Chemical Institute of Canada | *For Our Future*

Public Understanding of Chemistry

Coordinator's Resource Book

Table of Contents

INTRODUCTION

The major outreach event of the Chemical Institute of Canada (CIC) is the Public Understanding of Chemistry (PUC) program and in particular National Chemistry Week (NCW). The success of PUC depends on its volunteers. Now more than ever chemists, chemical engineers and chemical technologists can work together to bring our message to the public that chemistry is everywhere, that it's exciting and that it is indeed vital to our future.

The Public Understanding of Chemistry Resource Book is designed to help volunteers from Local Sections, Universities, Student Chapters and other interested groups to organize and stage effective activities and events to celebrate chemistry across Canada.

To assist you with the task at hand, the Resource Book contains a list of suggested activities that were successful and well received in previous NCWs and tips on how to initiate and organize your own events. We wish to thank all those who shared their thoughts and ideas with us. Now, here is your opportunity not only to build on past successes but to implement your own ideas. Take advantage of the Resource Book, but also, use your imagination and creativity to develop new activities and novel approaches to stage events. We need your good ideas to enhance the impact of NCW on the general public and to expand and improve the resource material.

The CIC National Office is here to assist you in your planning. Please do not hesitate to contact us if you need assistance with conducting events or if you have ideas to share with us.

Our goal is to have participation from every province and territory across Canada. You can help us to achieve this goal by making PUC such a resounding success that volunteers, organizations and the general public from every corner of Canada will be lining up to share in the excitement of this celebration of the chemical sciences.

Our sincere thank you for your commitment and dedicated, hard work and best wishes for a successful PUC.

GOING OUT INTO THE COMMUNITY

GOING INTO THE SCHOOLS

Imagine the deep personal satisfaction felt by a scientist who makes a discovery. Such satisfaction is quite independent of other rewards. If young people could experience some of that joy in their school years, they would retain a lifelong appreciation of science and technology. It has been suggested that scientists, engineers and technologists spend one day per month in the schools doing lecture-demonstrations, hands-on experiments, consultations on student experiments, judging of science fairs, conducting science games, arranging laboratory and plant visits and providing chemical samples, models and literature. National Chemistry Week is a good time to get involved.

By school visits, we are referring to both elementary and high schools. Contact with the schools is often initially made through a teacher or parent but it is wise from the outset to ask that more than one classroom be visited to make the trip worthwhile. This will bring the school principal or administrative officer into the discussion. It is recommended that a letter of invitation from the principal be obtained to formalize your visit since you will be representing your colleagues in the CIC. This also gives you coverage under the school insurance plan.

The costs involved with local school visits are minimal (transportation, simple equipment) and should be covered by the group organizing the event, the individual scientist, engineer or technologist or his or her employer. Principals receive many offers of visits by people who want to be paid. The fact that visits you carry outcost the school nothing is very impressive.

School visits should be given maximum publicity by the organizers, in the school or in the community. When advised of visits a few days in advance, the media have invariably responded with courtesy, kindness and accuracy. A half-page news release stating the main facts of the visit should be sent to editors and producers. Published pictures of students doing experiments, when posted on the school website or bulletin board, give an enormous boost to students, teachers, parents and the community.

Planning a classroom presentation is similar to making an effective projector slide. The necessary information is laid out and then every possible bit of extraneous matter is removed to give the clearest message possible. Demonstrations should be rehearsed, taking into account every possible variable, and at least an equal number of backup experiments kept in hand.

The visitor should be 'self-contained', even have a bottle of water, plastic catch basin and towel in the briefcase for clean-up. This helps to overcome the idea that chemistry can be done only in a laboratory with special equipment. Aim to need only a table, wastebasket and blackboard to be provided in the classroom.

Safety is very important. The importance of rehearsing ahead of time with every possible change of variable cannot be stressed too often. *Minimum Safety Guidelines for Chemical Demonstrations* developed by the Chemical Education Division of the American Chemical Society are available at http://chemistry.org/ncw. The *Laboratory Safety Handbook*, published by the CIC is a useful reference for general safety procedures.

The experiments. Complete scientific literacy is impossible since even scientists do not share a common vocabulary. What we can strive for is familiarity with science in everyday life. Brevity

and three and four-letter words are best. Technical terms may leave incomplete or misleading impressions that students may later struggle to unlearn.

* References to magic and wizards should be avoided. Children (and their parents) can easily be misled. Take the trouble to explain the chemistry involved in spectacular reactions to dispel the magical image. Relating everyday things to the experiments help the students to understand. One visible example for youth is showing how polymers work in wet baby diapers.

Use a personal title that describes your work activity such as industrial chemist, chemical engineer, safety advisor, chemistry professor, chemical analyst, mining technologist, etc. It is best to avoid doctor with its medical connotation.

Accentuate the positive! When environmental or health issues are discussed, always include hopeful trends and suggest actions that the family can take to help solve the problems.

The period between 10:00 a.m. and 3:00 p.m. is the preferred time for visits. Extra care must be exercised in driving in and near school grounds. Parking for visitors is usually clearly marked and it is important to report first to the school office. Cheerful guides are plentiful. Some schools issue visitor passes as a security measure.

A copy of the Periodic Table poster is an ideal memento of the visit for the classroom and is available from CIC National Office. The Table unifies science and with everyday life and our objective should be to make it as familiar as the calendar. First-year chemistry and physics textbooks collected from academic colleagues can also be distributed to school libraries with an inscription commemorating the visit.

Teachers and particularly student teachers should be invited to visit your laboratories and plants and they should be encouraged to keep in touch by newsletters and personal contact. Set up chat groups with the students so that they can keep up the interest through discussions with you and your colleagues. Young people are ready to make career decisions at the early age of 12 to 14 years. You may want to keep this in mind when planning school events for NCW.

Some groups who organized school visits during NCW suggest that schools or teachers be contacted before the end of June since they prepare their lesson plans during the summer. A follow-up with the teacher is a must in September. An alternative is to write to the teachers making sure that your letter arrives at the school during the last week in August. This should also be followed by a personal contact early in September.

Some ideas from past NCWs.

Memorial University students and staff made visits to elementary schools with a presentation on the properties of carbon dioxide. They also invited the local television station to tape the visit and this footage was presented on local prime time TV news as well as on the national CBC News World network. This was successful as children enjoy good visuals. Memorial also sent teachers ideas for classroom projects to use during NCW.

An Interdiscipline Poster Competition - Crofton House School in Vancouver had students preparing posters in their art classes which had chemical themes such as crystals incorporated into them.

Distance education allows teachers to share one visit with many schools through the use of the internet.

With the permission of the teachers, making ice cream with dry ice is always a popular event for students. Try to get some interactive experiments, not just the big shows.

PUBLIC DISPLAYS AND DEMONSTRATIONS

Organization of public displays, including hands-on experiments, is a useful method of communicating information on science to the general public, including children. Such a project can be organized by Local Sections, Student Chapters, post secondary departments or other groups. This is one activity that can be successfully undertaken in collaboration with colleagues in other disciplines.

Guidelines

The exhibition should be run by enthusiastic people. Students are excellent candidates.

The topic must be made understandable in everyday terms.

The exhibit should involve 'hands-on' experience.

If possible, the experiments should comprise a unified exhibit with a common theme. Have student hands-on mixed with industrial information booths.

Chemistry experiments must illustrate some principle and explain something related to everyday experience. They should not be strictly sensational.

All experiments and demonstrations must be safe for operator and audience, must have been tested by the prospective demonstrators and be foolproof when carried out repeatedly in a public place. Many malls now restrict such things as the use of helium for balloons, some of the visual experiments with flames and may have other safety restrictions.

If possible, experiments should involve the audience.

Local Sections that require insurance for their event in a mall, museum, etc. should contact National Office to make arrangements as early as possible.

Posters

The positioning and size of any posters used in the display are important.

The content of the posters should be carefully considered.

The budget should include funds for professional production.

Acknowledgements

All donors of equipment or funds should be acknowledged at the exhibition.

Location

For public events, do not hold the event at a university; it is unfamiliar to the public and visits there are not usually part of their routine.

Community, cultural or municipal centres are the best places to set-up public displays because they get a high volume of traffic and families are used to visiting these buildings. Shopping malls are also excellent venues, and reach people who would't normally search out science demonstrations. Book malls well in advance as October is the a busy month for exhibits. Thursday evenings and Saturdays are the best times to guarantee high traffic flow. Science centres and museums have a more focused audience but get relatively good traffic.

Shopping Centre: contact the shopping centre manager well in advance (8 months), requesting space and asking for information on exhibit type, insurance requirements. Insurance for Local Sections may be arranged with the CIC National Office on an individual basis. Don't let this item deter you from holding a public exhibit. For more information, contact the National Office.

Cultural Centre, Library: Choose a location that the public are in the habit of visiting for other events, e.g. libraries, art exhibits, etc. Some venues may help with the advertising and other expenses. Ask them in advance about any restrictions they may have that will prevent you from doing some of your experiments.

Logistics

Experiments should be demonstrated to an appropriate group (e.g. at a Local Section meeting) as soon as details have been worked out. A trial should be staged three to four weeks in advance at a high school or similar location, to verify the operation of the experiments and work out any problems.

The logistics of setting up and manning the event should be reviewed in detail. Determine the layout and assign specific exhibits to specific locations. Arrange for delivery of tables and other materials. Establish with the facility the appropriate time for set-up. Ensure the committee arrives on time. Appoint someone to be responsible for a final inspection. Be "self-contained" although in locations such as shopping malls you will have a little flexibility to purchase supplies if required.

Publicity

Flyers distributed to elementary and high schools, newspaper and radio interviews, advertise on web sites, free radio announcements on community news programs are all recommended.

Costs

Expenses include: insurance, rental of tables and poster boards, postage, mailing, equipment and supplies.

Evaluation

The estimated attendance of one groups survey at the shopping centre exhibit listed 1,000 persons during an 8.5 hour day, 65 % adults, 30 % children, 5 % youth (late high school, early college).

There were a larger number of the latter group in the mall but they did not visit the exhibit. Is there a way to attract this age group?

Sample Demonstrations and Experiments

Chemistry experiments:

- Soxhlet extraction of plant components using cabbage, spinach etc.
- Chromatography of spinach extract to show different chlorophylls.
- pH measurement, using pH meter, pH papers, and indicators, of household products -- lemon juice, soft drinks, water, other juices, vinegar etc.
- Effects of liquid nitrogen on substances such as bananas, rubber, flowers etc. (demonstrates states of matter).
- Molecular modeling on a computer -- PC modeling program -- of such things as alcohol, aspirin, heroin, vitamins.
- Hazardous/toxic chemicals -- information about the toxic nature of various chemicals (handout, pamphlet), dummy examples such as flour or icing sugar were used to represent other compounds showing the quantities that are lethal.
- Which is lighter – diet or regular soft drinks. One group of students had an aquarium to show this experiment. Drinks donated by a local grocery store were given away free to visitors who came to check out the experiment.
- A computerized quiz (composed by students).

Preparing Demonstrations

Public demonstrations of some of the most visual effects of chemistry have always been very popular. Douglas Hayward, FCIC, gave in-class demonstrations for a number of years. His 'Do-It-Yourself Chemistry' video was extremely popular.

Joe Schwarcz of McGill University's Centre for Science and Society has been working on a public lecture series in chemistry for over 20 years in collaboration with Dr. David Harpp and Dr. Ariel Fenster. They have been performing their chemistry shows across the country. Visit their website at http://ww2.mcgill.ca/chempublic/.

Chem 13 News, produced by the Department of Chemistry at the University of Waterloo, might be of interest to you. Every issue contains interesting ideas. For additional information contact *Chem 13 News,* Department of Chemistry, University of Waterloo, Waterloo, Ontario N2L 3G1; Tel: 519-885-1211, ext. 3701. A one-year subscription is $14; $26 for two years.

Information and guidelines on performing demonstrations can be found in the section Going out to the Schools.

CHEMISTRY WALK

Give the public a chemist's perspective of their community: a view of the art, architecture, history and environment. The Toronto has made this into a very successful annual program. It can be carried out through schools, science centres as easier access points to attract people initially.

What needs to be done:

- Designate a walk coordinator for the section
- Determine an area for the walk (probably about 2 km)
- Decide on stopping points (say 5 or 6) with some chemistry connection for the walk. Try to make these in a quiet place away from traffic, but with a good view of the place of interest
- Make a map of the walk showing stopping points
- Write a "blurb" for each stopping point to be used by walk leaders
- Advertise the walk (remember it is a fine weather activity!)
- Establish a date and time for the walk with interested parties

Possible focus points for stops on a city chemistry walk

- Local industries
  - Distillery
  - Fermentation
  - Distillation
  - Manufacture of glycol and acetone
  - Sugar factory
  - Destabilisation of colloids
  - Separation techniques
  - Polarimetry

- Other businesses to look out for as suitable focus points
  - Tanneries
  - Paper makers
  - Glass makers
  - Potteries
  - Food processors e.g. donut or pizza making (chemical engineering connections)
  - Microbreweries
  - Wine making stores
  - Old pharmacies or herbal remedy stores
  - Gas (old lamp)
  - Water (site of first well)
  - also possible
  - Electricity
  - Air conditioning
  - Central heating

- Building materials:
  - Cement
  - Silos
  - CN Tower
  - Bridges
  - Limestone cycle

- Bonding and structure
- Exothermic reactions
- Hydration reactions
- e.g. Bricks made from local clay (discuss reasons for different colours)
- Stone (Stonehouse distillery – Kingston limestone)

- Artwork
  - Curtain Wall mural (Alucobond, paint, attachment to wall etc.)
  - Distillery in the 19th century (featuring smokestacks)
  - Sculptures
  - Different forms of iron and steel
  - Cast iron, e.g. Fountain
  - Facades of buildings
  - Wrought ironwork
  - Redox
  - Galvanic corrosion (2 different metals)
  - Copper weathering (spire)
  - Rust (bridge)
  - Natural history topics
  - coloured leaves in Fall
  - geological formations, weathering of rocks, etc.
  - soil pH and vegetation
  - Brownfields restoration

Comparing the modern map with an old map (if you can find one) show how the area has changed with time.

SPEAKING OF SPEAKERS

There is a lot of interest in guest speakers for public lectures. However, much needs to be thought about before ever lifting the telephone to extend an invitation.

Topic

There is no national theme for National Chemistry Week, but you can come up with your own. Some points to ponder:

- Does your proposed topic 'fit' with the theme?
- Is the topic of interest in your community -- in other words, is there a potential audience?
- Is the topic sufficiently interesting to draw them away from home and hearth?
- Do you have a specific speaker in mind?
- Can your speaker cater the technical talk to your targeted audience?

Your Audience

- Will your topic appeal to everyone or to a specific audience -- i.e. of interest to parents; students; chemists; environmentalists; pharmacists; homemakers; youth groups such as Cubs or Brownies. Your guest speaker will need to know what kind of an audience she/he will be addressing.
- What size of audience are you planning (hoping) for?

Potential topics: Food; waste disposal; women in chemistry and chemical engineering; green chemistry, wine/beer making; fossil vs. synthetic fuels; allergies; pesticides. What are some of the 'burning issues' in your community? Listening to your local radio talk shows or a glance at the Letters to the Editor pages of your local newspapers will provide some clues. What are your local industries, universities and hospitals concentrating on? Obviously there will be some local experts available to speak on their 'pet projects'.

Places to look for expertise:

- Your local industries. Their Public Relations Departments can suggest a potential speaker. Some advantages: Probably no cost involved; the speaker is likely to be someone from your own community, with a feel for 'hot issues' in the community.

- Your local university. What are some of the innovative research topics being studied? There are likely to be professors or graduate students anxious to talk about their 'pet projects'.

- Conference programs. Participants of conferences have a lecture already written up. They are often interested in presenting their topic a second time and could cater it to your audience.

- If your target audience consists of high school students, consider inviting undergraduate' chemistry, chemical engineering or chemical technology students to speak. Besides the enthusiasm and energy they will have, their closeness in age to the audience will provide an excellent role model for the students.

- Retired chemists and chemical engineers in your community can be a powerful resource. Their commitment to the field has already been proven and they have unquestionable expertise upon which to draw.

- Your own colleagues at work or involved in the Local Section may have suggestions on potential speakers and topics.

- Does your university alumni publish a directory of "Where are they now?" indicating where former graduates are working? Perhaps one of them would be interested in speaking about career choices that are available to chemists, chemical engineers and chemical technologists.

1. Does your community have a Science Centre? If so, why not approach them for suggestions?

So, now you have a topic; you know the kind of audience (and its size) that you want to address and hopefully you have a lead on a couple of potential speakers. The rest is easy - book a hall; publicize the event and the people will turn out. You will know from reading the section on Working with the Media that there is more to it than that. You will require good advance planning, persistence and persuasion to attract an audience.

- Finally, consider other options - panel discussions; radio talk shows; video presentations; question and answer sessions for students.

The Edmonton CIC Local Section hosts its Café CIC where several speakers talk on ordinary topics such as chocolate, tea, coffee, whiskey. It is mixed with sampling and musical entertainment for a diverse event. Educational videos to host your own version of these events are available from the Edmonton CIC Local Section and CIC National Office upon request.

BRING THE COMMUNITY TO YOU

LABORATORY TOURS

To develop a better understanding of chemistry by school children, expose them to various kinds of chemical laboratories and local industry.

Organizational Details
Letters can be written to local chemical laboratories, universities or colleges and private industry. The various institutions could be asked to participate in National Chemistry Week by opening their facilities to school students.

If you get a positive response, ask

2. the age group of students who would benefit from the tour
3. the optimum size of the group
4. a description of the activities of the laboratory, facility
5. most suitable time and day.

It should be stressed that you do not wish to place excessive burdens on staff because you hope they will participate in National Chemistry Week again in future years.

From the information assembled, a prospectus was drawn up and circulated to the scientific consultants of the various local school boards. It is best to do this before the summer vacation. It is also helpful to work through the Science Teachers' Association, as well as the science consultants.

Tours could be booked on a 'first come; first served' basis. The coordinator should keep in touch with the participating laboratories and apprise them of the schools and teachers involved, so that any detailed arrangements can be made between the teachers and the laboratories directly. A follow-up with the teachers is important the week before the scheduled tour.

After the tours, the laboratories should be thanked for participating, and ask for their comments on how the tours might be improved.

Example

In one Local Section, of the 14 laboratories included in the program, 10 received visits and 62.5% of the available tour places were booked. During National Chemistry Week, 444 high school students from the region visited a chemistry laboratory. From the comments received from various laboratories, students and teaching staff, the tours went very well.

Another Local Section organized a series of tours to local industry open to high school students and the adult public. They advertised the tours in the city newspaper. The industrial tours basically followed the same organizational guidelines as the laboratory tours.

One drawback mentioned is the fact that in both types of tours the hosts do not wish students who are younger than high school age to participate and they prefer to have small groups (10-12). Make sure you ask about the suggested number and type of participants when approaching potential hosts. You could suggest that if a class is too large, one group can tour, while the other group attends a briefing and question period on the company or the laboratory.

STUDENT ACTIVITIES

Students can be a part of NCW by participating in awareness activities.

Student Chapter members could get involved by staffing an Open House in the chemistry, chemical engineering or chemical technology related department of their university or college. A tour of the department might feature interesting chemistry demos to capture the viewers' imaginations. Others might prefer to set up displays in a mall or community centre for the general public.

Ideas include a chemistry quiz, in which high school students compete in "Jeopardy" fashion, featuring questions about chemical structures, names and events in chemical history. Book prizes can be given out to the winners, also T-shirts stamped with chemical symbols.

Students might be interested in making industrial tours during the week, or in visiting research labs. In turn, they themselves might make the effort to visit elementary and high schools locally, to give presentations on the everyday chemical aspects of such topics as pollution prevention or food chemistry. Visually exciting messages coming from youth would, no doubt, make an impact on how chemistry does affect the lives of everyone.

The Department of Chemistry at York University (Toronto), announced during National Chemistry Week, the inception of The Chemical Hall of Fame, in recognition of those chemical substances and materials that have provided benefits to society and to honour the inventors/discoverers. Up to three inductions to The Chemical Hall of Fame are to be announced annually.

Because National Chemistry Week is all about communication, students and their teachers may want to expand further by use of the media. Local cable TV stations are often receptive to giving publicity to youthful projects. In Victoria, a phone-in show, in cooperation with the university, was an instant success, dealing as it did, with topical questions like what to put down the sink! Newspapers could publish student essays on related subjects - with photos. Students are experts at taking advantage of all sources of social media. Tap into it.

By offering a challenge to students, it is hoped that many will want to pursue careers in chemistry and will find encouragement in its beneficial aspects. In trying to raise the image of chemistry, emphasis should be on the safe, rather than on the spectacular.

During NCW, Student Chapter members visited elementary schools and high schools to perform demonstrations or to speak to the students.

- Co-op students of one Chemical Technology Program hosted a lecture. The students followed the lecture with a buffet that they had prepared themselves.
- CIC Student Awards Night is a way of recognizing students for their hard work. The Manitoba Local Sections hosts such a night annually for students from three universities, followed by a lecture.
- Students from a university may wish to present to students at high schools and colleges the advantage of pursuing chemistry at university.
- Many schools produce periodic table cupcakes as a fundraiser and chemical awareness project.

- Celebrate National Mole Day. There is no end to the activities you can get students to do for this celebration.

PLANNING AN OPEN HOUSE

Organizing an Open House is similar to organizing a public display although in a public display you take your accomplishments and knowledge out to the public and in an open house you invite the public to come to you to view your accomplishments and share your knowledge. Basic logistical arrangements apply to both activities. After going through this information you may want to review the information under the section Public Displays and Demonstrations.

Colleges, universities, industrial sites and research facilities are encouraged to open their doors to the public during NCW. Many departments are already holding Open Houses on an annual basis and have found this exercise to be beneficial and worthwhile. NCW can be combined with the organization's annual Open House. You don't need to invent a new event.

Why an Open House? To develop a positive public appreciation of chemistry. Bright young students need to feel positive about chemistry and be encouraged to pursue careers in the chemical profession. The future health of the chemical profession and the economic well being of the chemical industry depend on this.

Keys to a Successful Open House: Planning, Participation and Publicity

Planning: Set up a planning group. You cannot expect one person to do all the work. Identify your target audience and decide what you want to highlight. Test your program or exhibits with members of your targeted audience well in advance of the opening.

Ensure you draw up a budget, a staffing plan and a schedule with assigned responsibilities. People work best when they know exactly what is expected of them. Prepare a checklist of things that need to be done from well ahead of the Open House up to opening day.

Participation: Successful Open Houses need ample participation. Pull in enthusiastic volunteers to form your planning group. Involve one or two local teachers (elementary and high school), recruit people working in your operation, add a person from the local media or a local public relations firm and bring in some secondary school students to help plan.

Publicity: The best Open House in the world still needs publicity. Talk to your local media and invite them to tour before opening day when there are no crowds.

Advertise your Open House on the web, in the local newspaper a week ahead of time and then again during the week of the event. Since your event is free take advantage of free public service announcement services on radio and cable television.

Talk to teachers and/or send flyers to school for children to take home.
Where applicable, when you or your staff is participating in other public functions, talk about your upcoming Open House.

SAFETY HINTS

Minimum Safety Guidelines for Chemical Demonstrations - ACS Division of Chemical Education

Chemical Demonstrators must:

1. Know the properties of the chemicals and the chemical reactions involved in all demonstrations presented.
2. Comply with all local rules and regulations.
3. Wear appropriate eye protection for all chemical demonstrations.
4. Warn the members of the audience to cover their ears whenever a loud noise is anticipated.
5. Plan the demonstration so that harmful quantities of noxious gases (e.g. nitrogen dioxide, sulfur dioxide, hydrogen sulfide) do not enter the local air supply.
6. Provide safety shield protection wherever the slightest possibility that a container, its fragments, or its contents could be propelled with sufficient force to cause personal injury.
7. Arrange to have a fire extinguisher at hand whenever the slightest possibility for fire exists.
8. Do not taste or encourage spectators to taste any non-food substance.
9. Do not use demonstrations in which parts of the human body are placed in danger (such as placing dry ice in the mouth or dipping hands into liquid nitrogen).
10. Do not use open containers of volatile, toxic substances (e.g. benzene, carbon tetrachloride, carbon disulfide, formaldehyde) without adequate ventilation as provided by fume hoods.
11. Provide written procedure, hazard, and disposal information for each demonstration whenever the audience is encouraged to repeat the demonstration.
12. Arrange for appropriate waste containers for and subsequent disposal of materials harmful to the environment.

For more details on Safety issues visit www.chemistry.org/ncw.

MATERIAL FOR DISTRIBUTION
EVERYTHING IS TOXIC: IT DEPENDS ON THE DOSE

Dr. M.G. Hogben, Dept. of Chemistry, Concordia University, Nov. 7, 1984

Paracelsus (1493-1541) said it 500 years ago: "All substances are poisonous; there is none which is not a poison. The right dose differentiates a poison and a remedy."

Each of the following common household chemicals, if ingested (eaten or drunk) within a one or two hour period, is said to be able to kill the average 2 year old child weighing about 23 lbs. (10 Kg). **Often far less can kill or seriously harm even children who are strong and healthy.**

Alcohol	100g or about 1 1/2 cups of vodka, gin etc.
Salt	37g or 2 oz.
Sugar	300g or 1/2 lb.
Caffeine	30g or 1 oz; equiv. to 20 cups of coffee, tea or 30 colas
Baking Powder	(50% tartrate; 50% sodium bicarbonate) 10 g (La. p 316)
Crushed Fruit Seeds	(apple, peach, apricot, plum) 5-25 seeds can be fatal through the slow release of cyanide into stomach (La. p. 277)
ASA	(Aspirin) 2g (6 tablets);
Phenacetin	(Tylenol) 10 g (La. p. 328)
Cigarettes	(2 g tobacco) 20 eaten, not smoked!; actually 2 cigarettes have enough nicotine to be lethal but absorption is too slow.
Matches	strike anywhere (pot chlorate) 50-100 match heads **(La.p.407)**
Weed Killer	(potassium chlorate) 2 g.
Nail Polish Remover	(ethyl acetate or acetone) 100 ml or three I oz. Bottles
Moth Balls	(naphthalene) 2 g. (La.p.21 1)
Deodorizer Cakes	q)-dichlorobenzene) 5 g. (La.p. 178)
Kerosene/Turpentine	+ other petroleum spirits: 10 mls. has been fatal
Fuel Tablets	(metaldehyde) 1 g. (La.p.202)
Fondue Fuel	(methyl hydrate) 50 mls. or 1/4cup -- note: small amounts make you irreversibly blind
Latex Paints	50 ml (U.p.318)
Oil Based Paints	Equiv. to kerosene
Detergent	(dishwashing, laundry, shampoo): max. non-lethal lg (La.p.315)
Bleach (Javex)	15 ml. (La.p.314) as corrosive as same cone. lye; severe irritant but no chronic effect
Lye	(Draino or Liquid Plumber) 5 g. but terrible sub-lethal effects

or even pure **WATER!:** a gallon (force-fed over a period of one hour) is lethal. For comparison, the lethal dose for well known 'poisons' such as cyanide and strychnine would be about 20 mg. for a 2 year old.

NOTE: This information is not to be used to diagnose or to treat anyone; it is merely to warn! If you think your child has been poisoned, then phone a hospital and give them your suspicions. There are Poison Control Centres to assist you as well.

References: Most of the references on this sheet have been taken from the *Lange Handbook of Poisoning* by R.H. Dreisbach. For example: La. p.328 means page 328 of the *Lange*

CHEMISTRY IS CREATIVE

"Chemistry is creative was the theme of the 1990 National Chemistry Week. The results of creative chemistry and of creative chemists are all around you.

Consider your typical morning. It starts with the irritating "Bleep-Bleep" of your digital alarm. A chemist first made and studied the materials in the plastic case, the "chips" and quartz timing mechanism and the lithium battery that powers them-who said all of the results of Chemical creativity are pleasant? You throw back the brightly coloured polyester insulated comforter and blended cotton-polyester sheets. Chemical creativity is responsible for the polyester and the dyes to brighten your bed clothes.

As you stagger toward the bathroom, think about the carpet you are walking on, and the paint and the vinyl coated wallpaper and the dyes used to colour them. Step into the tub for your shower. You are still surrounded by the results of chemical creativity...the shower curtain, the wall ties including their colouring materials and grouting, the painted ceiling, and even the enamel finish of the tub. Turn on the water using the chrome-plated brass taps. As you come awake in the water stream think about how the water was made safe to drink with chlorine, or, if you are on the Bay Bulls reservoir and the plant is working, ozone. And now your shampoo and soap. Who first made the surfactants, the perfumes the anti-dandruff additives, and deodorants in them? Creative chemists.

Throughout the day, as you first towel yourself *off* get dressed, eat breakfast, brush your teeth, grab your coat and books and papers, and set-off for school...just about everything you see, smell, touch, taste, or hear is the result of or has been affected or influenced by chemical creativity. Let's consider the milk you poured on your cereal. It was in a brightly coloured, plastic coated paper container when you used it...plastics and dyes we have already mentioned and, of course, much creative chemistry has gone into paper making The origin of the milk though was a cow, a cow that ate Vass, hay, and grain grown with the help of fertilizers herbicides and pesticides. The cow received essential vitamin and mineral supplements and, when sick, antibiotics and other medicines. Between the cow and the carton, the milk also encountered numerous results of chemical creativity some subtle, for example the tires of the trucks that hauled it at various stages of its travels, others more direct like the vitamin D supplements often added to milk

The vast majority of the results of creative chemistry that you encounter are beneficial. Sometimes though, the final application of *the chemist's* creativity is harmful but should chemistry and chemists be blamed for killing trout if a forester decides spraying is necessary to control the hemlock looper and the pilot of the plane sprays streams and ponds as well as forest? Even then, it is an analytical chemist using methods developed by chemists who identifies and quantifies the toxin and, often, chemists determine how to clean up the mess.

Chemists sometimes wonder why a chemical that returns you to health is not a "chemical" but 'medicine, why a twenty litre can of hexane spilled on a highway is a disastrous chemical spill when the local garage uses gasoline to clean grease off engine parts routinely, why people believe it is possible to have a 'pure, chemical free mineral water"... But why go on.

Without the creativity of chemists, our standard of living would be much lower, our lives much shorter, less healthy, less comfortable, less varied, much greyer and less colourful, and much smellier! And, of course, world hunger would be infinitely worse

National Chemistry Week and the theme “Chemistry is creative” were designed to make everyone more aware of the contributions of chemistry and chemists to society, to raise our profile and to make more young people aware of the value, excitement and challenges of chemistry. Canada and Canadians need more chemical creativity and creative chemists. Take advantage of National Chemistry Week and the opportunity it offers to learn and to think about chemistry's contributions to your daily life.

Chemical Puzzles.
FIND THE CHEMICAL WORDS

Janice Kelland

Note: the words run in straight lines but may be horizontal, vertical, diagonal, forward, or backward. The same letter may be used several times.

M	E	T	A	L	E	T	A	T	I	P	I	C	E	R	P	H	N	S
C	O	M	P	O	U	N	D	C	I	N	O	I	Z	I	C	E	I	P
R	I	A	K	H	P	F	S	C	H	X	C	N	E	O	N	L	V	T
R	E	T	A	W	I	B	I	Y	I	F	L	A	S	K	V	I	O	E
N	U	C	L	E	U	S	D	D	C	S	E	G	F	E	Q	U	L	N
E	L	E	B	O	N	R	I	H	P	T	D	R	R	M	L	M	U	I
U	O	E	F	E	A	Z	E	C	A	P	R	O	T	O	N	U	M	L
T	C	I	R	T	E	M	I	V	A	R	G	X	C	L	E	I	E	A
R	N	O	E	T	I	F	I	E	L	L	Z	N	A	E	G	C	T	K
O	F	L	A	C	I	T	Y	L	A	N	A	M	T	F	Y	L	R	L
N	R	N	A	I	C	T	E	E	T	C	P	O	I	J	X	A	I	A
E	E	L	O	A	O	I	V	M	R	M	E	L	O	T	O	C	C	C
G	A	T	O	M	S	T	L	E	R	E	T	E	N	X	N	O	R	I
O	C	I	N	A	G	R	O	N	I	R	U	C	L	I	Q	U	I	D
R	T	C	N	I	Z	A	S	T	A	C	L	U	C	A	R	B	O	N
T	I	I	L	G	P	T	S	T	S	U	I	L	T	S	S	E	A	F
I	O	R	L	O	Z	I	I	E	P	R	D	E	G	T	A	S	Z	G
N	N	P	A	L	R	O	D	X	S	Y	S	I	S	Y	L	A	N	A
S	O	L	I	D	N	N	O	R	T	C	E	L	E	R	T	B	O	S

Words to find:

ACID
ACTIVATE
AIR
ALKALINE
ANALYSIS
ANALYTICAL
ANION
ATOM

BASE

CALCIUM
CARBON
CATION
CHEMICAL
COMPOUND

DILUTE
DISSOLVE

ELECTRON
ELEMENT

FILTRATION
FLASK
FORENSIC

GAS
GOLD
GRAVIMETRIC

HELIUM
HYDRATE

IONIC
INORGANIC
IRON

LIQUID

MERCURY
METAL
MOLE
MOLECULE

NEON
NEUTRON
NITROGEN
NOBEL
NUCLEUS

ORGANIC
OXIDIZE
OXYGEN

PHYSICAL
PRECIPITATE
PROTON

REACTION

SALT
SILVER
SOLID

TITRATION

VOLUMETRIC

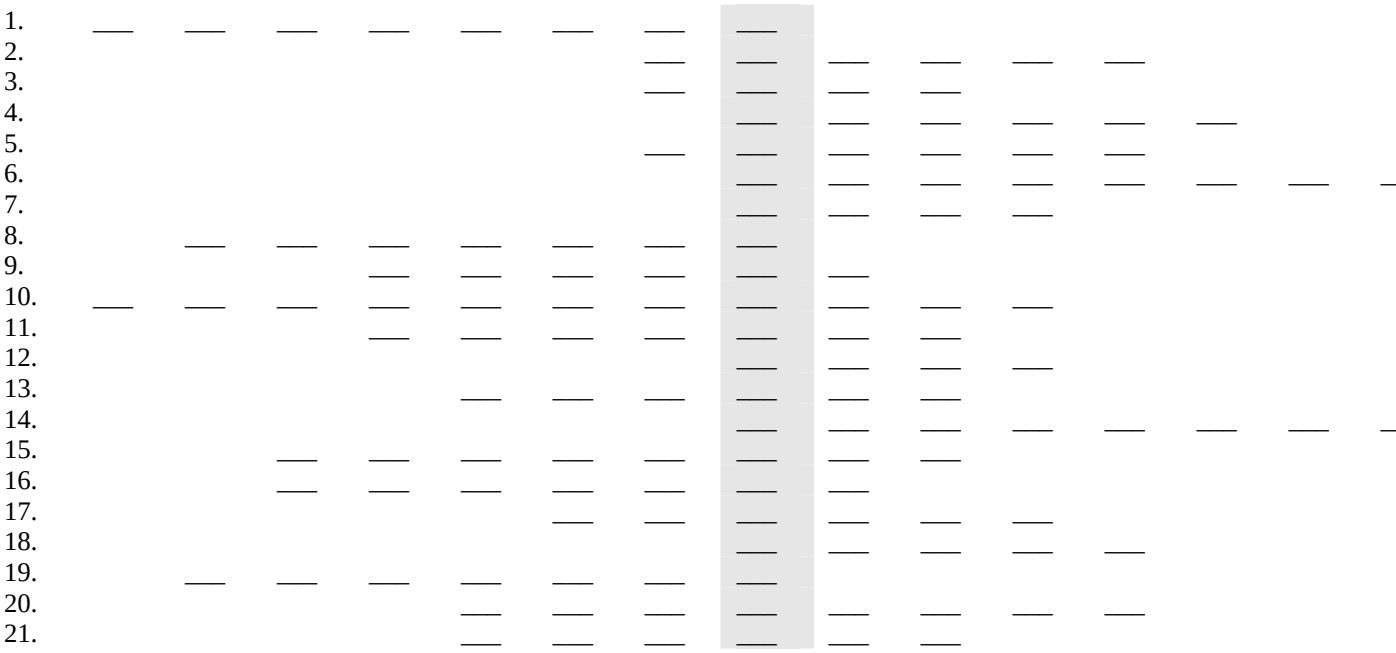
WATER

ZINC

CHEMICAL PUZZLE

Janice Kelland

Using the dues below, fill in the words that go with each set of blanks. When complete, the letters in the box **will** spell out a secret phrase.



1. The lightest element responsible for the Hindenburg explosion.

2. Diamonds, coal, and pencil leads are primarily this element

3. The smaIlest particle of an element.

4. A dark lowed material used in solution to disinfect cuts.

5. The red-brown. metal used to make pennies.

6. The element that makes up 78% of air.

7. This corrosive - material turns blue litmus paper red

8. This ingredient of beer, wine and whiskey is used as an automobile fuel in Brazil.

9. A white granular material that is the main component of glass and is used in small packets to keep electronic equipment dry.

10. This green pigment of plants is used in breath mints and kitty Jitter.

11 The centre of an atom; it contains almost all of the mass

12 You can measure this in kilograms.

13 This gas is used to make balloons float.

14 The result of dissolving a salt in water also the answer to a problem.

15 This fire-proof substance can cause lung disease.

16 This liquid metal is often used in thermometers

17 We can not live without this element; it is 21% of air.

18 This chemical coven 75% of the earth's surface.

19 The major *component of* natural gas.

20 The smallest particle of a compound.

21 A container used by chemists; a Muppet lab assistant.

FIND THE CHEMICAL WORDS

FL J. Anderson

Note the words run in straight ***lines*** but *in all* possible directions. The same letter may be ***used in several*** words.

T	I	M	E	R	F	L	A	S	K	L	E	S	C	H
E	B	R	A	S	S	I	S	Y	L	A	N	A	G	A
S	L	O	U	I	O	D	I	N	E	Y	R	L	E	R
T	H	E	R	M	O	M	E	T	E	R	E	T	S	D
T	E	O	**M**	O	T	A	N	H	R	I	K	C	O	N
U	L	P	T	E	N	E	X	E	H	T	A	C	R	U
B	I	E	N	T	N	E	C	S	P	S	E	O	C	O
E	U	N	O	S	E	T	C	I	S	A	B	L	U	P
C	M	I	X	T	U	R	E	S	D	I	L	O	S	M
A	E	R	Y	O	T	C	S	T	W	R	L	R	T	O
D	L	O	G	P	R	O	P	A	N	E	O	V	E	C
M	T	L	E	P	A	P	N	O	I	T	X	A	E	R
I	D	H	N	E	L	P	R	I	M	A	R	Y	L	R
U	A	C	I	D	L	E	T	S	A	W	O	L	S	G
M	I	C	A	C	A	R	B	O	N	O	G	R	A	M

Words to find:

ACID	CADMIUM	GOLD	MICA	SALT	TESTTUBE
AMINE	CARBON	GRAM	MIXTURE	SCENT	THERMOMETER
ANALYSIS	CHLORINE			SILVER	TIMER
ARGON	COLOR	HARD	NEUTRAL	SLOW	
ATOM	COMPOUND	HELIUM		SOLID	WASTE
	COPPER	HEXANE	OXYGEN	STEEL	WATER
BASIC		HOTTER		STIR	
BEAKER	ELEMENT		PRIMARY	STOPPED	
BORON		IODINE	PROPANE	SUCROSE	
BRASS	FLASK	MELT	REACTION	SYNTHESIS	

PROMOTIONAL MATERIAL

Promotional material is available from CIC National Office to enhance your activities. Material can be ordered by visiting www.cheminst.ca/publicunderstanding.

Types of material available:

- Educational books for Grades 1-3
- Furkins, NCW's mascot
- Periodic Table Posters
- Balloons
- Rulers
- T-shirts
- Lunch Bags
- and more

CORPORATE SPONSORSHIP

Seeking corporate support for a cause is becoming increasingly competitive in these times of fiscal cutbacks. By targeting specific businesses and carefully modeling one's approach, the chance of receiving a positive response is greatly enhanced.

Outlined below are guidelines to provide assistance to those who are planning a corporate sponsorship strategy.

Key Messages: It is important to have clear objectives for the project you wish to sell. Ours is NCW. Therefore you want to have prepared some key messages to present to the people from whom you are soliciting support. Here are a few suggestions of key messages.

- It is important to develop a highly trained work force whose expertise will contribute to Canada's role in world-wide scientific advancement.
- There is a shortage of trained chemists to fill the pressing need for expert personnel in industry and research.
- There is a need to encourage our brightest students to choose a career in chemistry.
- Public awareness of chemistry's role in our daily lives is very low. We should all work together to dispel the notion of "chemophobia"
- The target audience are potential employees of many of your sponsors.

Prepare summary notes on NCW and your organization: The corporate sponsors will want to know if they are supporting a stable group and a worthwhile cause. Brief notes on the inception and history of National Chemistry Week follow and may be of use to you in preparing such notes.

Notes on NCW

In 1988, a national science literacy survey showed that public awareness and understanding of science and technology was low among Canadians.

The Canadian Society for Chemistry, therefore, decided to hold a **National Chemistry Week** to highlight the contributions of chemistry to modem society and its enormous potential for future generations.

The first NCW was held in 1989, but the level of Local Section participation was low. In 1990, at least 18 organizations reported having staged events with good results. They were successful enough to warrant the institution of NCW as an annual event.

In 1990, The Chemical Institute of Canada took over the administration of National Chemistry Week to include all chemical professions to become more involved.

Levels of participation a corporation may select: Corporate sponsorship may take the form of a cash donation or the provision of services or materials at no charge, ie. catering, use of hall or boardroom, technical support, printing, public relations advice, graphic or design services, etc. Make sure you are prepared to ask for a specific amount of funds or services for a specific project or part of a project. In return, and depending on the value of the donation, you may present options as to how the corporation is to be recognized. These basic steps can certainly be expanded upon and tailored to your specific-projects.

- Corporate signage on-site during event
- Mention in a news release
- Invitations extended to corporate officials to attend event
- Recognition, at event, of corporate officials and mention of the donation
- Photo opportunities with corporate invitees
- Mention of corporate donor in publications or advertising