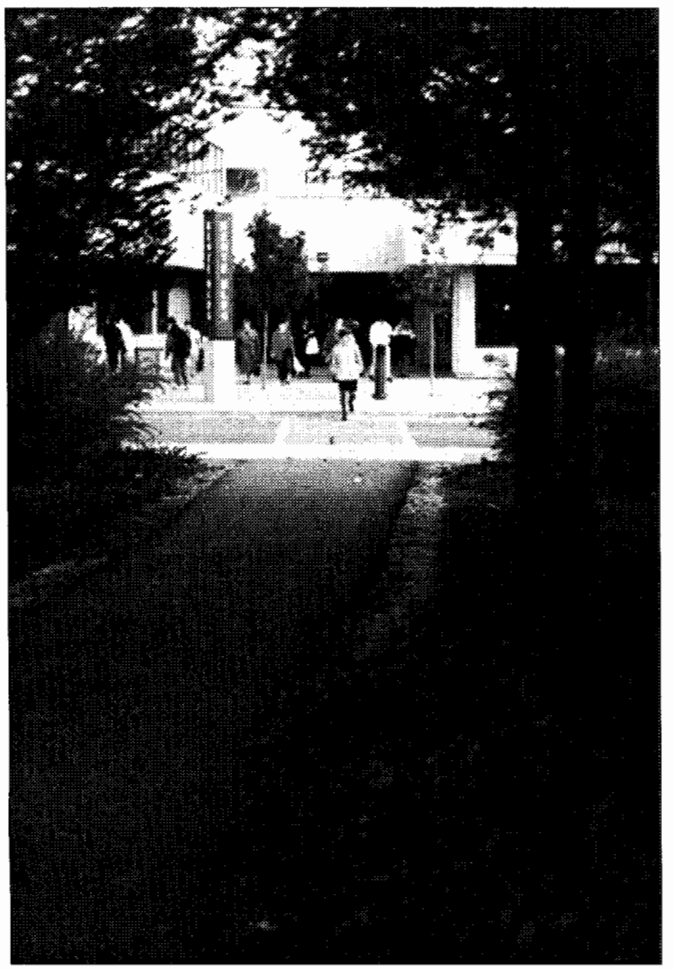
Winter 1998

C_3 News

Newsletter of College Chemistry Canada / La Chemie Collégiale au Canada



Loyalist College in Belleville, ON, site of the 1999 C_3 conference.

Come and experience Loyalist Country

by Reg Vinnicombe, Loyalist College

The organizing committee for the 26th College Chemistry Canada Conference invites you to visit eastern Ontario, the city of Belleville, and Loyalist College, June 3 to 6, 1999. The Quinte area was settled by United Empire Loyalists in 1784 and reminders of their heritage can be discovered as one travels down the Loyalist Parkway Route. Enjoy the picturesque countryside, farms, museums, century homes and more that make up the route. The Quinte area has strong ties to the agricultural community and is well known as one of the finest cheese and milk producing areas in the province and Hastings County has been officially designated as the Cheese Capital of Canada. The area is also a large producer of apples and this can be celebrated during "Applefest" in nearby Brighton.

Belleville is situated on the Bay of Quinte, which is famous across North America for its Walleye fishing. There are four provincial parks located in the Quinte area. Presqu'ile Provincial Park is a premier outdoor educational site and the park's interpretive activities, such as birdwatching, are very popular. Sandbanks Provincial Park, as the name suggests, is home to the largest and most beautiful sand beaches in Eastern Ontario with some dunes rising to 25 meters in height.

The campus is situated on the outside of the city limits and the committee has tried to organize the conference in a manner as to eliminate the need to commute back and forth between hotels, banquet facilities, etc. All functions will be held on campus and we hope most people will stay in residence to help simplify transportation concerns.

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C_3 News

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Articles of any length will be gladly accepted. Please send typewritten copy to the Editor at the above address or send by fax. Copy can also be sent on a 3.5" disk, Mac or IBM format using Microsoft Word 6.0, or IBM format using WordPerfect 6.0 or lower, or any word processor producing ASCII output.

Designed by R. Franchuk

Printed by Athabasca University

President's message

Hello chemists!! Here we are 75% of the way through the fall semester, only 7 months until the Loyalist conference. Check out the conference information included in this issue and start thinking about your travel plans. For those of you in the area, the CSC conference is taking place in Toronto (May 30 to June 2) just before our conference. In the meantime, I am certain that we are all struggling with a certain percentage of students in our classes who are under-achieving. I thought I would include a few thoughts on this matter, based on discussions with several of my students this fall, to let you know that you are not alone.

The first semester after high school can be overwhelming to a student who has managed to get by without developing good problem-solving skills. Here at Kwantlen we package up copies of midterm and final exams from the previous year from each instructor who taught a section of a particular course and the students can purchase these at our bookstore. The complete solutions are not provided in most cases, only a numerical answer. I had two students in our Chem 12 upgrading course (anyone with less than a C+ in Chem 12 must take it) come in to my office a couple of days before their first midterm exam. They wanted to know if the exams in the booklet they had purchased had actually been used the past year as they didn't see any multiple choice questions. I was a bit puzzled and asked what difference that made. Their response was that how could they be expected to do well if the correct answer was not provided? The exams they had in high school had been largely multiple choice and it had been a simple matter for them to put all the choices into the question and quickly determine which one fit the numbers provided. You can probably anticipate the outcome, neither student passed the first midterm exam.

Another student has been coming to every class with the solutions manual for the textbook and when it is time to try a question, immediately pops open the solution manual to get a hint as to how to solve the problem. I have tried (unsuccessfully to this point) to convince him that checking the solutions for a hint is like having me sit beside him during the exam, whispering hints into his ear. To many of them this is how problem-solving works, you read the question and get the solution manual to give you a hint. When students come for help with a question I immediately ask to see their workings; too often all they show me is the solution manual and ask me to explain why the question has been solved that way. It is a slow process but I gradually get them to believe that there are better ways to master the material. The difficulty is that they all require sustained effort throughout the semester, not just a massive cram session the night before an exam.

Many of our students are also unaware of the difference between a problem and an exercise. I tell them that one has to do exercises first to build up an understanding of the words associated with a particular portion of the course syllabus before moving on to tackle problems. Many students never move beyond the exercise stage because problems are too difficult, it is much more satisfying for them to do 15 questions in a section with the heading LIMITING REAGENTS than venture into a section with the heading PUTTING THINGS TOGETHER. This is not only true for first year, my second year introductory organic students have trouble making the distinction. An EXERCISE is a question that you don't have to think about; e.g., what is the structure of 1-butanol? A PROBLEM would be: provide the Newman Projection of the gauche form of 1-butanol, looking along C3 to C2. In this case the student must be able to draw the structure, remember what a gauche conformer looks like, sight along the correct bond, and then draw what he/she sees in 2-D.

We are all trying our best to help our students become better problem-solvers and more efficient critical thinkers using chemistry as the vocabulary base. So, when you feel like hitting your head against the blackboard in your classroom, just remember that many of your colleagues across the country are going through the same thing you are. Feel free to pass along any suggestions you find to be effective with your classes.

Bob Perkins

Loyalist College's new Living Technology Centre

by Mary Taylor, Loyalist College

Loyalist College houses the only natural-systems Living Technology Learning Centre in the area. Since its official opening on Sept. 14, Mary Taylor, Coordinator of the Environmental Technology program has given many tours of the centre to interested parties.

The entire project was spear-headed by members of the environmental club who convinced the college to renovate the greenhouse for this purpose. They spent many volunteer hours in fund-raising and construction and without their vision and initiative the project would never have become a reality.

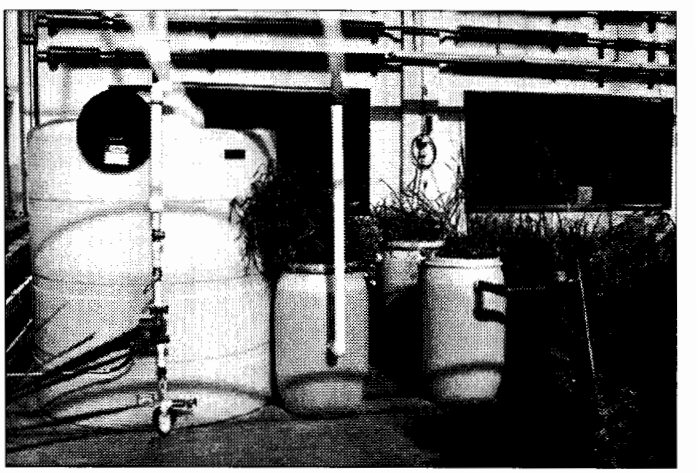
The greenhouse houses two installations, the breathing wall and the living machine. The breathing wall filters air through a wall of wet moss. Contaminants in the air dissolve in the water trickling down the wall and are absorbed and broken down by the plants on the wall and in the marsh at its base. The water collects in the marsh and is recycled back up. The research into systems of this kind was pioneered by NASA as a way of cleaning the air in space stations. Because these installations are beautiful as well as functional they are becoming increasingly popular to treat "sick building syndrome". The heating and cooling systems of modern office buildings provide minimal exchange with outside air. As a result compounds given off by furnishings and office machines accumulate in the atmosphere and cause sickness in office workers. Breathing walls not only clean and humidify the air, they also provide an attractive oasis of greenery in the working environment.

The living machine is used for the treatment of waste water. It uses the microorganisms, plants and animals in a series of simulated stream, pond and marsh ecosystems to remove contaminants and nutrients from the waste water. The waste passes through a series of "silos" which are home to bacteria, algae, and other microorganisms, snails, crustaceans, insects and fish as well as many kinds of plants. As in natural systems, a wide range of diversity is important to its functioning. From the silos the water goes through three biofilters which alternate aerobic and anaerobic conditions, then into a series of marshes. The first marsh is permanently wet, the next is a "tidal marsh" which is pumped down as it fills, and so cycles through high and low "tides". The entire system mimics the natural cleansing action of aquatic and wetland ecosystems.

The breathing wall, filtering airborne contaminants through a wall of wet moss.

At the opening of the centre, Federal Environment Minister Christine Stewart said this project represents action in the four basic themes that she promotes: clean water, clean air, climate change and nature. She officially opened the centre and congratulated staff and students on their accomplishment.

Aatos Lehtila, Dean of the School of Applied Science and Technology, said this type of system is very new and predicts a need for trained technologists in the area. Lehtila is pleased the college is now able to provide this training.



The living machine, showing the silos that house a variety of microorganisms, animals and plants.

Loyalist Country

continued from page 1

Trentway Wager Bus Lines has a direct link from Pearson International Airport, in Toronto, to Belleville. They have agreed to drop delegates off at the campus on route to the bus station, in downtown Belleville. With all the amenities that the college has to offer, we know that everyone is going to enjoy their stay in Loyalist Country.

Although the Quinte region has been hard hit by global downsizing, there are still many world class industrial facilities in the area. Some of the more notable operations include: Nortel, Mobil Chemical, Deloro Stellite, Rexcan Circuits, Quaker Oats, Canada Colours, IKO Industries, Procter & Gamble, Alcan, DuPont, Celanese Canada, Essroc Italcementi Group and Ontario Hydro.

So you can see that there is much to discover along the shores of the Bay of Quinte. Why don't you join us and see all that this area has to offer.

The conference will get underway on June 3 with the traditional wine and cheese.

This affords everyone the opportunity to renew acquaintances, visit with company representatives and view industrial displays.

On Friday, speakers will present papers on a wide range of topics, from specific chemical processes to cutting edge research. Most of the speakers will be alumni from the chemistry program at Loyalist College. The companies that will be represented are: Atomic Energy of Canada, Alcan International, Mobil Chemical, Estee Lauder Cosmetics, Nortel, Mead Johnson, Celanese Canada, Ontario Hydro, DuPont and Canada Colours.

On Friday evening, we have a banquet planned which will be held in the Student Activity Centre. After the banquet, the centre will be available so that delegates can continue to socialize. And to answer your next question, yes it is a licensed establishment.

Saturday morning will start with a fun run that will be held in the Moira River Conservation Authority grounds, which is directly across the road from the college. Saturday will include presentations on the changing workplace and how this will affect graduates. We have scheduled several hands on sessions that includes: surfing the internet for chemistry items, how to use computer interfaces in the laboratory and a tour of our Living Technology Learning Centre, which houses a "breathing wall" and a "living machine" (see story, page 3).

Saturday evening there will be dinner in the Student Activity Centre and once again delegates are invited to stay around, sit on the patio and enjoy the scenery and stimulating conversation.

On Sunday we have planned a tour of the 1000 Islands area, which includes a three hour boat cruise and a stop at Boldt Castle. The tour will leave from the campus and make a quick stop in the "County" for breakfast at Lake On The Mountain. From there we will take the Glenora ferry back to the main land and on to the 1000 Islands Skydeck observation tower. This provides a spectacular view of the 1000 Islands and the St. Lawrence River. After resting for lunch, it's on our way to Gananoque for the boat cruise.

So hopefully now we have piqued your interest and will see you in June. More information will be provided in the next issue, but if you have any questions please feel free to contact me or Don Todd:

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Students encounter difficulties in conceptual thinking!

by Sudhir Abhyankar, Sir Wilfred Grenfell College

It is a common experience of chemistry teachers that students will have little or no difficulty in answering questions, which require them to fill in numbers in an equation, and to get the correct answer using the calculator. A typical example in acid-base chemistry would involve calculation of the K_a value of a weak acid of known concentration, using the percent dissociation. Most students know how to do this and will arrive at the correct answer using the formula, the equation and the calculator. It is quite surprising, however, to find that when the students are required to do some conceptual thinking which requires understanding and applying that understanding to a given problem, they find it difficult.

We had asked the following question on the final examination of our general chemistry course:

A volume of 25 mL of 0.10 mol/Lof a monoprotic weak acid is needed to neutralize a certain mass of sodium hydroxide. If you were provided with a 0.10 mol/L solution of a monoprotic strong acid, would you need more, less, or the same volume of the strong acid to neutralize the same mass of sodium hydroxide? Explain your reasoning.

We were very surprised at the number of students who had difficulty in answering this question. There were 169 students who wrote the final exam. The results of their answers are summarized in the following table:

Response to the question	% of students
Less volume of strong acid	53
Same volume of strong acid	31
More volume of strong acid	7
No response	7
Irrelevant response	2

It can be easily seen from the results that only 31% answered the question correctly by choosing the same volume option. More than half or 53% responded by saying that less volume of the strong acid would be required to neutralize the same mass of sodium hydroxide. Another 7% responded by saying that it would require more of strong acid and 9% gave no answer. Finally there was a very small percent of students, 2% who gave a totally irrelevant answer.

It is interesting to note further that even though 31% of the students gave the correct answer by choosing the same volume option, 5% of them did not explain their reasoning as required by the second half of the question. Thus only about a quarter or 26% of all students were able to answer the question correctly and fully.

It is clear from the numbers described in this note that students encounter difficulties in conceptual thinking. Here, for example, they do not completely understand the difference between a strong and a weak acid, the principles of acid-base titration, and the concept of equivalence point.

In conclusion, it is essential that we address these difficulties in our classroom instruction, develop simple demonstrations or experiments to reinforce their understanding and design questions which will test students' conceptual thinking rather than their ability to memorize equations, punch in the numbers and get the correct answer.

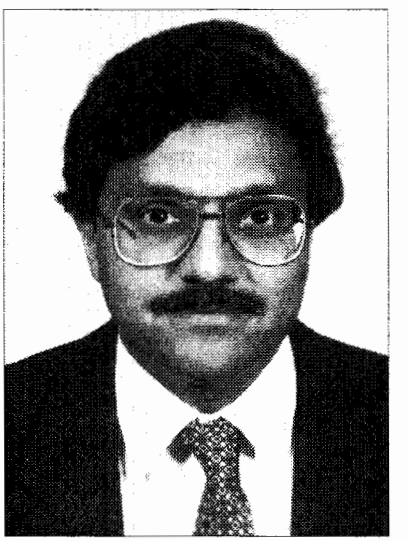
Editor's note

Dr. Sudhir Abhyankar has been included in the 1998 edition of "Canadian Who's Who." The directory, publishd by the University of Toronto Press, includes short biographies of prominent Canadians from all walks of life who have made significant contributions to life in Canada.

As many of our members know, Sudhir has taken an active role in C_3. He has served as the Regional Director for the Atlantic region (1985-1990, 1997-) as well as the President-elect, President and Past-president (1993-97). Sudhir was the conference coordinator for the joint C_3-2YC_3 conference at Sir Wilfred Grenfell College in Corner Brook in June 1997.

Sudhir is one fo the first members of C_3 to be included in this prestigious publication. Hopefully we will have a few more.

Congratulations, Sudhir.



15th Biennial Conference on Chemical Education: A Personal View

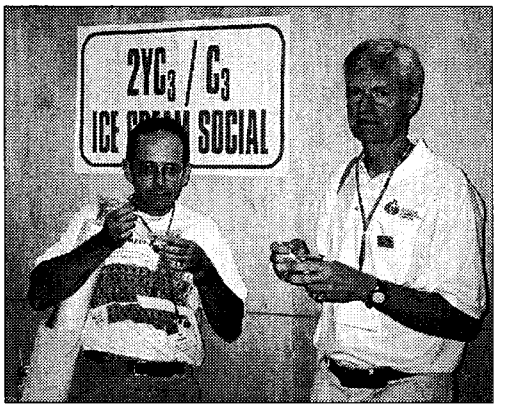
by Bob Browne, Kwantlen University College

The 15th BCCE was held at the University of Waterloo in August, the first time the conference has been held outside of the U.S. No matter how you measure it, this conference was big. There were 1500 delegates from all over the world, over 800 papers presented, and hundreds of workshops given during the six-day conference.

Bringing the conference to Canada, and Waterloo, was the dream of Reg Friesen. Those of you who attended the 1997 C_3 conference in Corner Brook Newfoundland, will remember Reg as an active, enthusiastic promoter of this conference, and of chemical education in general. While his declining health had unfortunately confined him to a wheelchair, his stamp was unmistakably imprinted on the planning and implementation of the meeting.

Plenary Sessions

For me, the plenary sessions were the highlight of the conference. David Dolphin from UBC and QLT Technologies led off these sessions with a discourse on his company's latest photoactivated drugs for curing certain types of cancer and AMD (Advanced-age Macular Degeneration). In the process we learned about clinical trials and the business aspects of bringing a drug from the bench to the market. There were two wonderful sessions on demonstrating chemistry, one by Steve Spangler, and the other by Irwin Talesnick. Mary Anne White, who gave one of the better talks at our Newfoundland conference, spoke on how materials science can be use to sneak physical chemistry into the chemistry curriculum. The closing plenary, or should I say show, was entitled "Signature Demonstrations", and was held in a real theatre complete with theatre lighting and music. Organized and moderated by Steve Spangler, this show gave some high profile educators a chance to do their one favorite demonstration. Bassam Shakhashiri and Hubert Alyea even made appearances thanks to modern technology. Irwin Talesnick showed how to introduce the elements of risk, and surprise (the two most important ingredients of a successful demonstration, according to him) with the U.V. activated H_2 + Cl_2 reaction. The surprise was that it didn't work the first time, but the audience soon realized that this was part of the script. It closed the conference on a high note.



Bob Perkins (left) and Bob Browne socialize over ice cream at the 15th BCCE.

Workshops

Workshops were presented in the two days prior to the official opening and throughout the five days of the conference. The first day I attended a three-hour workshop on Great Ideas in Physical Science, thinking that I might pick up some tips for teaching a course for non-science majors which I had just given for the first time. I'm sure that if you wanted to gain a specific skill, a workshop might be just the ticket for you. However, after spending an hour determining the density of Coke and Diet Pepsi, I gained an appreciation for why many of our students have been turned off science. The only "great idea" I got was how to escape this mind-numbing session without major brain damage. I decided to skip the other workshops.

Concurrent Sessions

Can you imagine having to decide what talk you want to hear when there are ten concurrent sessions each morning and afternoon? I can tell you, it was a lesson in planning and decision-making. I ended up going a to number of talks on the use of the World Wide Web in the teaching of chemistry. These sessions all left me with the impression that American educators just have too much time and money for their own good. The resources being poured into web-based instruction seem enormous, in spite of the available evidence that suggests it does little to improve student learning or retention. One major university is writing a chemistry text on line. Research suggests, however, that students do not read text-based materials on line, but print them out for reading later.

It wasn't until the very last session of the very last day that I heard a presentation on the use of the Web that made sense. Scott Bramer from Widener University uses a web browser as a presentation manager in the classroom. This has two advantages. First, the browser software makes it easy to show video-clips, animations, spreadsheets, and molecular modeling without having to start a separate application for each one. Of course it also allows him to show web sites which are relevant to what he is teaching. The second advantage is that all of this material can be put on the web for his students to access after class. It is his assertion that students will only access web-based materials if they are different than what can be found in traditional sources (text etc.).

Ice cream social

C_3, and our sister organization in the US, the $2YC_3$, sponsored an ice cream social on the second evening of the conference. I'm sorry to report that it didn't raise our profile in the ChemEd community very much. Oh there was ice cream all right, and there were hundreds of people there, but Bob Perkins had to search to find the one sign (sans explanation) which indicated who the sponsors were.

Conclusion

I note in passing that there were some obvious difficulties with using a campus as small as Waterloo's for a conference of this size, but overall, this to me is THE chemical education conference on this continent, and well worth the struggles.

Getting Your Chemistry Class on the Internet

by Brad Pavelich, Medicine Hat College

Have you ever needed to distribute material to your chemistry students who have already left the classroom for their next course, or the city for a weekend or mid-semester break? What about sending an e-mail message to a student or a group of students, but you do not know the e-mail addresses? Or would you like to have your students send you messages or questions at any time, day or night, without the invasion of privacy which comes with the home telephone call?

Maybe the combination of your library, e-mail, and voice mail has allowed you to reach more students more of the time. Perhaps your institution has provided server space, and you have already made your course available over the internet, complete with course outlines, assignments, and a forum for questions and answers. Of course, the latter solution requires money and your time, especially when it comes to developing a multifaceted course home page.

If you would like the convenience a web page provides without spending a penny and requires only enough time to cut and paste course outlines, old tests, etc., then direct your web browser to http://www.nicenet.net, and let the Internet Classroom Assistant bring the power of the internet to your class.

The Internet Classroom Assistant (ICA2) is the primary product of Nicenet, an organization dedicated to supplying tools and resources to education providers at absolutely no cost and without advertising. ICA2 allows you to conference with your students, send and receive messages, share documents, keep an up-to-date class schedule, and share interesting links. ICA2 runs on Nicenet's server and works with any web browser on any platform. And it only takes a couple of minutes to input a user name, password, and class name to create your class at Nicenet. You will then be able to provide your students the "class key" that will allow them to enter the class over the internet, and begin exploring your internet classroom. Thousands of people all over the world have been visiting the hundreds of courses already created at Nicenet, including my students in chemistry, biochemistry, and mathematics. (Sadly, at the time of writing, the Nicenet site has been experiencing server problems, and my students and I have had to resort to older methods to communicate outside of the classroom; we sorely miss the web site!)

The strength of ICA2 goes beyond the price and time requirements - it is in the resources provided for every class. These include the following:

Conferencing

You can create private, threaded conference topics, but you also have control over whether or not students can create topics for discussion.

Scheduling

You can place a complete class schedule on line. Each time a student logs on they are presented a "Week at a Glance" summary, and they can look at the complete schedule with the click of a mouse.

Document Sharing

Simple forms allow both the student and professor to publish their documents on the site; thus, assignments can be turned in on- line. This is a great place to post new assignments and old examinations for students to browse or print.

Personal Messaging

With the convenience of e-mail, students can send messages to other classmates ("Where is the data for the lab report due tomorrow?"), or you can send messages to individual students or the entire class.

Link Sharing

You (and your students, if you choose) can post links to sites appropriate for the course.

After spending an hour visiting another instructor's Nicenet classroom (Dr. Jay Johnson of the Medicine Hat College, with whom I presented this material at the 1998 C_3 Conference), I was convinced this was the fastest way to create home pages for my classes on the internet, without spending hours working with web page creation software and playing with HTML tags. Both my Chemistry 203 and Biochemistry 393 students were the first to witness my efforts, and everyone came away satisfied. In particular, my first year chemistry students (complete with an energetic group of engineers) loved the site. Scheduling, sending messages, and posting documents were the reasons I wanted to use ICA2, but the students took full advantage of the conferencing and messaging.

Certainly there have been a few problems, and access times can be long, but everyone has been happy with the product. When the current semester began I offered to create similar internet classes for chemistry and mathematics, and everyone wanted the convenience of the internet. And when "Who makes the best hamburgers in Medicine Hat?" or "Why the Spice Girls are the top musical group of 1998..." appear as conference topics, I have the option as class administrator to read and laugh, or quietly delete.

Writing an article as to why you should use Nicenet if you do not already have your course on the internet will not convince you to do so by itself. Try visiting the site, and create your own class. I promise that it is much easier than any chemistry course you have taken, and the results will soon convince you that it was the right thing to do.

(Note: If you would like to visit my chemistry class at Nicenet, send me <pavelich@acd.mhc.ab.ca> your e-mail address and I will send you the class key.)

Visit the C_3 web site at www.c3.douglas.bc.ca

Conference photos and information!

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Renewals

If you would like to continue receiving C_3 News, please remember to renew your annual membership. Forward a $20 cheque to the Treasurer, Jacky McGuire, payable to "College Chemistry Canada."

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26th Conference of College Chemistry Canada
Loyalist College
Belleville, Ontario, Canada
June 3 - 6, 1999

Preliminary Call for Papers
Participants are invited to submit papers concerning chemical education.

Title and abstract of your paper (or description of the workshop):
Attach a separate sheet with the title, abstract, and/or description of your paper or workshop.

Required Audio/Visual Equipment:

_____

_____

Name: _____

College or Institution: _____

Mailing Address: _____

_____

Phone: _____

Fax: _____

E-mail: _____

Mail or fax this form to:

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Deadline for Submissions: March 1, 1999