December 1988
Vol. 13, No. 4

C_3 News

Newsletter of College Chemistry Canada / La Chimie Collégiale au Canada

Welcome to the *New* C_3 News

Bob Browne, Editor

This is my first issue as editor of the C_3 News. As you can see, there have been a few changes in format and content since the last issue. First of all, I'm using Xerox Ventura Publisher, a 286 computer, and a postscript printer to lay out the pages. Learning how to edit a newsletter and use the desktop publishing software has been more than enough to keep me busy for the past few months.

The second change I have tried to implement is to make this less of a journal and more of a newsletter, hence the name change. In the coming months I hope to have regular columns being written about teaching techniques, profiles of some of our members and their institutions, textbook and software reviews and, articles on computers in chemistry. Bob Perkins has kindly agreed to continue his "Hot from the Presses" and "Teaching Tips" columns which you will find in this issue. Finally, to reduce the cost of mailing, I am applying to Canada Post to have the newsletter registered for second class mail.

If you have any ideas or comments about the newsletter, or any other topic, please write to me. If I get enough letters I may start a "Letters to the Editor" column. I also need articles, long or short, on any topic you think our fellow C_3 members might find interesting.

Many thanks to those who responded to my requests for articles for this issue. Thanks also to the Douglas College Public Information Office who designed the nameplate and the Systems and Computing Department for their assistance with the hardware. I hope you enjoy the new C_3 News.

1989 Conference Update

Plans Taking Shape For Calgary Conference

Phyllis Lake
Conference Coordinator

The Sixteenth Annual Conference of College Chemistry Canada will be held at Mount Royal College in Calgary, Alberta, June 1-3, 1989. Make your plans now! Registration and a welcoming social evening will be held Thursday evening, June 1, and the technical sessions will occupy Friday and Saturday June 2 and 3. The Executive and Directors Meeting will be held after the sessions on Thursday afternoon, June 1; the A.G.M. will be on Saturday afternoon.

Delegates will be staying in the Delta Bow Valley hotel, which is a short walk from absolutely everything in downtown Calgary. The special conference rate will be about $240 for two people for the three nights, June 1, 2 and 3. You can arrange to stay longer if you wish. They have facilities for children as well as adults, so bring the whole family.

The delegates will be transported to the College each morning and returned to the hotel each night, but you will not be "captive" by this schedule. If you sleep in, or wish to leave early, a City Transit bus travels from downtown right to the College. It has been arranged to bring the delegates to the College early, so they can have breakfast on campus as a group. This will allow everyone ample time to renew old acquaintances, make new contacts and browse the exhibits of books, equipment, software, etc.

Ron Tyler tells me that he anticipates many worthwhile exhibits and displays. Companies that have already expressed a strong interest in participating include Johns Scientific Inc. from Toronto, and Chemonics Scientific of Calgary.

Breakfast and lunch, both Friday and Saturday will be at the College, and we're stealing Seneca's meal ticket idea to simplify planning for the number of meals.

Don't make your plane reservations yet! We expect to have an "Official Airline", and hope that you will all make use of it, so that the Conference can benefit. At present we are waiting for the airlines to submit their

Please see "Conference", page 2

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1989 Conference Update

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proposals to see which we should choose. Details will be available in the next newsletter.

The Laboratory Safety Program we've been advertising will be given by Jim Kaufman of Curry College, Boston. Jim gave the Safety Program at the Chemical Congress in Toronto last June, and we've heard many good reports. He'll talk about what constitutes a good safety program, and I'm sure we'll all find that useful. Because of the cost, it will be necessary for each person who attends the safety workshop to purchase the printed material that goes with it. The price is US $5.00, so the exchange rate next spring will determine what we will actually pay.

Papers are beginning to trickle in! So far we have papers on WHMIS, Sterechemistry, Lab Exams, Alka-Seltzer and Delayed Neurotoxicity. Anyone wishing to submit a paper should contact Mel Lungle. If you've found a safer way to do that classic lab, or a better way to avoid hazardous chemicals in the lab, we'd particularly like to hear from you.

A beef barbecue complete with all the "fixin's" and western entertainment, will be the highlight of the social calendar. It will be on Friday night at Symon's Valley Ranch, which is just outside the city. Transportation will be provided and the final cost will depend on the entertainment.

We also have a couple of tours of some excellent museums outside of Calgary arranged for Sunday. If you are into dinosaurs, there's a trip to the world-renowned Tyrrell Museum of Paleontology located in the badlands of nearby Drumheller. For those of you interested in the history of the west, another tour is planned of Head-Smashed-in Buffalo Jump (a wonderful new exhibit of Plains Indian culture) and the Fort MacLeod RCMP Museum. There's a wide range of things to do on your own. The Rocky Mountains are an hour's drive away, with lots of opportunities for hiking and sightseeing in the Kananaskis and Banff areas (we may organize a trip to the mountains). If you don't have the whole day free, there are many attractions closer to home. Have a look at the Winter Olympic venues, the University of Calgary, Spruce Meadows equestrian centre, the Glenbow Museum, Energeum, the Calgary Zoo, Heritage Park and much more!

The official registration form will be out in the next newsletter, and the costs (in case you want to start looking for funding) are as follows: Registration fee is $40.00 for members, $60.00 for non-members (Saturday only, $20.00/$30.00). The lunches and breakfasts haven't been finalized yet, but estimates are very reasonable. The barbecue will be about $25 and the tours about $15 plus lunch.

A couple of other items to consider. Would anyone be interested in a software exchange? Have you a program that does something that commercial programs can't that you'd like to share with the rest of us? It strikes me that we all have similar problems and that maybe we could help one another out. I haven't thought out any details yet, just wondered if anyone would be interested. We are also thinking of organizing a hike in the mountains. We can arrange either a "serious" hike or pack a maximum amount of scenery into a minimum amount of time. Don Burke would like some feed back to plan the best program for the group.

The address for all of us is:

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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 5 1/4" floppy disk, IBM format, using WordPerfect, WordStar, Microsoft Word or any wordprocessor producing ASCII output. Deadline for the next issue is Feb 24, 1989.

Second Class Mailing Registration Pending.

16th Conference: Call For Papers

The theme of the 16th annual conference of College Chemistry Canada is "Chemicals and the Environment". Papers are sought in the fillowing areas:

Safety in the College Laboratory: modifications to laboratory procedures which eliminate the use of hazardous chemicals; handling of hazardous chemicals in the college laboratory and related topics.

Disposal of Hazardous Chemicals: effects of chemicals on the environment; what can we do to protect the environment; regluations and legal aspects (with respect to damage, and also with respect to safety), and related topics.

Please submit abstracts (one page or less) by March 1, 1989, to Mel Lungle, Department of Chemistry and Biology, Mount Royal College, 4825 Richard Road S.W., Calgary, Alberta, T2E 6K6, Telephone (403) 240-6163.

LeCouteur Wins Polysar Award

The 1988 Polysar Award for chemistry teaching was presented to Penny LeCouteur at the Third Annual Chemical Congress this past June in Toronto. Penny joins the growing list of C3 members who have received this award since it was instituted in 1977.

The Polysar Awards are presented to outstanding teachers in chemistry, biochemistry, chemical engineering or chemical technology at community and technical colleges. Each award consists of a $500 honorarium, a scroll, and travelling expenses to attend the conference.

Penny LeCouteur joined the faculty at Capilano College in North Vancouver in 1968. Since that time she has been extremely active in teaching and writing about chemistry. One of the first projects she undertook was to develop a self-paced learning course for first year chemistry. The experience gained in this project has led to her acting as a consultant to the B.C. Open University and she is now writing the second year organic chemistry course for this organization.

A March 1989 publication date has been set for a Grade 12 chemistry text which Penny has co-authored with Rintje Raap, Geoff Rayner-Canham and Peter Fisher. The book is called "Chemistry: A Second Course" (published by Addison-Wesley) and contains many examples drawn from the Canadian chemical industry.

A project which is a particular favorite of Penny's is the Girls in Science Workshops which are sponsored by the Society for Canadian Women in Science and Technology. This project has run for the past five summers and is designed to give 9 to 12 year old girls some positive involvement with science and technology. Penny has developed and taught a unit on working with concrete, a material chosen because of its "non-traditional" nature.

Penny has some interesting thoughts on teaching consumer chemistry. She has helped develop and teach a one week course called "The Knowledgeable Consumer" which is given as part of the Elderhostel Program. She has promised to write an article for the next issue of *C3 News* about her experience with this program.

Penny lives with her husband Peter and her two sons in a house with a beautiful view of Stanley Park and the city of Vancouver. Being quite modest about her achievements, she has only two certificates hanging on the walls of her study; one is her 1988 Polysar Award, and the other is a PhD diploma which was pulled out of the closet when the governor of the State of California who signed it went on to bigger and better things.

The Polysar Awards are given each year for chemistry teaching in community and technical colleges. Nominations must be received by the Canadian Society for Chemical Technology by April 1 each year. For more details see Vol 13 No 3 of this newsletter, or Canadian Chemical News which publishes an annual call for nominations.

President's Message

Dear Members:

Welcome to a new year with C3. We have a bright new Executive and Board of Directors, we are now fully incorporated, and we have a new style of newsletter. After an excellent conference at Seneca College, we are set to visit Mount Royal College in 1989, and then a "North West" conference at Capilano College in North Vancouver in 1990. The C3 membership is at an all-time high, and although it is becoming harder each year to make money on a conference, our finances are stable.

For those people who helped found C3, this news must be welcome. Those of us who joined later on are grateful to those planners who quietly and effectively built an organization which contributes a good deal to the quality of chemical education in Canada.

This year I'm taking a break from teaching. I'm replacing the B.C. Institutional Evaluation Officer for a year, so I get to travel around the province, meet a lot of interesting people, and act like an amateur bureaucrat. One thing I've discovered so far is that teaching a full load is far more demanding than doing administrative work. My respect for my colleagues as they march off to classes and struggle to keep up with marking has increased a great deal, although I do feel some pangs of jealousy as they get to know the fresh faces that arrived at Fraser Valley College this year.

Administration has its own demands, of course. One never quite knows from where the problems are going to appear on any one day, and one is certainly never sure where the solutions lie. And one is a constant target of abuse from those in the trenches:

Q: Why don't administrators look out of the window before lunch?

A: Because then they wouldn't have anything to do in the afternoon.

Have a good year!

Alan Davis, C3 President

17th Conference Announced

The 17th C3 Conference will be held jointly with 2YC3 at Capilano College in North Vancouver in the spring of 1990. The conference theme will be *"Chemistry in the Pacific Rim"*. Coordinators for the conference will be:

Conference Coordinator:
Penny LeCouteur, Capilano College

Program Coordinators:
Bill Wasserman
Seattle Community College
Alan Davis
Fraser Valley College

WHMIS: GETTING OUR SAFETY ACTS TOGETHER ?

By Jean Allan

Jean Allan is a member of the technical staff at Douglas College.

The Workplace Hazardous Materials Information System (WHMIS) legislation came into effect on Halloween and I am tempted to ask the obvious question, "Trick or treat?". WHMIS is the Canada-wide "right-to-know" legislation designed to provide employers and employees with the necessary information regarding the handling, storage, waste disposal, and emergency procedures associated with hazardous chemicals (controlled products) in the workplace. It requires that Material Safety Data Sheets (MSDS) be available on-site for each controlled product. The establishment of worker education programs are also a high priority.

According to the Hazardous Products Act, the employer is responsible for implementing WHMIS legislation but this responsibility will undoubtedly be delegated to the person directly in charge of the chemical inventory. As the person in this role at Douglas College, I would like to relate my experiences, frustrations, criticisms and helpful hints to those who have yet to undertake this task.

Douglas College is fortunate to have a well-designed hazardous chemical storage facility, remote from the laboratories. This area is separated into various compartments housing flammable liquids, flammable solids, oxidizers, corrosives and toxics such as carcinogens and irritants. Local suppliers allow us to keep a minimum inventory, and some items e.g. ether, are delivered the day they are to be used. Despite this, my inventory includes 550 items, 60% of which are designated "controlled products" by WHMIS. My first task was to check every item on the inventory list and assign a WHMIS classification code. The six classes of "controlled products" and their Divisions are shown in table 1. I have listed the Transportation of Dangerous Goods (TDG) classification for comparison. These are the colourful 4" x 4" diamonds attached to shipments of chemicals.

Table 1: Comparison of the WHMIS and TDG classification of hazardous materials

WHMIS Classification			TDG Equivalent	
Class/Division		**Material**	**Class**	**Label**
Class A		Compressed Gas	Class 2	various colours/symbols
Class B		Flammables/Combustibles		
	Div 1	Flammable Gases	------	------
	Div 2	Flammable Liquids	Class 3	red with flame
	Div 3	Combustible Liquids	------	------
	Div 4	Flammable Solids	Class 4	red/white stripe/flame
	Div 5	Flammable Aerosols	------	------
	Div 6	Reactive Flammables	Class 4	half red/white/flame
Class C		Oxidizing Materials	Class 5	yellow with flame
Class D		Poisonous/Infectious	Class 6	skull and crossbones and various
	Div 1	Immediate/Serious Toxic		
	Div 2	Other Toxic Effects	------	------
	Div 3	Biohazardous Infectious	------	------
Class E		Corrosive Material	Class 8	black and white with dissolving hand
Class F		Dangerously Reactive	Class 4	various

As you can see, there is no simple correlation between these classification systems. At our college goods are received by building service workers who are instructed to open packages to check the contents against packing slips. The TDG shipping stickers alert handlers to the hazards associated with the package contents but the actual goods will be labelled with the WHMIS classification code. As a chemist, I find this confusing. Fortunately, there are hazard pictograms associated with the labelling system which may provide the necessary cross-reference.

Are you confused yet? Let me add to the complexity of the situation. To illustrate, let's look at the label of a common chemical found in practically every laboratory, copper (II) sulfate. My example was supplied by Fisher Scientific in July 1988. Since the product originated in the U.S.A., it carries a number of classification codes, "Class 1B, ORM-E, NFPA rating, and Storage Code G". Reading the hazard warning would prompt me to classify this compound in Class D, division 1 under the WHMIS scheme and yet I consider copper (II) sulfate safe enough to store with my non-hazardous stock.

This label represents one supplier's attempt to provide safety information. There are many others, each with their own set of cryptic codes. If an item has been in stock for four or five years, the label may bear no safety information at all. The appropriate classification, however, must be made, and hazard warnings, first aid procedures and safety pictograms must be affixed to comply with the new regulations. By the way, for those of you that are having trouble differentiating between flammable and combustible liquids, flammable liquids are defined as those with a flash point below 37.8°C. Trying to decide whether a substance causes immediate and serious toxic effects (Class D1) or other toxic effects (Class D2) is arbitrary but I choose to err on the side of safety and place most items in D1. Useful references for classification data are The Merck Index and The Aldrich Co. Chemical Catalog.

Classification completed, the next step is to up-date the necessary labels. WHMIS

labels must have a broken-line border around them, with the symbols inside. I have located a supplier of a range of hazard pictograms: Revere-Seton Inc., Box 3307, Markham, Ontario L3R 6G6. (416) 470-2011.

After taking care of labelling, the next stop is to obtain a Material Safety Data Sheet from the supplier of each of the controlled products. MSDS are widely publicized by all chemical manufacturers but I have yet to receive one in my laboratory. I drew up separate lists of the controlled products in my stock and sent them to the supplier in question. (This was a tedious task since my inventory is not on computer). I have received replies from all suppliers but only one company has provided the actual MSDS. I have been assured that I will receive all of the requested information early in 1989. I must admit that I was disheartened when the first package of MSDS arrived as a continuous computer printout, many hundreds of pages long. I had expected a discreet, highlighted, one-page entry for each compound. Not so. For example, the MSDS for ammonium chromate rambles over four pages of "bland" computer printout making it difficult to extract the relevant safety information, particularly in an emergency. None of the sheets have a WHMIS clasification. No doubt you have received an avalanche of mail in the last few months advertising expensive safety information systems. Buyer beware! The information must be supplied free of charge from each chemical supplier and you will be paying for the convenience of having these sheets in 3-ring binders ($500 or more).Computerized data systems may be a worthwhile investment for larger institutions, providing that all personnel are trained to use the system and terminals are provided in chemical storage areas.

The other important aspect of the WHMIS legislation is the introduction of safety education for all personnel who may come into contact with controlled products, e.g. janitors, tradesmen, security guards and regular department employees. I plan to conduct safety seminars for all concerned as soon as I have completed my labelling chores and received the promised MSDS.

It is interesting to note that similar legislation was introduced in the U.S. as SARA Title III, also known as the Emergency Planning and Community Right-to-Know Act. School science laboratories have been exempted from certain sections of this Act and one wonders if there may be similar exemptions from WHMIS.

Although I fully support the intentions of the WHMIS legislation, I question the wisdom of creating another new classification system without attempting to coordinate it to the existing TDG structure. I find it difficult as a chemist to cope with all of the classification and rating systems, and pity the layman who must try to decipher these codes. On a positive note, I think that WHMIS may achieve an unforeseen "bonus". The arduous task of relabelling out-of-date stock bottles should draw attention to the fact that most of our chemical stores are in need of spring cleaning. If a chemical has remained untouched for five years, the odds of it being used within the next five years are pretty remote. I would like to suggest that we make every effort to decrease stocks of hazardous chemicals by disposing of them in the authorized manner.....and thereby hangs another tale.

Hot From The Presses !

By Bob Perkins
Kwantlen College

R. Gedye et al report that rate enhancements of 200 to 1200 can be achieved for a variety of organic reactions through the use of a microwave oven. Canadian Journal of Chemistry **66**, 17-26 (1968). Similar reports appear in Education in Chemistry, January 1987, 13, and March 1988, 55-56.

If you don't have a microwave in the lab, maybe you'd like to use your ultra-sonic cleaner to perform reactions. T. Mason gives several examples of suitable systems. Education in Chemistry, July 1987, 102-105.

M. Feldman describes how he has used Fudge Sandwich Cookies to illustrate chirality at two centres. After the exercise, the students get to eat the models. J.Chem.Ed. **65**, 580 (1988).

A new oxide of carbon (C_5O_2) has recently been prepared by G. Maier and coworkers. It is stable for several days in solution at room temperature, but as the pure solid, it polymerizes above –90°C. Angew. Chem. **27**, 566-568 (1988).

An excellent historical account on the discovery of the noble gas compounds is found in an article by P. Laszlo and G. Schrobilgen. Angew. Chem. **27**, 478-489 (1988).

Along the same lines, the first compound to contain a krypton-nitrogen bond has been recently prepared by G. Schrobilgen. $HCNKrF^+AsF^-$ is stable below –50°C. Chem. and Eng. News, Apr. 4, 16-17 (1988).

Recent calculations suggest that helium could form a stable compound (at low temperatures) with BeO. New Scientist, Feb. 25, **34**, (1988).

J. Parker suggests that many of the problems that students experience with stoichiometry result from a lack of understanding of the principles of measurement. Education in Chemistry, May 1988, 92-95.

Several gases ($CClF_3$, CHF_3, CF_4, and SF_6) have been studied in an attempt to extend the bouncing life of tennis balls. Chem. and Eng. News, Feb. 29, **44** (1988).

"I think you'll find my test results are a pretty good indication of your abilities as a teacher."

AGM Approves Fee Increase

The Annual General Meeting of C3 has approved an increase in annual dues from the current $15 per year to $20 per year for 1989-90. In addition, the conference fee for 1989 will be raised to $40 for members and to $60 for non-members. The Conference Coordinator may set special fees for students and high school teachers. Increased conference costs were sited as the main reason for these fee increases.

The AGM was held at Seneca College on June 4 and was attended by five executive members and 22 C3 members. In addition to the discussion of fees, the meeting received reports from the President, Treasurer, Secretary, Editor, and the Conference Coordinator.

In the President's Report, outgoing president Dick Kroeger described what he viewed as the two most important achievements during his tenure. The first was the organization of the 15th Conference at Seneca College. Kroeger expressed his appreciation to all the members of the organizing committee for making the conference a success. The second important event was the incorporation of C3, now officially called College Chemistry Canada Inc. The process of incorporation was begun at Camosun College in 1982, and Kroeger cited Peter Slade, Norm Webster, Gary Wilson, and Shahid Jalil as being instrumental in bringing the process to a successful conclusion.

The Treasurer's Report for the year ending March 31, 1988, was tabled by Shahid Jalil. Total expenditures for the period were $4,601.11, of which the two largest items were advances for conferences ($1,600) and publication of the C3 Journal ($1,696.45). Total income for the year was $2,276.81, leaving a balance on hand of $8,782.30.

A new slate of Regional Directors was elected and the appointments for the 1989 conference were made. The names and addresses of the new executive and directors appear in the table opposite.

Alan Davis reported that the 1989 conference will be held at Mount Royal College in Calgary, the 1990 conference in British Columbia, and the 1991 conference in Ontario.

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Scientific Literacy Studied

Sudhir B. Abhyankar
Sir Wilfred Grenfell College
Corner Brook, Newfoundland

One of the primary goals of science education is to achieve scientific literacy among students. Scientific literacy, like art, is easy to appreciate but difficult to define. Certainly one important component of scientific literacy is a knowledge of scientific terms and concepts, and the ability to communicate this understanding effectively. Although promoting scientific literacy has been a goal of almost all of the science curricula, "misunderstanding of science is widespread and the public understanding of chemistry is poor" (A.C.S., Chemistry Education Task Force, 1982). We were interested in finding out what our first year students know about some of the commonly used scientific terms and we decided to carry out a pilot study. The findings of this study were presented at the College Chemistry Canada Conference in Edmonton, and are summarized in this article.

We designed a survey sheet to find out how much students know (or think they know) about some commonly used scientific terms. We used ten terms: Acid Rain, P.C.B., Antacid, pH (as in pH-balanced shampoo), Nuclear Energy, Food Additives, Microwaves, Satellite, Insecticides, and Strategic Defense Initiative (S.D.I. or Star Wars). Students were asked to complete the sheet by indicating how much they know about each of these terms. They were given four choices: *A lot*, *Something*, *Little*, or *Nothing*. In addition, they were asked to provide a definition of each term in their own words.

The sample consisted of 221 students enrolled in the first year courses at Sir Wilfred Grenfell College in Corner Brook, Newfoundland. A majority of these students (64%) were planning to major in one of the sciences, 20% were preparing for arts, and the remaining 16% were either undecided, or were planning a career in other fields.

The survey revealed that only 7% of the students knew a lot about the two terms, Acid Rain, and pH, and this was the largest percent response under this category (*A Lot*) for any of the ten terms. The terms students had the least difficulty with were Insecticides and Food Additives. 88% of the responses were under the *Some* or *Little* category for both of these terms. The majority of students had difficulty with the term P.C.B.; 89% of them indicated that they knew a little or nothing. We also found that less than 50% of the students were able to provide an acceptable definition of six of the ten terms P.C.B., (15%), Nuclear Energy, (25%), Microwave, (25%), Antacid, (33%), S.D.I. (39%), Acid Rain, (45%) and Satellite (49%).

These results are not very encouraging to the practitioners of science education. To see how the Corner Brook students compare to their counterparts on the mainland, this survey was also done in Vancouver, Edmonton, Montreal, and Halifax. We are in the process of analyzing the data and will be publishing the findings from this national sample soon.

Teaching Tips

by Bob Perkins

Demonstrations form a large part of my classroom presentations. Whenever possible, I like to use visual material to introduce (or review) a topic. The following are some of the simple ones which I use with my foundation students in the area of the gas laws.

Gas Pressure - Tape a balloon to the side arm of a filtering flask containing $CaCO_3$. Add HCl(aq) and place a stopper in the top of the flask. The balloon will rapidly inflate as CO_2 is liberated. If you measure the mass of the $CaCO_3$ the students will be able to estimate the pressure inside the system.

Pressure/Volume I - I use this one to start off discussion. Place a small amount of water in a florence flask and bring it to a boil. Remove from the heat and quickly place a balloon over the opening. As the flask cools down, the balloon will be sucked into the flask and re-inflated. I bring the flask into class and ask the students to figure out how I got the balloon to inflate inside the flask.

Pressure/Volume II - Place two pieces of glass tubing through a 2-hole stopper into a 1L erlenmeyer flask. Tape a balloon to the end of one of the pieces of glass tubing. Now ask the class to inflate the balloon. The obvious choice is to blow into the balloon. The less obvious method is to suck on the second piece of tubing. Discussion can now follow on blowing/sucking to inflate a balloon.

Temperature/Volume - Place partially inflated balloons (of the same volume) over large test tubes. Now place the test tubes in a) boiling water b) ice water and c) water at room temperature. Check the relative changes in volume. If you have access to dry ice or liquid nitrogen the changes are even more spectacular.

Pressure/Temperature/Volume - The gas law cheat sheet as I like to call it. Write the letters P T V on a piece of paper and put a hole through below each letter. Now what happens to the volume of a gas if the temperature remains constant and the pressure is increased? Put a pencil through the T hole and move the paper up. The students can read off that as P increases, V goes down. If P remains constant, V will increase as T goes up. The combined gas laws will be necessary if all three change.

C_3 Calendar

16th College Chemistry Canada Conference
Location: Calgary, Alberta
Dates: June 1-3, 1989
Contact: Phyllis Lake, Mount Royal College, 4825 Richard Rd. S.W., Calgary, Alberta, T3E 6K6

CHEM ED '89
Location: Kingston, Ontario
Dates: August 13-18, 1989
Contact: Irwin Talesnick, Chairman, Faculty of Education, Queen's University, Kingston ON, K7L 3N6

10th International Conference on Chemical Education
Location: Waterloo, Ontario
Dates: August 20-25, 1989
Contact: Chung Chieh, Department of Chemistry, University of Waterloo, Waterloo ON, N2L 3G1

College Chemistry Canada / La Chimie Collégiale au Canada

Application for Membership

Name: _____

College Affiliation: _____

Position: _____

Address: _____

City _____ ***Province*** _____ ***Postal Code*** _____

Renewal _____ ***New Member*** _____

Individual Membership: $20.00 per year, payable annually in March
Membership Fee for Institutions: $50.00

Method of Payment: Cheque _____ Money Order_____

Please return this form, with payment, to:

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