High School

Melvin Landry, Woodlawn High School

Tommy McFarland, Woodlawn Junior High School

Judy Madden, Bossier High School

Christina Riley, Breaux Bridge High School

Nola Schmidt, Nacogdoches High School

Mike Strange, El Dorado High School

Trish Tidwell, Dan F. Long Middle School

Cindy Tolliver, Airline High School

Michelle Underwood, Chatham Jasper Henderson High School

Michelle Woodruff, Huntington High School

SUPER JOB EVERYONE!!



YO EVERYBODY, ROCKY LOVES C₃!!!!

As if anyone could forget it, the image of Rocky, Adrian, Paulie, and Mick helping facilitate the Year 2 workshop presentations is still burned in the consciousness of the C₃ team. But it's just one more reason we know you're a total KNOCK OUT!!!!

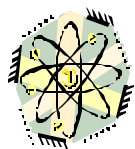




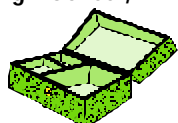
SPOTLIGHT ON C₃ SUCCESS



Michelle Hopkins, Ruston High School, incorporated technology into her students' element research projects. Each student had to develop a creative powerpoint presentation that focused on information obtained through their research. And the projects were GREAT! Plus, students were graded using a rubric. Terrific! . . . **Chris Baker, Choudrant High School**, used manipulatives to help his students understand the concepts connected to covalent and ionic bonding.



Students created models that reflected the bonding and drew molecular level drawings. In addition, **Chris** extended his learning cycle lesson this year by implementing a newly developed concept map that students constructed from a card sort for newsprint presentations. Excellent! . . . **Mike Strange, El Dorado High School**, also put manipulatives in his students' hands as they explored atomic structure.



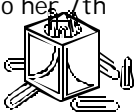
Using sealed black boxes, students had to make observations that would lead them to what might be inside the box. The exploration beautifully led into the discovery of subatomic particles. Wonderful! . . . **Tommy McFarland, Woodlawn Junior High School**, also had his students get their hands busy when working with atomic structure. Following an



exploration with Rutherford's Gold Foil Experiment, the students used mini-Legos and newsprint to create models of specific elements that **Tommy** pointed out, including isotopes of elements. Super! . . . **Michelle Underwood, Chatham Jasper Henderson High School**, used the ice cream lab as the focus of her exploration when looking at phase changes. In an effort to make it more "open ended," **Michelle** developed a card sort with the steps for the procedure that had to be completed before the students could begin. Excellent! . . . **Chris Hightower, Summerfield High School**, did his first Chemistry carousel and it went



GREAT! Students worked through six stations that featured calculations related to moles as well as identifying formula names and formula weight. Plus, the carousel served as a performance assessment. Wonderful! . . . **Trish Tidwell, Dan F. Long Middle School**, used the Colorful Clips activity to introduce chemical equations to her 7th graders. And it worked like a charm! There was great excitement as the students "got it" and **Trish** emphasized each accomplishment. Fantastic! **Nola Schmidt, Nacogdoches**



High School, is implementing a timeline in her classroom that will develop throughout the year. Her students worked through the history of atomic structure card sort, using a modified jigsaw for resource purposes, before adding the first event cards to the timeline. **Nola** also discovered unused technology in her closet and has implemented the Classroom Performance System into her classes, including a laptop. Fantastic! . . . **David Hough, Weston High School**, is focusing on molecular level drawings with his students and introduced them to the concept using team worksheets that featured specific scenarios. The students worked collaboratively to develop their first molecular level drawings on newsprint, then presented them to the class. **David** used each presentation to further develop concepts and clarify misconceptions, just like Dr. Bill! Super!! . . . And while talking about molecular level drawings, **Michelle Woodruff, Huntington High School**, hung a clothes line across her room so that she could display her students' work more effectively. In



addition, she posted a timeline in her hallway and says thanks to **Trish** for that excellent tip! Terrific!! . . . As usual, the C₃ teachers continue to shine, as do their students. And as usual, we are proud of you! Keep up the excellent work!



POLITICS IN SCIENCE?!

Chris Hightower, Summerfield High School, shares that when presenting the Blue Bottle Demonstration in his class, one of his students came up with an unusually creative hypothesis for the color change. According to this Summerfield scholar, Congress passed a law that all liquids in a flask must be blue and therefore the color changed.



But, President Bush vetoed the bill and suddenly all the liquids were colorless again! Whether or not the election year prompted such cross-curricular thinking, **Chris** decided that this student definitely deserved extra points for such creativity. After all, he just might be the President of the United States one day himself!



Congratulations to those C₃ teachers who are participating in Louisiana Tech's NSF GK-12 Teaching Fellows Project: **Tommy McFarland, Woodlawn Junior High School**, and **David Hough, Weston High School**. We're proud of you and appreciate the impact you will have on the university science students you are working with!

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. **Trish Tidwell, Dan F. Long Middle School**, is undergoing training with "Classroom Instruction That Works" and will redeliver the information to her **Long** colleagues. **Oretha Whitley, Lincoln Elementary School**, is participating in the Monroe City School IMPACTS project, a science course designed to improve middle grades science teaching and learning. The three year program focused on physical science this year, with life science and earth science to follow. Terrific work everyone. No doubt you will have lots to share with your colleagues when you all get back together!



LOOK AT OUR LEADERS!

Trish Tidwell, Dan F. Long Middle School, serves as Science Department Chair as does **Melvin Landry, Woodlawn High School**. **Nola Schmidt, Nacogdoches High School**, has been selected as the Science Department's Campus Advisory Committee Representative. **Chris Baker, Choudrant High School**, has been working with the developer of GLOWCO math/science manipulatives to develop classroom instructional materials that will be included with each teacher kit. We are proud of the outstanding work that each of these educators continues to do to improve science education for their colleagues and students.



DID YOU KNOW?

Chris Hightower, Summerfield High School, states that the first resource he reaches for when planning his classes is his C₃ binder . . . **Trish Tidwell, Dan F. Long Middle School**, has her entire C₃ binder marked with sticky notes and labels for easy access when planning . . . **Christina Riley, Breaux Bridge High School**, shares that the C₃ materials are "custom made" for National Board Certification and help make the process much easier for you . . . EXCELLENT NEWS!!!

CONGRATULATIONS

C₃ congratulates **Lamar Cranston, Pinecrest Middle School**, on being named PMS Teacher of the Year. Well deserved, **Lamar!** **Chris Hightower, Summerfield High School**, has passed the PRAXIS test for certification in both Chemistry and Physics. Wonderful news **Chris!** **Christina Istre Riley, Breaux Bridge High School**, married her Marine beau **Mike** this summer and remains aglow as a newlywed. In addition, **David Hough, Weston High School**, and his wife **Jessica** also welcomed their second child this summer. Best wishes **Christina and David!** We are proud of the outstanding work of ALL these fantastic C₃ participants and share in their joy!



WE DO EXTRA CURRICULAR, TOO!!

When not exciting students in their chemistry labs, C₃ teachers are also engaged in the lives of their students outside the classroom. **Chris Baker, Choudrant High School**, continues building a running dynasty with his track and cross country programs at CHS. Recently receiving news that his Varsity Boys' Cross Country Team is ranked in the state Composite Top 10, he helms the reigning Boys' State Champions as well as the Girls' Runner-up squad. Continued good luck, **Chris!** . . . **Michelle Underwood, Chatham Jasper Henderson High School**, has been tapped for all graduation responsibilities and had already kicked off the year by sponsoring a school dance. Fun! **Christina Riley, Breaux Bridge High School**, continues to coach the Science Olympiad at BBHS while **Chris Hightower, Summerfield High School**, is sponsoring the school 4-H program. And **Mike Strange, El Dorado High School**, leads his campus Key Club organization. Looks like the C₃ crew is in for another busy year in ALL areas of school life!

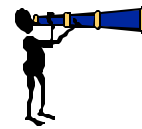




C₃ CLASSROOM OBSERVATIONS UNDERWAY!!



With the 2004-05 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 make EVERYBODY look good!!



MOLE MADNESS: OCTOBER 23

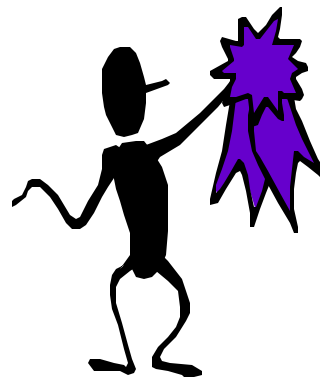
(observed Friday, October 22nd)



Will you and your students plan anything special for Mole Day, 2004? C₃ would like to know! Let Cathi know how you and your classes celebrated Mole Day and you could win a **fabulous** prize. The deadline for submissions is October 27, 2004. And don't forget to share all the festive details; your plan may be copied by others next year!

HOT OFF THE PRESSES!!!! New "Tricks of the Trade" manuals are freshly printed and in Cathi's office; if you need any for your Collegial Coaching, let Cathi know ASAP!!!

**"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 19 January 2005. More: <http://www.nsta.org/programs/tapestry/index.htm>

SCIENCE THROUGH ARTS (STAR): AN EYE ON THE MOON

During this yearlong program, students will learn about the Earth's Moon via Internet research, videoconferencing with NASA, the Cleveland Museum of Art, and other STAR participants. Students will learn about writing science fiction through videoconferences with published science fiction writers. Based on today's scientific knowledge, students will put together a mission to the Moon, including a mission to acquire new scientific information. Art will make the mission come to life. Writing, drawing, music, acting, and more could become part of this enriching experience. For more information, go to the following web site:
<http://www.grc.nasa.gov/WWW/K-12/STAR/Eye>

NATIONAL MOLE DAY IS OCTOBER 23 (22nd); MARK YOUR CALENDAR AND CELEBRATE! This year's theme is "Pi Ala Mole". As you make preparations, visit <http://moleday.org>

NATIONAL HIGH SCHOOL ROCKET CONTEST

Sponsored by AIA, the National Association of Rocketry (NAR), NASA, and the American Association of Physics Teachers, the Challenge provides student high school teams with a realistic experience in designing a flying aerospace vehicle that meets a specified set of mission and performance requirements. This year's Challenge is to design, build, and fly a model rocket carrying a raw egg and return it safely to the ground while staying aloft for exactly sixty seconds. To obtain information about the Team America Rocketry Challenge, visit www.rocketcontest.org. The application deadline for the contest is November 30, 2004.

NEW AND IMPROVED ACTIVITIES IN MATH AND SCIENCE

Get back to school with some new and some improved activities tied to national math and science standards. An update of the Designing Craters activity was done by McREL over the summer, giving it a new look and adding more references. It is still the inquiry-based activity that Gretchen Walker produced. And as if that weren't enough, the team at McREL also matched the Mission Challenges to national math standards, putting them in student and teacher's guide formats. Now, your students can use math to solve real challenges that a mission team encountered. They'll have so much fun, they won't know they're learning! For more information visit the following web sites:

Designing Craters:

http://deepimpact.umd.edu/designing_craters/index.html

Mission Challenges:

<http://deepimpact.umd.edu/disczone/challenge.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!

Kennedy Space Center's (KSC) newest website seeks to encourage middle school students across the nation to develop an interest in science and math by viewing real working experts in these fields. The "Enter the Firing Room" site provides interactive games and information linking these subjects to exciting careers with NASA. The site highlights system engineers who work in KSC's launch firing rooms. The site includes a firing room tour, fun facts, pictures, and a special page for educators. Students get a chance to meet actual engineers through videos and biographies. Videos of astronauts are also featured on the site. After a virtual tour, students can test their knowledge by taking the Launch Simulation Quiz. For more information, visit <http://enterfiringroom.ksc.nasa.gov>

How will you engage and excite students to learn about science and a new career this year? Why not consider the use of Forensic Science Instruction in your curriculum. Whether you have an established program or are interested in learning more about offering a unit or course on Forensic Science, "Clues in Crime" is for you! For classroom instruction, Eduscreen offers Teacher curriculum cards, 5-Packs, and Site Licenses, complete with lesson plans, key terms and definitions, and quizzes. Find out what adding a forensic science unit can do for your curriculum—visit www.eduscreen.com

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:

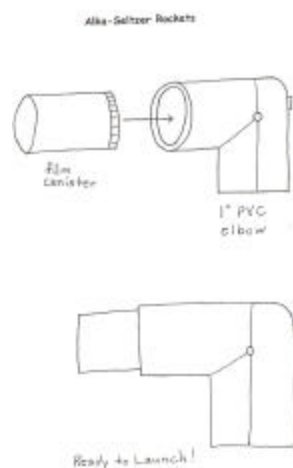
The challenge for students is to find the combination of factors that will cause the rocket to travel the greatest distance. Variables to test include: amount of water in the rocket, temperature of the water, size of the tablet (whole, half, etc.), tablet in one piece or crushed, and angle of launch.

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)