

# C<sub>3</sub> NEWS

Newsletter of College Chemistry Canada / La Chimie Collégiale au Canada



## 1994 Conference Highlights

The 1994 C<sub>3</sub> Conference was hosted this year by the British Columbia Institute of Technology and the Open Learning Agency in Burnaby, BC. With almost 100 attendees it was a definite success. What follows are some, (but not all) of the highlights of the conference. While you read this keep in mind next year's conference, to be hosted by Heritage College in the Ottawa-Hull Capitol Region, June 1-3, 1995. (Note it's one week earlier than usual). The theme of the 1995 conference will be: "Teaching Chemistry for the 21st Century".

The highlight of the conference for some folks was the annual (at least it tries to be annual) fun run. For those who enjoy getting

up exceedingly early this year's run was aptly named the "Swamp Trot", as it involved running through the picturesque although sometimes mushy bog surrounding Burnaby Lake. A healthy turnout of runners and walkers turned out on a beautiful Saturday morning to complete for the coveted J. Willard Gibbs Memorial Fun Run Trophy. While many had been in training, hoping to defeat the defending champion, non were

able to outrun the speedy Ringte Raap who once again ran away with the race. For those slower mere mortals there were a number of fun run prizes which were awarded democratically (drawn for) at the banquet. So for the rest of you who slept in, get in practice now and be prepared for next year's fun run, wherever it may take us.

### *In this issue :*

*C<sub>3</sub> Business* .....Page 3

*Periodic Table Tournament* .....Page 4

*Conference Highlights* .....Page 6

## C3 Business President's Report June 1994

### Conferences

Conferences continue to be the major effort of our organization. Last year, for the first time, we held a joint conference with 2YC3 outside Canada. Organization of the Rhode Island Conference presented a whole new set of problems for the C3 executive and the conference itself was not completely successful. This conference may have been an anomaly even for the 2YC3, but in spite of this, I would recommend that future joint conferences continue to be held in Canada.

The sites of future conferences have been set until 1998, with the Yukon conference presenting the only difficulties. The cost of travel to Whitehorse may be prohibitive for most members, but given the strength of the membership from BC and Alberta, there still may be sufficient numbers to justify it. I think one must compare this to the Rhode Island Conference attended by about 30 of our members.

### Communications

The teleconference meetings continue to be an important means of conducting the business of C3 between conferences. These were held every month, with the agenda being faxed to members of the executive one week in advance, and a summary of the meetings circulated one week after the meetings. We were fortunate that the Open Learning Agency provided the bridging service for these conference calls at no charge to the organization. I would urge the new executive to continue with these meetings following the present format. Incidentally, most of the executive members were on the internet, so I would expect that e-mail will become an important means of communication.

### Changing Roles for Executive and Board

During the two years which I have been president, changes have been made in the roles of executive and board members. The secretary has been given more responsibility for membership renewals, and has automated much of the record-keeping. New guidelines for Regional Directors have been in effect for a year and these place more emphasis on acquisition of new memberships. While I strongly believe in this change in direction, I am concerned that Directors may feel excluded from the everyday operation of C3. I think that further changes could be made to use these people more effectively, and include them in the ongoing operation of the organization.

### Record-Keeping and Continuity

When I became president, I did not receive files, letters, policies, or even a copy of the constitution of C3. If we are to avoid re-inventing the wheel every time there is a change of president, this will have to change. I intend to pass on to the new president all the records of business transacted on behalf of C3 for the past two years, together with a summary of policies, awards, time-lines etc. which I have followed. While this may represent a break with

*Continued on page 3*



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Continued from page 2

our past oral traditions (ie learning the job from the past president over a scotch in some smokey bar) it will ensure some measure of consistency over time. I would suggest that the new president start a new binder and pass this on to the next president.

## Future

I think that the part of C3 which appeals to most of us is that the organization is small and friendly, with low fees and a minimum of cumbersome machinery. It continues to depend on the good will of our home colleges for a great deal of support. For example, OLA has mailed out the newsletter for the past two years at no cost, and colleges hosting conferences have absorbed a large portion of the conference costs. Most members share my hope that the organization continues in this way. For this reason, I have been quite negative about joining other groups such as CSCT, which would raise membership fees, and costs, and not be as sensitive to the needs of our members. I continue to support joint conferences with organizations such as CSCT and 2YC3.

## Thanks

I would like to thank the members of the Executive and Board of College Chemistry Canada for their work over the past two years. I especially want to thank Alan Davis, Bob Perkins, and Phyllis Lake for their fine work. And a special thanks to Gary Wilson who guided me through my first year of office.

Bob Browne  
June 9, 1994

## Call for Nominations

### C3 Award

Nominations for the 1995 C3 Award are now open. The C3 Award recognizes the outstanding contribution by an individual to the promotion and teaching of chemistry at the 2-year college level. Nominations must be accompanied by two letters of recommendation, outlining the achievements of the nominee, and must be received by the President of C3 by January 31, 1995.

### "Novacor Chemicals Ltd. Award for Chemistry Teaching in Community and Technical Colleges"

Nominations are being sought for the 1996 "Novacor Chemicals Ltd. Award for Chemistry Teaching in Community and Technical Colleges". The awards are presented annually to two outstanding teachers in the area of chemistry, biochemistry, chemical engineering technology, or chemical technology. The award consists of an honorarium and assistance towards travelling expenses of the Award recipients to attend the conference at which the awards are presented.

Nominations should be forwarded to the Secretary of C3 by January 31, 1995. Nominations will then be made by the executive of C3 to The Canadian Society for Chemical Technology by the deadline of April 1, 1995

## Phyllis Lake Tribute

It is with a certain amount of sadness that I must report that Phyllis Lake (our beloved C3 treasurer) will not be in the classroom this fall. Due to continuing cutbacks taking place in the province of Alberta, Phyllis has retired (re-Kleined is probably more like it) from her position at Mount Royal College. I have had the pleasure of serving with Phyllis on the C3 executive over the past few years, and have certainly appreciated her efforts as treasurer. Most of us don't realize the amount of time it takes behind the scenes to keep the accounts in order as membership cheques get forwarded to the treasurer. The financial statements from each conference eventually wind up on her desk as well. As an organization we are extremely fortunate that Phyllis is willing to stay on as treasurer for this year.

She has also been an active conference attendee over the years (who can forget the expedition to Rhode Island in 1993) helping to make each one a memorable event. She also helped organize one at Mount Royal College several years ago. Phyllis says that she is looking forward to having some free time, and hopes to take some courses this year; they will probably have nothing to do with chemistry.

Thank you Phyllis, and I trust you will enjoy this next phase of your life. We'll hopefully see you at Heritage College in June for the next C3 conference.

*Bob Perkins - C3 Secretary*

**“Round 1.****Game # and Property Elements**

1- Greater number of p electrons	Sc v Ne
2- Lower number of protons	Na v Ca
3- Lower atomic volume	Ni v Al
4- Greater number of unpaired electrons	He v H
5- Lower first ionization potential (IP1)	Cl v Ar
6- Greater number of d electrons	Ti v Li
7- Higher electronegativity (Pauling)	Si v Ga
8- Has stable ion with greater radius	Mn v Ge
9- Higher melting point	Zn v V
10- More exothermic electron affinity	Cr v Mg
11- Larger number of valence electrons	F v Be
12- Lower density	C v S
13- More positive oxidation potential	B v Cu
14- Higher boiling point	N v Fe
15- Greater number of stable isotopes	K v Co
16- Higher IP1	P v O

**Round 2**

1- Smaller +1 ion (hypothetical)	Si v Ti
2- Higher IP2	Cl v Na
3- Lower number of stable isotopes	Sc v Ni
4- Lower electronegativity (Pauling)	Ge v O
5- Lower boiling point	Cr v H
6- Smaller atomic mass	V v F
7- More positive reduction potential	Fe v S
8- Larger atomic radius	K v Cu

**A Periodic Table Tournament.**

*Harold Wilson*

*John Abbott College, Ste. Anne de Bellevue,  
P.Q. H9X 3L9, Canada*

One of the introductory chemistry courses in the Quebec C.E.G.E.P. system is concerned with atomic and molecular structure. In this course the role of the Periodic Table is emphasized. Students are expected to be able to predict ground state electron configurations from the position of an element in the Table and be able to explain the periodicity observed in properties such as Ionization Potential and Atomic Volume on the basis of these configurations.

In my teaching I have been successful in showing how electron configurations can be obtained from the Table but exasperated by student responses to questions such as “Why does potassium have a lower first ionization potential than sodium?”

Despite all my efforts to show that physical and chemical properties are connected to the structures of the atoms and molecules involved, answers to such a question are invariably of the form “Because its lower down the table”.

It seems as if the students summarize their study of the periodic table into a set of mnemonics that they use to explain trends. They have extreme difficulty if asked to compare properties of atoms that are not in the same group or period.

To counteract this I have expanded on the basic treatment common to most General Chemistry texts by using materials presented in J. Chem. Ed.

1. The Periodic Table and Electron Configuration (1)
2. Anticipating Valences from Electron Configurations (2)
3. Electron Configurations of Monoatomic Ions (3)
4. Analyzing Tables of Ionization Potentials (4)

5. Periodicity of Electron Affinity (5)
6. Predicting Nuclear Stability using the Periodic Table (6)

To help the student assimilate the wealth of information contained in these articles I have designed the following exercise which has proven to be a valuable teaching tool.

It is a game designed to give students practice in using the Periodic Table. The game can be played in a Solo version which allows students to privately review the use of the Table in writing electron configurations and in predicting relative values of properties such as Ionization Potentials (IP), Electron Affinities (EA), Density, Atomic Volume etc.

All questions in the game refer to the ground state electron configurations and to the elements in their standard states.

A classroom version of the game has also been developed and it has been found that it is best to use this game as a final review of the topic after students have had plenty of experience with the solo game.

**Solo**

The symbols of the first 32 elements are written on individual pieces of paper and placed in a small paper bag. The first element is drawn from the bag and placed in Game 1 of Round 1. The second element drawn will be the opponent in Game 1. In the sample tournament reproduced below the first game was Sc vs Ne.

The next element drawn from the bag was Na and this is placed as the first element in Game 2, i.e. using question 2. The fourth element drawn was Ca and this becomes the opponent of Na in Game 2. The draw is continued until all 32 places are filled. Let the games begin!

Obviously Sc has a greater number of p electrons and is placed in the bag for the second round draw. The Ne is eliminated. In the second game involving Na and Ca the

*Continued on page 5*

Continued from page 3

winner with the lower number of protons is Na, which is then also placed into the bag for the second round draw.

Students should be encouraged to predict the outcome of each game using theories with which they are familiar before consulting an appropriate reference book. Most of the required information is available in the C.R.C. Handbook and an extensive list of Electron Affinities can be found in ref (5).

The draw is now made for Round 2.

The winners of Round 2 now go into the Quarter Final draw.

Note that a problem arose in Games 2 and 3 of the Quarter Final.

In Game 2, H cannot have an IP3. When the question is not applicable merely proceed to the next question to make a decision, i.e. which atom has more unpaired d electrons?

In Game 3, neither element has unpaired d electrons so the winner is decided on the basis of question 4.

The winning element in this solo game is Na.

You should work through the sample game to see if you agree with all the decisions that were made. You will be quite surprised by the number of interesting (Difficult to predict!!) situations that arise.

Obviously the game is different every time it is played and extensive play-testing has revealed no bias toward any particular element. You may wish to change the questions to reflect your own curriculum but the game gives endless variety with just one set of questions.

## Tournament (Classroom) Version

One week before the tournament each student randomly selects one of the first 32 elements. The student will be responsible for the placement of that element during the game. Only 24 of the elements are so assigned, the remaining eight are "wild" elements.

At the start of the class the Round 1 Chart will be displayed on an overhead projector or blackboard, the opponents in each game still to be decided. The 32 elements are placed in a bag and drawn one at a time.

If the first element drawn belongs to one of the students he/she can place the element in the draw in the most advantageous position. For instance if the student was responsible for F it would obviously guarantee a victory if it were placed in Game 7. The student would therefore write the symbol in the appropriate position on the overhead or blackboard.

If the symbol drawn is "wild" it is written in the first position available in the draw, starting at Game 1 and working down the Table. There is no choice for the "wild" symbols. This continues until the draw is complete.

When a game is played the participants attempt to predict the outcome before consulting the reference books. Students are responsible for discussions involving their own elements and the "wild" elements can be assigned to students who have been eliminated from the competition. Errors in prediction can lead to interesting discussions.

The symbols of the winning elements in Round 1 are placed in a bag for the Round 2 draw. The Round 2 Table is displayed and the draw is made as before. If an assigned element is drawn the student involved can place the element in any available space in the table. A "wild" symbol must be placed in the first available space.

This is repeated until only one element remains.

### Literature Cited.

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2. Eichinger, J.W., Jr., J. Chem. Ed., 1967, 44, 689.
3. Tybodi, R.J., J. Chem. Ed., 1987, 64, 943.
4. Haight, G.P.Jr., J. Chem. Ed., 1967, 44, 469.
5. Myers, R.T., J. Chem. Ed., 1990, 67, 307.
6. Blanck, H.F., J. Chem. Ed., 1989, 66, 757.

### Quarter Final

#### Game # and Property Elements

- |                              |         |
|------------------------------|---------|
| 1- Higher density            | F v Fe  |
| 2- Lower IP3                 | H v Sc  |
| 3- More unpaired d electrons | K v Ge  |
| 4- Less electronegative      | Na v Si |

### Semi-Final

- |  |         |
|--|---------|
| 1- Proton/neutron ratio in most abundant isotope is higher       | Sc v Na |
| 2- Binary compound with oxygen contains greater number of nuclei | Fe v K  |

### Final

- |   |         |
|---|---------|
| 1- Proton/neutron ratio in most abundant isotope is lower | Fe v Na |
|---|---------|

## POSITIONS AVAILABLE

*(Temporary Part-Time and Regular Full-Time positions)*

BCIT's Chemistry Department invites applications for temporary part-time and regular full-time Faculty positions. The successful candidates will be in charge of chemistry courses for students in Engineering Technology or Health Sciences programs.

**Qualifications:**

- Master's Degree in Chemistry or the equivalent.
- Good communication and interpersonal skills.
- Successful relevant teaching experience at the post-secondary level preferred.

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**COMPETITION NO.:**  
(TBA) for Temporary Appointment  
(TBA) for Regular Appointment

**CLOSING DATE:** (TBA)

**NOTE:**

Please indicate the competition number for the position for which you are applying, and include a copy of your resume for each competition.

The above competition falls within the jurisdiction of the B.C. Institute of Technology Staff Society.

**PLEASE APPLY TO:**  
Personnel/Employee Relations  
British Columbia Institute of Technology  
3700 Willingdon Avenue  
Burnaby, B.C., V5G 3H2  
Fax No: 434-8462

## CONFERENCE HIGHLIGHTS



### 1994 Award Recipients

C3 Award - Bob Browne, Douglas College, New Westminster, BC

C3 Student Scholarship - Michael Bremner, Chemical Sciences - Pollution Option, BCIT, Burnaby, BC (see left)

Chemmy Award - Bill Blann, Keyano College, Fort McMurray, AB

C3 Editor's Award - Bob Perkins, Kwantlen College, Richmond, BC

CONFERENCE HIGHLIGHTS, continued from page 6

## DISTANCE EDUCATION IN THE CLASSROOM

by Dr. Stephen Lower  
Submitted by Phyllis Lake

Dr. Lower's talk encouraged us to think about some things that I am sure we were aware of, but, I at least, never thought a great deal about before. He asked "Is all Education Distance Education?" He went on to point out that very little learning actually occurs in the lecture room and that after they have left the lecture, the students need the same guidance as Distance Learners. They need a guide which tells them "Pay attention to this section of the Text", "Here is some more information to clarify that section of

the Text", and so on. The Course Guide to supplement the Text which he originally designed to help Distance Learners has now expanded into a Course Text for the Classroom.

Dr. Lower also cautioned us about how we make use of CAI (Computer Assisted Instruction). If we introduce it into the course as an "add-on" to help the dumb ones, or to provide extra work for those who need it, it will never be a success. We must integrate it carefully into the course and make it important. Make it easy to access, take the students there and give them detailed instructions at the beginning. Make sure that they feel comfortable with the system. Assign them computer exercises on the current topic. Allow students to take copies of the software home with them.

By using these techniques, Dr. Lower has found that the computer exercises are the

most popular part of the course. Lectures can now concentrate on what lectures do best. The students spend from one to four hours a week on the computer, and tutorial time is not wasted, because now each student can concentrate his time where he needs it, Dr. Lower found that the student questions had changed from "How do you do this?" to "Why do you do this that way?". He has found that he can ask more "in-depth" questions on examinations with a reasonable expectation of getting the right answer. And perhaps most important, he enjoys teaching more, and was teaching more, with the addition of CAI.

The last overhead contained the statement "A teacher who can be replaced by a computer should be replaced by a computer." Perhaps this is something we should all ponder.

## Adapting Course Requirements to Include a Skill Component

by Prof. Vivienne Whitworth, Ryerson Polytechnic University.  
Submitted by Harold Wilson

Prof. Whitworth described how it is possible to teach essential skills (not necessarily chemical) in a regular chemistry course. The skills which she chose to emphasize were:

- (i) Oral and written communication
- (ii) The use of a computer as a work processor, for data analysis and graphical presentations
- (iii) Group work.

These skills were developed whilst teaching a course on Protein Metabolism and Biosynthesis. Students working in groups of 2 or 3 were asked to produce conference style posters which emphasized an aspect of biochemistry not included in lecture material or the class text.

Success was achieved by de-emphasizing tests and examinations and rewarding students for work in which they showed competency in the essential skills. Several of the resulting posters were shown to demonstrate the professional level achieved by the students.

CONFERENCE HIGHLIGHTS, continued from page 7

## Forensic Chemistry

Dr. Alexander Beveridge  
OLA/RCMP

Submitted by Suzanne Gardner

Dr. Beveridge is a multi-talented individual whose professional activities range from tutoring first year chemistry and business courses at OLA, to being a certified masseur, all in addition to his position with

the Forensic Chemistry Labs of the R.C.M.P. Rumor also has it that Dr. Beveridge is taking time off this year to pursue studies in law.

Dr. Beveridge's talk explored the role of forensic scientists, and many of the techniques used in his work: from using IR and gas GC to identify and match paint samples to head space GC analysis on bomb debris. Dr. Beveridge also pointed out how methodology has changed over the years,

with a great introduction of instrumental techniques throughout the 1980's. He also showed us that sometimes the simpler methods are what is needed and how a Simon Fraser University co-op student was able to help solve a complicated problem using a simple technique.

Overall Dr. Beveridge informed us of the life of a forensic scientist, although it may not be "Quincy" it certainly sounds like a fascinating and exciting career.

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