

C₃ News



Newsletter of College Chemistry Canada / La Chimie Collégiale au Canada

Loyalist College welcomes C₃

Loyalist College in Belleville, Ontario is gearing up to host the 26th College Chemistry Canada Conference, June 3 to 6.

The conference will highlight presentations from local industry, and from C₃ members on chemical education. The program on Saturday will include some hands-on seminars.

Social activities include a wine and cheese reception, fun run, and a field trip to the 1000 Islands area. Belleville is situated in eastern Ontario, on the shores of the Bay of Quinte, a mere two hours drive east of Toronto. For a complete conference program, please see pages 4 and 5.



All signs point to Loyalist College for the site of the next great C₃ conference!



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C₃ News

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President's message

The big news this issue is from the National Office of the CSC. I attended the Chem Ed Division Meeting at the CSC Conference in Whistler last year (it was a hard choice as I had to miss out on the Medicine Hat field trip to see the dinosaurs) and suggested that C₃ members could become more involved in the CSC if the cost was not so high. After lengthy discussions over the past year, the CSC Board has approved offering Affiliate Membership in the Chem Ed Division to those who teach in community/2 year colleges and are members of College Chemistry Canada. I am very pleased with this new opportunity for C₃ to join with the Chem Ed Division of the CSC to enhance chemical education in Canada. I will bring along some application forms with me to the Loyalist Conference. For those of you who won't be at the conference, membership application forms are downloadable from the following URL:

<http://www.kingsu.ab.ca/~chemed/hstchaff.htm>

Affiliate Membership in the Chem Ed Division of the CSC will cost \$10 and includes the following services:

1. A copy of the Chem Ed Division newsletter
2. Special registration rate (\$55) at the 1999 national CSC Conference in Toronto
3. One copy of the Education Issue of the CSC monthly magazine - ACCN

This may be too late for many of you to make plans to attend the both the CSC and C₃ conference this year, but it could be very feasible next year as the CSC conference will be in Calgary just before our C₃ conference in Kamloops (just a short drive over a few mountains!!). I will keep you posted of any further developments.

As I sit typing this report all I see to my left and right are stacks of exam papers. I keep telling myself that I do the teaching for free, marking is what the college pays me to do. We are all running out of steam at this point in the semester so it is a good thing it is time for a C₃ conference. Don and Reg have put together an excellent program and I look forward to some thought-provoking presentations, a chance to renew friendships and an opportunity to compare notes of what is happening at colleges across the country. I hope to see many of you there and please seriously consider putting your name forward for one of the executive positions that are up for election.

Bob Perkins

Visit our C₃ Web pages at

www.douglas.bc.ca/chem/c3/c3home.html

for C₃ information, links to other college chemistry sites, and summaries and pictures of previous conferences, as well as this year's C₃ conference information.

Difficulties in conceptual thinking or interpretation?

Henry Carter, Augustana University College

I read with a great deal of interest Sudhir Abhyankar's article entitled "Students encounter difficulties in conceptual thinking" in the Winter 1998 edition of C₃ News. I agree that students often lack an intuitive understanding of simple concepts and often depend on formulae or equations to solve problems. As chemistry teachers, of course, we try to get our students to understand chemical principles, to think critically and to use logic in solving problems rather than mindlessly plugging numbers into equations. There is a key difference between learning material and trying to memorize information.

While answering questions from students, I try to analyze how students are thinking and try to determine their sources of confusion. I also try to identify student thinking patterns by examining their responses to exam questions. Clearly, some students are able to think intuitively. Others students prefer a more methodical approach to solving problems.

Occasionally, students miss a question that the instructor thought was easy. Here, the problem could be a lack of understanding on the part of students. However, it is also very possible that the real problem is how students have interpreted the question.

This may well be the case for the question posed by Sudhir on his final exam: "A volume of 25 mL of 0.10 mol/L of 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."

I would suggest that this question might be confusing to those students who recognize that the solution resulting from a strong acid/strong base titration is essentially neutral at the equivalence point, while the solution resulting from a weak acid/strong base titration is basic at the equivalence point. Since the topic of titration curves is well-covered in lectures

and is experienced by students in the lab using both indicators and pH meters, this is a real possibility.

Support for this argument comes from a follow-up article in the Spring/99 edition of C₃ News written by my colleague at Augustana. John presented a slightly modified version of Sudhir's question to his second year organic chemistry class. He also asked his students as to how they interpreted the word "neutralize". Does it mean ...

- (a) bring the reaction mixture to pH 7.00?
- (b) find the equivalence point (react with a stoichiometric amount of)?
- (c) something else?

In response to John's modified question, only 6 out of 29 students in the class chose the "correct" answer. However, it gets worse. Of the 6 students who chose the "correct" answer, 4 chose "neutralize" to mean answer (a) which, while true for the titration of a strong base with a strong monoprotic acid, would not be true for the case of the titration of a strong base with a weak monoprotic acid. Furthermore, 20 out of the 29 students interpreted "neutralize" to mean answer (a), i.e. bring the reaction mixture to pH 7.00.

If "neutralize" does mean bring the reaction mixture to pH 7.00, then slightly

more weak acid than strong acid would be required to neutralize the strong base. If we mean "neutralize" to imply that the equivalence point has been reached, then the same amount of strong acid as weak acid would be required. Of course, if not using a pH meter, we would have to choose our indicator carefully for the strong base/weak acid titration so that the pH range of the indicator covered the equivalence point.

Perhaps, Sudhir's question should read: "In titrating a certain mass of sodium hydroxide dissolved in water, the equivalence point is reached after a volume of 25.00 mL of a 0.1000 M solution of a weak monoprotic acid is added. If you were now provided with a 0.1000 M solution of a strong monoprotic acid, would you need more, less or the same volume of the strong acid to reach the equivalence point of the titration of the same mass of sodium hydroxide dissolved in water?" I plan on giving this question (on a survey basis) to my first year chemistry class next year.

In the meantime, while I agree with Sudhir's view that students have difficulties in conceptual thinking, it may not be the main problem entirely for this particular exam question. It may also be a matter of interpretation.

Fame! Fortune! Excitement!

At the AGM to be held during the Loyalist Conference, we will be electing Regional Directors for all five regions of the country as well as several key executive positions. Nominations are now being accepted for the following positions:

President-Elect
Treasurer
All Regional Directors

Secretary
Editor

Nominations can be submitted to any of the Regional Directors or members of the Executive.

Conference program

The program features 10 speakers on Friday (mostly Loyalist grads) and three speakers plus three group seminars on Saturday. These group seminars will highlight:

1. Using the Internet
2. Computer Interfaced Chemistry and
3. Loyalist College's "Living Technology Centre".

Most of the lectures will take place in Alumni Hall (1H6). The other locations will be given at the time of registration. Sign-up sheets for the group seminars will be available at registration so that all participants will be able to attend all three of these workshops.

Thursday, 3 June

03:00 C3 Executive Meeting
 06:00 Registration Opens
 07:00 Wine and Cheese Reception

11:30 Graham Stratford (Alcan)
 Chemical Applications to R & D in the Aluminum Industry
 11:55 Max Ferguson (Eastern Connecticut State Un.)
 Ten Top Environmental Problems in North America

Friday, 4 June

07:30 Breakfast Available
 08:30 Registration Opens

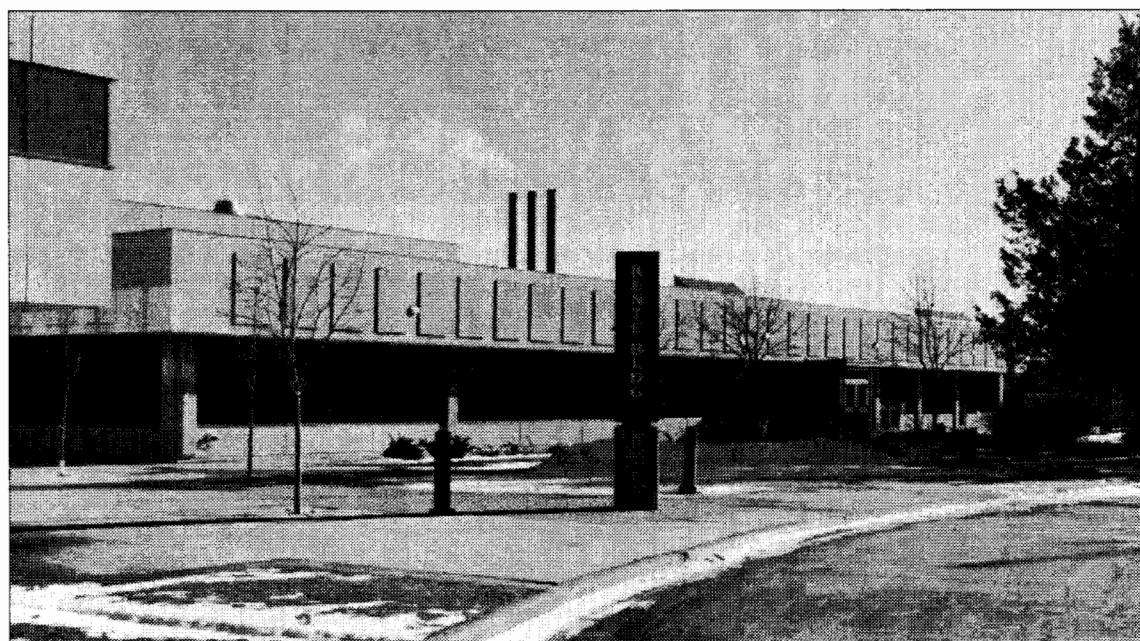
 09:00 Opening Remarks

 09:20 Mike Ryan (AECL)
 Analytical Chemistry in the Nuclear Industry
 09:45 Ruth Orwin (Quaker Oats)
 QA in the Manufacturing Industry
 10:10 Break
 10:40 Tom Baker (Celanese Canada Inc.)
 Low Level Finish-on-Fibre Analysis by NMR
 11:05 Wendy McGeachy (Mobil Chemicals)
 Oxygen Barrier Enhancement of Polypropylene Films

12:00 Lunch

 01:30 Roy Paul (McNeil Consumer Products)
 Chemistry in the Pharmaceutical Industry
 02:05 Mike Sullivan (Canada Colours)
 Colouring Thermoplastics
 02:30 Break
 03:00 Norm Reed
 Chemistry & Environmental Chemistry Programs at the University College of the Cariboo
 03:30 Wendy Desrocher (Dashing Designs)
 Applying Learned Skills to a New Venture

 07:00 Banquet - Student Centre



The main entrance to Loyalist College.

Saturday, 5 June

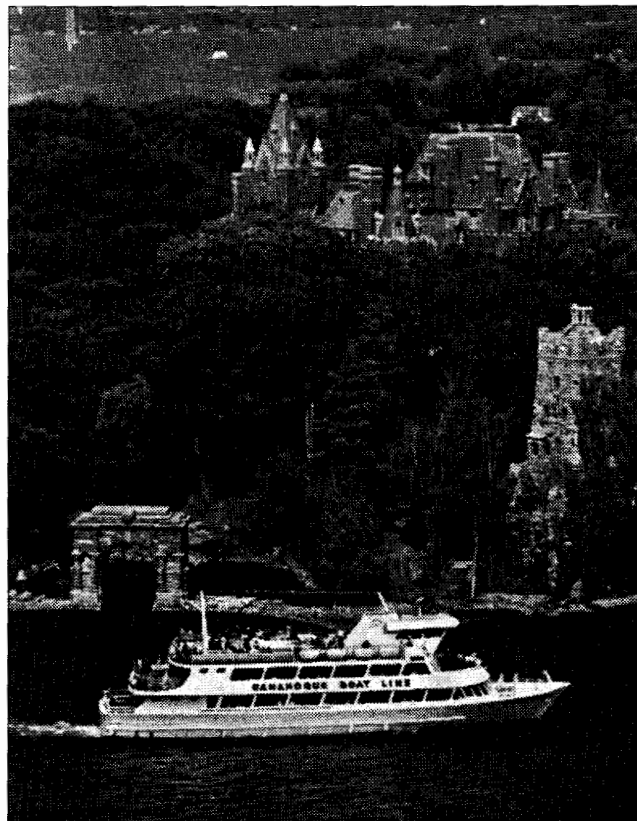
- 07:00 Fun Run/Walk
- 08:00 Breakfast Available
- 08:30 Registration Opens

- 09:00 Bev. Christian (Nortel)
Potential Global Warming Contributors
- 09:45 Sudhir Abhyankar (Sir Wilfred Grenfell College)
Student Input in Designing General Chemistry Problems
- 10:15 Break
- 10:30 Group Sessions #1

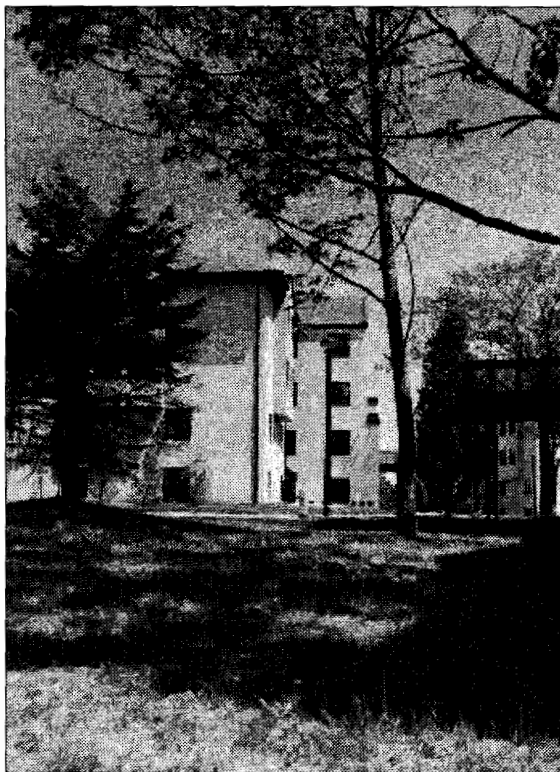
- 12:00 Lunch

- 01:00 Patricia Welsh (Mead Johnson)
Education Needs
- 01:30 Group Sessions #2
- 03:00 Break
- 03:15 Group Sessions #3
- 04:45 C3 Annual General Meeting

- 07:00 Buffet Dinner



The Gananoque Boat Tour cruises past Boldt Castle - part of Sunday's field trip.



Loyalist College residences.

Sunday, 6 June

- 08:00 Tour Departs College Residence
- 08:50 Arrive at Lake on the Mountain
- 09:15 Leave Lake on the Mountain
- 09:20 Arrive at Ferry
- 11:00 Arrive 1000 Island Sky Deck and Restaurant

- 12:30 Leave Sky Deck Restaurant
- 12:45 Arrive Gananoque Boat Lines

- 01:00 Boat Tour (three hr) plus Boldt Castle (two hr)
- 06:00 Arrive back at Gananoque
- 06:10 Leave for Belleville, with fast food stop somewhere on return trip
- 08:00 Arrive Loyalist Residence

On being a woman in chemistry

Susannah Scott, University of Ottawa

"You explain this stuff so well, you should be a professor!", an undergraduate effused as she wrestled with a multiple equilibria problem from my laboratory course in Environmental Chemistry. Caught off guard, I retorted that I was a professor, to which the student earnestly replied, "Well, I meant, you ought to be a *real* professor, not just a lab professor." This is a true story; I was both flattered and disconcerted by it. The student was female, and so am I. And I am a genuine, no-disclaimers-necessary professor of chemistry at the University of Ottawa.

Why, on the verge of a new millenium, do students continue to perceive my job as incompatible with my gender?

Another *mise-en-scène*: I'm a featured speaker on the synergy between chemistry and economic opportunity, at a meeting for Members of Parliament and other influential policy makers at the National Press Club in Ottawa. Dressed in (what I think is) a smart suit and wearing my name badge, I sit down in the front. A politician takes a seat nearby, then introduces himself. He asks if I'm a student at the University and which professor I'm studying with. I reply that, actually, I work at the University. When I rise to give my talk, he looks embarrassed.

Why, in an age of equal opportunity and affirmative action, are both ordinary and accomplished people surprised by my chosen profession?

I started training to be a scientist 15 years ago. During this period I benefited from many university and NSERC initiatives and incentives, all based on academic merit, and one specifically targeted to enhance the participation of women (NSERC's Women's Faculty Award program). I did not encounter institutional barriers, although I was encouraged more by some teachers and colleagues than by others. A few of them went out of their way to shore up my confidence and guide me towards a career in science.

To those non-scientist friends who ask me why I chose chemistry (I assume to my

fellow chemists that the answer is obvious), and even more curiously, academic research, I reply that I love discovery, the thrill of being in unexplored territory. I also love order; making ideas and observations fit into place so that underlying patterns emerge is what delights me. And I believe at the crucial time when a decision had to be made, "Which science path to follow?", chemistry was one among many that I could have chosen. Chemistry won me over because of the teachers who showed it to me. The young, energetic faculty (Ole Hindsgaul, Norm Dovichi and Joe Takats especially) at the University of Alberta were the most dynamic and fascinating lecturers I had ever seen, despite the absence of even one woman among them. The women I encountered in the chemistry department were research assistants, laboratory managers, secretaries.

So how important are female role models for young women studying science? From my own experience, they are not essential. Anyone with the patience and interest to encourage students to pursue their goals with passion can be a mentor and a role model. But I do admit to an important, possibly pivotal experience as a graduate student working closely with a woman, Andreja Bakac, whom I revered as one of the most perceptive scientists I have ever met. She was not a professor, although she was certainly smart and hard-working enough to have been one. I learned from her that a good scientist needs impeccable probity, guts of steel and a hide of leather. And you've got to put your heart into it.

The undergraduates I teach now are socially-, ethnically- and gender-diverse. The science faculty is not. The percentage of female academics is slowly increasing, but women are still a visible minority, and one which students and outsiders find incongruous. Of course, there are benefits to being "unusual". Attention is what most

scientists crave, from whatever source. Being recognized, cited, talked about, and invited to conferences, are all important signs of recognition, especially early in one's academic career. At the same time, one must not be dazzled by the spotlight. Because they are a scarce commodity in science and engineering faculties, women find themselves overloaded with committees and administrative duties. It may also be true that women, socialized to please, struggle more than their male colleagues with their own consciences to decline these duties.

It is not a simple task to identify the modern day inequalities which still inhibit the full participation of women in the scientific enterprise. They are rarely overt, but are hidden in the academic career structure. The emphasis on assertiveness and showmanship creates an internal dilemma for young women who are in the process of defining their own identities, because these are not qualities that society equates with femininity (whereas shyness, a more typical feminine attribute, can be a decided disadvantage to a scientist). Women in university science departments feel isolated. Nurturing self-confidence, perseverance and a network of fellow sympathizers are some of the survival tactics.

Being a successful researcher requires dedication, even to the point of obsession. It is only fair to warn apprentice seekers-of-truth that being a scientist is rarely a nine to five job. Young male as well as female colleagues agonize over career/social life/family choices, so that women can no longer feel uniquely disadvantaged. What can teachers of chemistry do to encourage young women to view science as a personally as well as professionally fulfilling career? Make it a point to show your students how science is and always has been a human endeavor. Chemists are real women and men with flaws and dreams. The more diverse the seekers, the richer is our profession.

Profiteering 'trainers': Newfoundland leads the country

Diana Messervy, College of the North Atlantic

Last September a prominent private college in the province of Newfoundland declared bankruptcy, causing an uproar in both Newfoundland and Nova Scotia, where students were left stranded in the middle of their programs, and the government of Newfoundland was looked upon for financial help to relieve the situation.

Reaction to the collapse of this college (reportedly with an accumulated debt of twenty million dollars) was swift and vocal. The government quickly moved in to form a commission to investigate the cause and effect of the school's demise; private citizens spoke out with concern.

Instructors and staff of one of the campuses of the provincially owned College of the North Atlantic prepared a brief to the head of the commission, Dr. Phillip Warren, outlining their concerns about the unprecedented growth of private colleges in Newfoundland during the past decade.

The brief stated: "the instructors in our college comprise the main body of post-secondary educators in the province; therefore we feel it is both our right and our duty to speak out in defense of our profession. We dedicate considerable energy and concern to the training of our students and to the development of our programs and our college. The track records of our graduates speak for themselves. We have a history we are proud of. We are quite dismayed to see our students being lured away to unproven new colleges that have sprung up overnight with little justification for existence other than to be a hot new business venture for aspiring entrepreneurs.

Nowhere in Canada have private schools increased as they have in Newfoundland and Labrador since 1990. Private, for profit colleges have grown to a point that they threaten the existence of our public system."

Three major areas of concern were questioned:

1. Are educational standards being maintained in the private schools?
2. Does not 'Education for Profit' equate to a conflict of interest?
3. Then, the question of Ethics

The brief also made reference to an article entitled: "Profiteering 'Trainers' : Newfoundland Leads the Country."

Exerpts from the article are given below:

"It is a dubious distinction, but the privatization of college level education has gone farther in Newfoundland than in any other province in Canada - indeed, beyond what any other Canadian province is ever likely to go. There are now over 90 private school campuses in the province, compared with 16 public campuses. There are around 9,000 students enrolled in private school programs, roughly equal to the number in the public system - and up from two or three hundred less than a decade ago...."

"As Newfoundlanders have found out the hard way over the past few years, private colleges mean astronomical tuition fees, dubious program quality and unreliable credentials. How, then, can our Governments justify allowing the uncontrolled growth of a private education 'industry' at the expense of our population?

The fact is our Governments have not simply allowed the private education sector to grow. The federal and provincial Governments together have actively encouraged and supported its growth. The federal government has deliberately redirected its funding for programs in the public colleges to the private college sector. In the last four years, federal revenues in the public colleges have dropped by 60 %, from \$38 million in 1993-1994 to \$16 million in 1997-1998. At the same time Human Resources Development Canada (HRDC) has paid tuition fees for thousands of students to go to private schools- fees which are typically four to five times that charged by

public colleges and which can even go to more than ten times public college tuitions. The effect of an HRDC-sponsored student attending a private college is a massive transfer of federal training funds to private profits and a corresponding decrease in available funds for the public system.

Our provincial Government claims that it is not privatizing college education- simply allowing the market to operate freely. But a closer look at the ways in which the Tobin Government is supporting private colleges exposes this claim for the falsehood that it is. For the fact is that, without the active cooperation and support of the provincial government, private colleges would have a much more difficult time making their profits. Anywhere else in Canada, for example, private college students would not be eligible for student loans until the college had been in operation for at least two years. The Newfoundland Government saw fit to "modify" this federal legislation - initially allowing students attending colleges which had been established for one year to receive loans. Recently, the regulation has been "modified" further to allow student loans to flow to colleges which have just opened. A recent CBC Radio series on private colleges reveals the extent to which some of these colleges are dependent on student loans for their existence. One student who had attended Centrac College reported that the college could not purchase the learning resources necessary for their program until the loans arrived."

With the shocking revelation of the debt load currently being carried by young Canadian students, this debate can be expected to become even more heated.

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Renewals

If you would like to continue receiving C₃ 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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