



**2nd WORLD CONGRESS OF CHEMICAL ENGINEERING
IX INTERAMERICAN CONGRESS OF CHEMICAL ENGINEERING
31st CANADIAN CHEMICAL ENGINEERING CONFERENCE**

Co-sponsored by:

Interamerican Confederation of Chemical Engineering
European Federation of Chemical Engineering
Asian Pacific Confederation of Chemical Engineering

Organized by:

Canadian Society for Chemical Engineering

The Congress Committee gratefully acknowledges the financial assistance
of the National Research Council of Canada for Congress publications.

TABLE OF CONTENTS

Welcome to Montreal	2
Services	6
Student Program	7
Spouses' Program	7
Gala Québécois Evening	7
Business Meetings	8
Events	9
World Chemical Exposition	11
Congress at a Glance	12
Detailed Technical Program	14
Chairman Index	145
Author Index	146
Personal Program	154
Notes	156
Congress Site	160

LISTE DES SUJETS

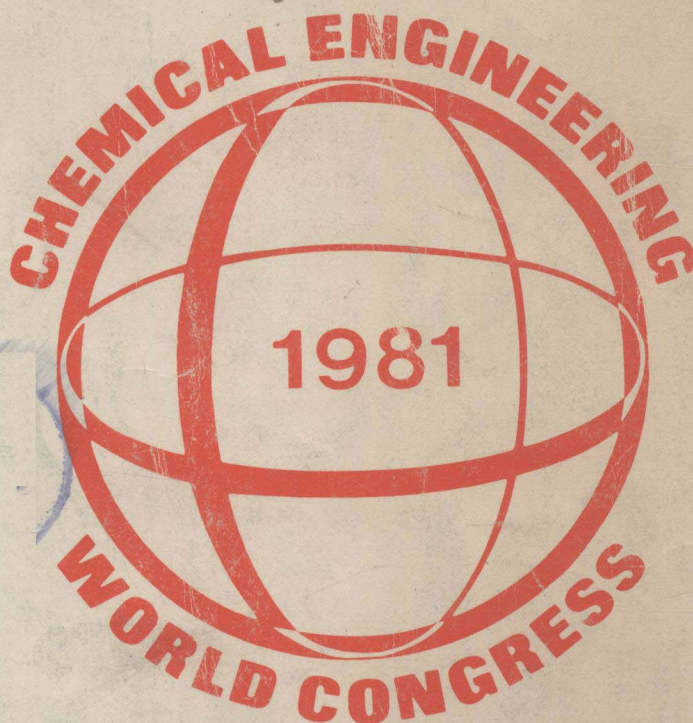
Bienvenue à Montréal	2
Information générale	6
Programme pour étudiants	7
Programme d'activités pour les conjoints	7
Soirée de gala québécois	7
Reunions d'affaires	8
Activités	9
Salon de la chimie industrielle	11
Sommaires des exposés	12
Programme détaillé	14
Liste des présidents de sessions	145
Liste des auteurs	146
Programme personnel	154
Notes	156
Site du congrès	160

INDICE

Bienvenidos a Montreal	2
Servicios	6
Programa Estudiantil	7
Programa para los Cónyuges	7
Noche de Gala en Quebec	7
Reuniones de Trabajo	8
Actividades	9
Exposición Química Mundial	11
Resumen del Congreso	12
Programa Detallado	14
Presidentes de Sesiones	145
Autores	146
Programa Personal	154
Notas	156
Site del Congreso	160

FINAL PROGRAM AND ABSTRACTS

2nd World Congress of Chemical Engineering and World Chemical Exposition



Montréal, Canada
1981 October 4-9

**IX Interamerican Congress
of Chemical Engineering**

**31st Canadian Chemical
Engineering Conference**



MESSAGE DU MAIRE JEAN DRAPEAU

C'est toujours un plaisir pour le Maire de Montréal de souhaiter la bienvenue à ceux qui viennent dans notre ville pour y tenir leur congrès; c'est un plaisir et un honneur quand les auspices de la Congrès mondial de la chimie, organisé sous les auspices de la Congrès mondialis d'Amérique, d'Europe et d'Asie, qui trois fédérations prestigieuses de la chimie, les plus qualifiées. Je félicite leurs représentants parmi d'avoir choisi Montréal et cite le comité organisateur de votre congrès, qui témoigne, d'une part, d'avoir mis au point un programme très dense, qui témoigne, d'autre part, de l'importance de la chimie à votre époque, de l'industrie chimique et parachimie surtout, sur le plan technique et économique, d'autre part, de la haute conscience que vous avez de votre mission.

part, de la haute conscience que vous avez de votre rôle.

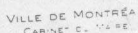
Quand, surmenés par des heures de cours intensifs, d'exposés, de séances techniques ou d'information, vous voudrez vous en égarer, ou à tout le moins vous détendre, sachez que Montréal vous en offre la possibilité. Vous êtes des congressistes; que Montréal vaut la peine d'être visité. Ville de contrastes, fondée par les Français en 1642, mais en partie anglophone et anglo-saxonne, elle a vu se rencontrer deux grandes civilisations, l'Europe et l'Amérique, point de rencontre de deux grandes cultures, l'occidentale et l'orientale, celle de votre pays et celle de la France. C'est pourquoi la ville de Montréal est une ville internationale prestigieuse; aussi, la capitale 1967 de l'Exposition universelle. Elle comprend-elle la visite de la ville de Montréal, la ville de l'Exposition universelle, des Floralies, du stade Daniel Costello dans l'Histoire des Jeux olympiques. Bien d'autres endroits intéressants à visiter vous attendent.

Je souhaite que votre congrès soit une réussite sur le plan professionnel et culturel. Sachez d'avance que, pour avoir réuni ici tant de gens distingués, il restera dans la mémoire des Montréalais que je représente ici comme l'un des plus marquants qui auront été tenus à Montréal.

Le maire de Montréal

Le maire de Montréal

Le maître de l'œuvre
Jean Grapreau



MESSAGE FROM MAYOR JEAN DRAPEAU

It is always a pleasure for the mayor of Montréal to welcome to our city visitors who come here to attend a congress, a pleasure that becomes an honour when that event is the 2nd World Congress of Chemical Engineering, held under the auspices of the three major federations active in Europe, Asia and bringing together the foremost representatives of those bodies. The organizing committee of the congress deserves to be congratulated for its selection of Montréal and for the development of a very important compact agenda in the field of chemical engineering, with special emphasis on keeping abreast of the latest developments in chemical and technological levels - on the one hand, with the world of chemical and para-chemical activities - and, on the other hand, with your own very conscientious approach to your mission.

After many hours of taxing lectures, conferences, technical or information meetings, you may seek relaxation and entertainment: this is one field where Montréal has a great deal to offer. Do not forget the congress for a few hours to become tourists in our fair city: you will soon find that it is well worth a visit. Montréal is a city of many faces, having been founded by the French in 1608. It is fashioned with many faces by the English and many ethnic communities. It is the second French-speaking city of the world and at the crossroads of two continents between Europe and America, standing at the crossroads of two major civilizations and in close touch, since 1967, has gained world fame. It is a city of many faces. The 1967 World Expo, with its 67 pavilions, its numerous cultural activities include a visit to the "temple of the most beautiful" in the 1980 Floraliades and the Olympic stadium "one of the most beautiful in the 1980 Floraliades and the Olympic stadium" in the words of Daniel Costelle in his "Histoire des Deux olympiques". Many other areas of our city are also of considerable interest to visitors.

I sincerely hope that your deliberations will be successful both professionally and culturally. In any case, because it has brought together so many distinguished participants, this event will remain a most memorable one for all Montréalais whom it is my honour to represent.

Mayor of Montréal



MENSAJE DEL ALCALDE DE MONTREAL

Siempre es un orgullo para el Alcalde de Montreal el
desear una cordial bienvenida a todos los que vienen a nuestra ciudad
para celebrar sus congresos.

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Cuando extenuados por los cursos intensivos o agobiados por las reuniones técnicas o de información, quisieran ustedes divertirse o cuando menos relajarse, deben saber que Montreal les ofrece la posibilidad. Ustedes son Congresistas, transformémosle en turistas durante algunas horas cada día y constaten que Montreal vale la pena de disfrutarse.

Ciudad de contrantes, fundada por los Franceses en 1642, en parte de habla inglesa y hogar de numerosos grupos étnicos, es la segunda ciudad de habla francesa del Mundo y por esta razón la liga entre Europa y América, punto de contacto entre dos grandes civilizaciones y vecina de una tercera, los Estados Unidos. Ciudad donde se han desarrollado desde 1967 tres manifestaciones internacionales de gran prestigio.

La sección recreativa de su programa de actividades comprende la visita de los Pabellones de la Exposición Universal, los Floralíes, el Estadio Olímpico, "uno de los mas hermosos e no el mas hermoso del Mundo" según escribe Daniel Costelle en la Historia de los Juegos Olímpicos, además de otros muchos lugares interesantes que esperan la visita de ustedes.

Les deseo que este Congreso sea un éxito en el aspecto profesional y cultural, sepan de antemano que por haber reunido aquí tantas personalidades distinguidas, quedará en la memoria de los habitantes de Montreal que yo represente, el orgullo de haberlos tenido con nosotros.

Paul Robeson
Alcalde de Montreal

WELCOME TO MONTREAL

As the host of this World Congress, the Interamerican Confederation of Chemical Engineering takes a special pleasure in welcoming you to what we believe will truly be one of the memorable events of your career. Starting with the very choice of cosmopolitan Montreal as the site of this meeting, everything about the arrangements has been carefully planned to combine a tremendously diversified technical program of the highest caliber with equally enticing and enjoyable social activities. On behalf of the chemical engineers from North, Central and South America, who constitute our Confederation, heartiest greetings to our fellow engineers from all over the world.

W.H. GAUVIN
President
Interamerican Confederation
of Chemical Engineering

The Canadian Society for Chemical Engineering is most delighted to organize this 2nd World Congress of Chemical Engineering. We think that the Technical Program is one of the best in the history of chemical engineering. And it is truly international, with papers from 55 countries and 6 continents. The outstanding general sessions linking chemical engineering to economic and social development substantiate the Congress theme "Chemical Engineering for World Development".

We are particularly pleased to welcome visitors from abroad. We hope you find the Congress stimulating; and that you enjoy the excellent social program. As Canadians we hope that you have the time to see something of our country. And particularly that you experience the "joie de vivre" of Montreal.

J.M. STEWART
President
Canadian Society
for Chemical Engineering

It is with the greatest pleasure that I welcome you to Montreal for the 2nd World Congress of Chemical Engineering which coincides with the IX Interamerican Congress and the 31st Canadian Conference of Chemical Engineering. Two primary objectives were defined in the early planning stage of this Congress: the first was to publicize and have the participation of chemical engineers world-wide. The second objective was to provide a technical conference of the highest quality. I am proud to report that both these objectives have been achieved as evidenced by the program with 1200 presentations from 55 countries.

This was possible through the efforts of many persons (organizing committee members, theme coordinators, session chairpersons and federation and society representatives) who spent uncounted hours to make this Congress successful. I also acknowledge the impressive financial support from industry and government agencies.

I hope you enjoy your stay in Montreal and that the 2nd World Congress will be a most memorable event for you.

PIERRE CARREAU
President
2nd World Congress
of Chemical Engineering

BIENVENUE A MONTREAL

En tant qu'hôte de ce Congrès mondial, la Confédération interaméricaine du génie chimique se fait un grand plaisir de vous accueillir à ce que nous croyons sera l'un des événements mémorables de votre carrière! En commençant par le choix même de Montréal, ville cosmopolite par excellence, comme lieu de rencontre pour le Congrès, tout a été préparé avec soin afin d'associer une gamme d'activités sociales aussi attrayantes qu'agréables à un programme technique hautement diversifié. Au nom de tous les ingénieurs chimistes de l'Amérique du Nord, Centrale et du Sud qui forment notre Confédération, salutations cordiales à tous nos confrères ingénieurs du monde entier!

W.H. GAUVIN
Président
Confédération interaméricaine
du génie chimique

La Société canadienne du génie chimique est enchantée d'accueillir ce 2^e Congrès mondial du génie chimique. Nous croyons que le programme technique est l'un des meilleurs de toute l'histoire du génie chimique. Et c'est vraiment un événement international, avec des communications venant de 55 pays et de 6 continents. Les séances particulières qui font le lien entre le génie chimique et les sciences économiques et le progrès social répondent bien au thème du Congrès "Le génie chimique au service du développement mondial".

Il nous fait particulièrement plaisir de souhaiter la bienvenue aux visiteurs de l'étranger. Nous espérons que le Congrès sera pour vous une expérience stimulante et que vous apprécierez l'excellent programme social. En tant que Canadiens, nous espérons que vous aurez le temps de visiter certaines parties de notre pays et particulièrement de découvrir la "joie de vivre" de Montréal.

J.M. STEWART
Président de la Société
Canadienne du Génie Chimique

J'ai le vif plaisir de vous souhaiter la bienvenue à Montréal, à l'occasion du 2^e Congrès mondial du génie chimique, qui coïncide avec le IX^e Congrès interaméricain et la 31^e Conférence canadienne du génie chimique. Dès le début de l'organisation de ce Congrès, nous nous étions fixés deux objectifs primordiaux: d'abord de faire connaître cet événement et d'assurer la participation des ingénieurs chimistes de tous les coins du monde; de plus, nous voulions offrir un programme de la plus haute qualité. Je crois que nous avons relevé le défi, tel qu'en témoigne le programme ci-joint, comprenant quelques 1200 communications venant de 55 pays.

Ce Congrès n'aurait pu être un succès sans les efforts soutenus de plusieurs personnes (membres du comité d'organisation, coordinateurs et présidents de séances, représentants de fédérations et de sociétés savantes). Je me dois également de souligner l'aide financière considérable reçue de l'industrie et d'agences gouvernementales.

J'espère que vous apprécierez votre séjour à Montréal et que le 2^e Congrès mondial sera pour vous un événement mémorable.

PIERRE CARREAU
Président
2^e Congrès Mondial
du Génie Chimique

BIENVENIDOS A MONTREAL

Como anfitrión de este Congreso, la Confederación Interamericana de Ingeniería Química se siente especialmente complacida en extenderles la bienvenida a lo que creemos será uno de los acontecimientos más recordados en vuestra carrera. Comenzando por la selección de la ciudad cosmopolita de Montreal como sitio de esta reunión, todo lo concerniente a su organización ha sido cuidadosamente planeado para combinar una tremenda diversificación en el programa técnico del más alto calibre con actividades sociales igualmente atractivas y agradables. De parte de los ingenieros químicos de Norte, Centro y Sud América, quienes constituyen nuestra Confederación, extendemos los más cordiales saludos a nuestros colegas de todo el mundo.

W.H. GAUVIN
Presidente
Confederación Interamericana
de Ingeniería Química

La Sociedad Canadiense de Ingeniería Química se complace en auspicar este 2^o Congreso Mundial de Ingeniería Química. Creemos que el Programa Técnico es uno de los mejores en la historia de la ingeniería química. Es verdaderamente internacional, ya que más de 55 países de 6 continentes están representados. Las importantes sesiones generales, que relacionan la ingeniería química al desarrollo económico y social, fundamentan el tema del Congreso: "Ingeniería Química para un Mundo en Desarrollo".

Nos es particularmente grato dar la bienvenida a nuestros visitantes. Esperamos que encuentren el Congreso estimulante y que disfruten del excelente programa social. Como Canadienses esperamos que ustedes tengan tiempo de ver algo de nuestro país, y, particularmente, que experimenten la "joie de vivre" de Montreal.

J.M. STEWART
Presidente
Sociedad Canadiense
de Ingeniería Química

Tengo el gran placer de darles la bienvenida a Montreal en la ocasión del 2^o Congreso Mundial de Ingeniería Química, que coincide con el IX Congreso Interamericano y la 31^a Conferencia Canadiense de Ingeniería Química. Al comienzo de la organización de este Congreso nos fijamos dos objetivos primordiales. El primero, dar amplia difusión a este acontecimiento y asegurar la participación de ingenieros químicos de todas partes del mundo. Segundo, ofrecer un programa de la más alta calidad. Creo que hemos superado estos objetivos como lo atestigua el programa adjunto que contiene unas 1200 comunicaciones provenientes de 55 países.

Este congreso no hubiese sido posible sin el gran esfuerzo de numerosas personas (miembros del comité organizador, coordinadores y presidentes de sesiones, representantes de federaciones y sociedades científicas). Debo igualmente subrayar la considerable ayuda financiera recibida de parte de la industria y de oficinas gubernamentales.

Espero que disfruten su estadía en Montreal y que el 2^o Congreso Mundial sea para ustedes un acontecimiento inolvidable.

PIERRE CARREAU
Presidente
2^o Congreso Mundial
de Ingeniería Química

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5. **Fossil Resource Development – Energy and Petrochemicals**
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6. **Energy Development and Utilization**
Dr. I. Farag
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7. **Nuclear Engineering**
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8. **Fundamentals**
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9. **Unit Operations and Separation Processes**
Professor J.R. Grace
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10. **Control**
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11. **Reaction Engineering**
Dr. M.J. Phillips
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14. **Primary Industries**
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15. **Polymer Engineering**
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16. **Biochemical Engineering**
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17. **Biomedical Engineering**
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18. **Education and Student Program**
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Interamerican Confederation of Chemical Engineering

Prof. Murray Douglas, Montreal
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FUTURE CSChE CONFERENCES

1982 — 32nd Conference
Vancouver, British Columbia
October 3 — 6, 1982

1983 — 33rd Conference
Toronto, Ontario
October 2 — 4, 1983

1984 — 34th Conference
Quebec City, Quebec

1985 — 35th Conference
Calgary, Alberta

1986 — 36th Conference
Sarnia, Ontario

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FUTUROS CONGRESOS INTERAMERICANOS DE INGENIERIA QUIMICA

1983 — X Congreso
Santiago, Chile

1985 — XI Congreso
Montevideo, Uruguay

Acknowledgement

The Organizing Committee would like to thank all those volunteers and others who have worked to make the Congress a success, but whose names could not be included for lack of space.

Remerciements

Le comité organisateur voudrait remercier tous ceux qui ont contribué au succès de ce Congrès. Le manque d'espace nous empêche malheureusement de les mentionner individuellement.

Agradecimiento

El Comité Organizador quisiera agradecer a todos aquellos que han hecho posible el éxito del Congreso y cuyos nombres han sido omitidos por falta de espacio.

SERVICES

Message Center

Messages can be relayed to Congress participants by calling the following Congress number:

(514) 866-4131

Messages received at this number will be posted at a booth located on the convention floor of the Queen Elizabeth Hotel. This service will be available during the following periods:

Sunday October 4	15:00 – 19:00
Monday – Thursday	9:00 – 18:00

Congress Information Center

Need to know where and when your committee meeting is being held? This and any other information on Congress activities is available at the Congress information center located on the convention floor of the Queen Elizabeth Hotel and open during the following hours:

Sunday October 4	15:00 – 19:00
Monday – Thursday	9:00 – 18:00

Tourist Information Center

What to do and what to see in and around Montreal? Brochures and information will be available at a self-service counter on the convention floor of the Queen Elizabeth Hotel.

Congress Ticket Counter

It is strongly recommended that tickets for Congress events be purchased at registration time. However additional tickets may be purchased, if available, at a counter on the convention floor of the Queen Elizabeth Hotel. Ticket refunds may be obtained at this counter up to 48 hours prior to the event, when our contractual obligations allow. The refund will be at the price listed for advance registration. This counter is open during the following hours:

Sunday October 4	15:00 – 19:00
Monday – Wednesday	9:00 – 18:00

Proceedings Purchase and Mailing

Congress participants will receive one ticket for each proceedings volume ordered at registration time. (Free volume and purchased volumes). These tickets should be exchanged later for the corresponding volumes at a counter located on the convention floor of the Queen Elizabeth Hotel. Additional volumes can also be purchased directly from this counter if available.

It is also possible for Congress participants to have their volumes shipped back home. Arrangements for packing and mailing should be made at the purchase counter. As Congress participants may need their volumes until the end of the Congress, this service will be extended until Friday, October 9. The counter will be open during the following periods:

Monday – Wednesday	9:00 – 16:00
Thursday and Friday	8:00 – 18:00

Currency and Exchange Facilities

The Canadian dollar is legal tender in Canada but the U.S. dollar is accepted almost everywhere at the prevailing rate of exchange.

Foreign currencies may be exchanged at the exchange service located to the east of the lobby of the Queen Elizabeth Hotel (08:30 – 17:30 Monday through Friday). Several banks will also exchange some foreign currencies. The Guardian Trust, 618 St. Jacques will exchange most foreign currencies.

INFORMATION GENERALE

Bureau des messages

Les messages pourront être transmis aux congressistes en appelant au numéro suivant:

(514) 866-4131

Les messages ainsi reçus seront affichés sur un tabillard spécifique à l'étage du Congrès de l'hôtel Reine Elizabeth. Ce service sera disponible aux périodes suivantes:

Le dimanche 4 octobre	15:00 – 19:00
Lundi à jeudi	9:00 – 18:00

Centre d'information du Congrès

Un centre est ouvert à l'étage du Congrès (hôtel Reine Elizabeth) pour faire part des diverses activités ou réunions de comités ainsi que l'endroit ou la salle qui est réservée à ces fins. Il sera ouvert aux heures suivantes:

Le dimanche 4 octobre	15:00 – 19:00
Lundi à jeudi	9:00 – 18:00

Information touristique

Des brochures et renseignements sur les activités et les visites recommandées seront disponibles à l'étage du Congrès de l'hôtel Reine Elizabeth.

Comptoir des billets

On recommande fortement de se procurer les billets pour les diverses activités du Congrès lors de l'inscription. Toutefois des billets pourront être obtenus, lorsque disponibles, à ce comptoir situé à l'étage des congrès de l'hôtel Reine Elizabeth. Des remboursements se feront aux prix de la pré-inscription dans le 48 heures précédentes et si nos obligations contractuelles le permettent. Ce comptoir sera ouvert aux heures suivantes:

Le dimanche 4 octobre	15:00 – 19:00
Lundi à mercredi	9:00 – 18:00

Achat des compte-rendus

Les congressistes recevront 1 ticket par volume des compte-rendus commandés lors de l'inscription (volumes inclus dans frais d'inscription et achetés). Ces tickets seront échangés contre le ou les volumes requis à un comptoir situé à l'étage des Congrès de l'hôtel Reine Elizabeth. Des volumes additionnels pourront aussi être obtenus directement à ce comptoir.

Il est aussi possible de faire envoyer ces volumes par courrier. Des arrangements devront être pris pour préparer les paquets et les affranchir au comptoir d'achat. Ce service sera offert jusqu'au vendredi 9 octobre:

Lundi à mercredi	9:00 – 16:00
Jeudi et vendredi	8:00 – 18:00

Devises et bureau de change

Le dollar canadien a cours légal au Canada, mais le dollar U.S. est accepté presque partout au taux de change courant. Les devises étrangères pourront être changées au bureau de change situé tout près de l'hôtel Reine Elizabeth (08:30 – 17:30, du lundi au vendredi). Plusieurs banques acceptent quelques devises étrangères. On peut changer presque n'importe quelles devises étrangères au Guardian Trust, 618 St. Jacques.

SERVICIOS

Centro de Mensajes

Para enviar mensajes a los participantes en el congreso debe llamarse al siguiente número:

(514) 866-4131

Los mensajes que se reciban en este número se anunciarán en una cabina ubicada en el piso de la convención del Hotel Queen Elizabeth. Este servicio podrá utilizarse en los siguientes períodos.

Domingo, 4 de Octubre	15:00 – 19:00
Lunes a Jueves	9:00 – 18:00

Centro de Información del Congreso

Necesita saber cuando y donde se realizará su reunión de Comité? Esta y cualquier otra información acerca de las actividades del Congreso puede obtenerse en el Centro de Información del Congreso ubicado en el piso de la convención del Hotel Queen Elizabeth, que permanecerá abierto durante las horas siguientes:

Domingo, 4 de Octubre	15:00 – 19:00
Lunes a Jueves	9:00 – 18:00

Centro de Información Turística

Qué hacer y qué ver en Montreal y sus proximidades? La información necesaria estará a su disposición en la mesa de auto servicio en el piso de la convención del Hotel Queen Elizabeth.

Mesa de Tickets del Congreso

Recomendamos a los participantes reservar las entradas para todas las funciones en el momento de la inscripción. Sin embargo, en caso de haber disponibilidad, es posible adquirir tickets adicionales en la mesa del piso de la convención del Hotel Queen Elizabeth. Devoluciones también pueden efectuarse en esta mesa con 48 horas de anticipación cuando los contratos permitan. La devolución se efectuará a precio de inscripción anticipada. Esta mesa está abierta con el siguiente horario:

Domingo, 4 de Octubre	15:00 – 19:00
Lunes a Miércoles	9:00 – 18:00

Compra y Envío de los Anales

Los participantes recibirán un boleto por cada volumen de los anales que haya sido solicitado en el momento de la inscripción. (Volumen gratis y volúmenes comprados). Estos boletos deben cambiarse posteriormente por los volúmenes correspondientes en la mesa ubicada en el piso de la convención del Hotel Queen Elizabeth. En esta mesa también pueden comprarse volúmenes adicionales si los hubiera disponibles.

Los congresales pueden solicitar el envío de los volúmenes a su domicilio. Los arreglos para empaque y envío deben realizarse en la mesa de compra. Este servicio se extenderá hasta el Viernes 9 de Octubre para permitir el uso de los volúmenes durante el Congreso. La mesa de compra operará en los períodos siguientes:

Lunes a Miércoles	9:00 – 16:00
Jueves y Viernes	8:00 – 18:00

Cambio de Moneda

La moneda legal en Canadá es el dólar Canadiense, pero U.S. dólares se aceptan casi sin excepción en todas partes, al cambio del día.

En el servicio de cambio inmediato al Hotel Queen Elizabeth es posible cambiar moneda extranjera (08:30 – 17:30, Lunes a Viernes). Diversos bancos también cambian moneda extranjera, El Guardián Trust, de 618 St. Jacques cambia casi todo tipo de moneda.

Admission to Congress Sessions

Admission to the technical sessions will be by Congress registration badge only. Admission to the special events and tours will be by ticket only. Tickets for special events and for tours, if still available, may be purchased at the Congress Ticket Counter.

Press Headquarters

The Matapedia Room of the Queen Elizabeth Hotel will be available to members of the press from 12:00 Sunday, October 4, 1981 to 17:00 Thursday, October 8, 1981.

STUDENT PROGRAM

Students are especially invited to the 2nd World Congress and a special program has been organized. This program includes presentations of the winning papers in the student contest (Sessions 18.1 and 18.2) and a session on career opportunities and development in Chemical Engineering (Session 18.3) as well as a number of industrial visits.

The special events feature a Student Mixer on Sunday, October 4, 1981, a Luncheon on Tuesday, October 6, 1981 and the Student Party on Wednesday evening, October 7, 1981 with Ecole Polytechnique and McGill University acting as hosts.

The student registration will give access to all Congress sessions. Student identification will be required.

Admission au Congrès

L'admission aux sessions techniques sera permise aux détenteurs d'un macaron d'inscription et celle aux autres activités se fera sur présentation de billets. Ces billets peuvent être obtenus lors de l'inscription ou sur place jusqu'à épuisement de ces derniers.

Centre de la presse

La salle Matapédia du Reine Elizabeth est réservée pour les agents d'information, les journalistes, photographes et personnel de télévision du dimanche 4 octobre à 12:00 jusqu'au jeudi 8 octobre à 17:00.

PROGRAMME POUR ETUDIANTS

Une invitation toute particulière est lancée aux étudiants de participer à ce 2^e Congrès mondial et un programme spécial a été créé à cette fin. Ce programme comprend la présentation des solutions gagnantes dans le concours entre étudiants, (sessions 18.1 et 18.2) un colloque sur les carrières et le développement en génie chimique (la session 18.3) et un certain nombre de visites industrielles.

Des activités sociales ont aussi été prévues, tels un cocktail le dimanche 4 octobre, un déjeuner le mardi 6 octobre et une réception le mercredi soir 7 octobre offerte par l'Ecole Polytechnique et l'Université McGill.

L'inscription donne droit à toutes les présentations. La carte d'étudiant sera requise.

PROGRAMME D'ACTIVITES POUR LES CONJOINTS

Le salon de Réception St. Charles situé sur le même étage que les salles de conférence du Reine Elizabeth sera ouvert le dimanche 4 octobre de 13:00 à 17:00, et de 08:30 à 17:30 du 5 au 8 octobre, à l'intention de ceux qui s'inscrivent à ce programme. On pourra y obtenir des billets pour les activités culturelles et sportives, des renseignements sur les restaurants, magasins, transports etc. Le café avec biscuits sera servi.

Admisión a las Sesiones del Congreso

Para ser admitidos a las Sesiones Técnicas los participantes deberán exhibir el distintivo de Inscripción. La admisión a las funciones especiales y excursiones se controlará a través de cupones. Ellos podrán ser adquiridos, en caso de haber boletos disponibles en ese momento, en la mesa de Tickets del Congreso.

Oficinas de Prensa

El Salón Matapedia del Hotel Queen Elizabeth será habilitado para los miembros de la Prensa desde las 12:00 del Domingo 4 de Octubre de 1981 hasta las 17:00 del jueves 8 de Octubre de 1981.

PROGRAMA ESTUDIANTIL

Se ha extendido una invitación especial a los estudiantes de Ingeniería Química, para quienes se ha organizado un programa especial. Dicho programa incluye la presentación de las publicaciones ganadoras de la competencia estudiantil (sesiones 18.1 y 18.2), una sesión sobre las perspectivas de la carrera y el desarrollo de la Ingeniería Química, (sesión 18.3) así como un cierto número de visitas industriales.

Las funciones especiales organizadas incluyen un Encuentro de Estudiantes el domingo 4 de Octubre, un Almuerzo el martes 6 de Octubre y la Fiesta de Estudiantes la noche del miércoles 7 de Octubre, actuando como anfitriones la Ecole Polytechnique y la Universidad de McGill.

La inscripción de los estudiantes da acceso a todas las Sesiones Técnicas. Se solicitará comprobante de inscripción.

PROGRAMA PARA LOS CONYUGES

El Salón de Recepción St. Charles está ubicado en el piso de Convenciones del Queen Elizabeth Hotel y estará abierto para las personas inscritas en el Programa para Conyuges que lleven la tarjeta de identificación, el domingo 4 de Octubre de 13:00 a 17:00 y entre el lunes 5 y jueves 8 de Octubre de 8:30 a 17:30. Allí existirá un servicio de información telefónica, venta de entradas para funciones culturales y deportivos, información general sobre restaurantes, centros de compras y "como ubicarse" en el área de Montreal. Se servirá café y masitas a las personas registradas en el programa para conyuges.

BOUSES' PROGRAM

Hospitality Lounge, St. Charles, is located on the Convention floor of the 7:00n Elizabeth Hotel. This lounge will be by Badge only, to registrants in the Bouses' program on Sunday, October 4 13:00 to 17:00 and on Monday, October 5 through Thursday, October 8 8:30 to 17:30. Telephone, information service, sale of tickets for sport and cultural events, general information on restaurants, shopping and "how to get there" in the Montreal area, as well as coffee and cookies, will be available.

GALA	GALA	GALA
Wednesday, October 7	19:30 – 23:30	
Event 03: Gala Québécois Evening		

Cocktails and a gourmet dinner with wine will be served in a Québécois décor while you enjoy an evening of entertainment with the accordion trio of Bibi la Crème and chanteuse Carole Cloutier. The famous folk dance group Les Sortilèges, in authentic traditional costumes will perform the best of Québec's repertoire and will invite everyone to join in the good old steps. Finally, the Big Band Sound of Johnny Monti will close the evening with one hour of ball dancing music. Come join the fun Quebec style! Register early – space limited!

GALA	GALA	GALA
Le mercredi 7 octobre	19:30 – 23:30	
Activité 03: Soirée de gala québécois		

Des cocktails et un buffet pour gourmet seront servis, vin inclus, dans un décor très québécois. Vous apprécierez votre soirée grâce au trio d'accordéonistes Bibi la Crème et à la chanteuse Carole Cloutier. L'excellent groupe de danse folklorique, "Les Sortilèges" vêtus des costumes authentiques du temps, présentera les meilleures danses du répertoire québécois, auxquelles, on vous demandera de participer. Finalement la soirée se terminera avec une heure de danse au son de l'orchestre de Johnny Monti. Venez et participez à la joie de vivre à la québécoise. Il faut s'inscrire rapidement car le nombre de places est limité.

GALA	GALA	GALA
Miércoles, 7 de Octubre	19:30 – 23:30	
Evento 03: Noche de Gala en Quebec		

Se servirán cocktails y un banquete, incluyendo las bebidas, en un ambiente Québécois. Usted disfrutará del espectáculo con el trío de acordeón Bibi la Crème y la cantante Carole Cloutier. El famoso grupo de baile folklórico Les Sortilèges, en auténticos trajes tradicionales, presentará lo mejor del repertorio de Québec e invitará a todos a integrarse al baile. Finalmente la Big Band Sound de Johnny Monti clausurará la reunión con una hora de música bailable. Venga y diviértase al estilo de Québec! Inscribáse anticipadamente, entradas limitadas.

Ladies: Cocktail dress
Gentlemen: Business suit
Price: \$35 Can.

Tenue de Ville
Coût: \$35 canadiens

Séñoras: Vestido de Cocktail
Caballeros: Traje de negocios
Precio: Can. \$35

BUSINESS MEETINGS
REUNIONS D'AFFAIRES
REUNIONES DE TRABAJO

Time	Event	Activité	Actividad	Location
Saturday, October 3				
9:00 – 17:00	CSChE National Executive Meeting	Réunion du Conseil Exécutif de la SCGCh	SCIQ Reunión del Ejecutivo Nacional	388 Macdonald Engineering McGill University
Sunday, October 4				
18:00 – 19:00	Executive Meeting Catalysis CIC	Réunion du bureau de la division de catalyse de l'ICC	Reunión Ejecutivo CIC Catalisis	St. Laurent Bonaventure
17:30 – 18:45	World Congress Presidential Reception	Réception présidentielle	Congreso Mundial Recepción Presidencial	Suite,* Queen Elizabeth
19:00 – 19:30	Opening Ceremony	Cérémonies d'ouverture	Ceremonia de Abertura	Grand Salon Queen Elizabeth
19:30 – 21:00	World Congress Reception	Réception du Congrès mondial	Recepción Congreso Mundial	Grand Salon Queen Elizabeth
Monday, October 5				
7:00 – 8:00	Speakers' Breakfast	Petit déjeuner des conférenciers	Desayuno de Oradores	Duluth, Queen Elizabeth Côte St. Laurent Bonaventure Le Royer, Hyatt
7:00 – 8:30	Breakfast Meeting Membership & Local Sections, CSChE	Petit déjeuner d'affaires du comité de l'adhésion et des sections locales de la SCGCh	Reunión – Desayuno Miembros y Secciones Locales, SCIQ	St. Pierre, Bonaventure
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth
12:00 – 12:30	Presidential Reception for Head Table guests	Réception présidentielle pour les invités à la table d'honneur	Recepción Presidencial para participantes en Mesas de Honor	Suite,* Queen Elizabeth
12:30 – 14:15	Congress Luncheon: Interamerican Confederation	Déjeuner de la Confédération interaméricaine	Almuerzo: Confederación Interamericana	Grand Salon Queen Elizabeth
12:30 – 14:15	Air & Ammonia Keynote Speaker Luncheon	Déjeuner avec conférencier invité de air & ammoniac	Almuerzo con Orador invitado del grupo Aire y Amoníaco	Le Royer, Hyatt
17:45 – 19:00	CSChE Annual General Meeting	Réunion annuelle des membres de la SCGCh	SCIQ, Reunión Anual	Westmount Bonaventure
19:00 – 19:45	Economics & Business Mgt. – Annual General Meeting and Cocktail Party	Réunion annuelle et Cocktail de la division d'Economique et Gestion des Affaires (ICC)	Reunión Anual y Cocktail, Administración de Empresas y Economía	Mount Royal Bonaventure
19:00 – 19:30	CSChE Presidential Cocktails	Cocktail du Président de la SCGCh	SCIQ, Cocktails Presidenciales	St. Laurent Bonaventure
19:30 – 22:00	Canadian Chemical Engineering Banquet	Banquet du génie chimique canadien	Banquete: SCIQ	Outremont Westmount Bonaventure
Tuesday, October 6				
7:00 – 8:00	Speakers' Breakfast	Petit déjeuner des conférenciers	Desayuno de Oradores	Duluth, Queen Elizabeth Côte St. Laurent Bonaventure Le Royer, Hyatt
7:00 – 8:30	CSChE Faculty Advisors Breakfast Meeting	Petit déjeuner d'affaires des conseillers universitaires de la SCGCh	SCIQ, Reunión – Desayuno Consejeros Académicos	St. Laurent Bonaventure
7:30 – 8:30	CSChE Long Range Planning Breakfast Meeting	Petit déjeuner d'affaires du comité de planification de la SCGCh	SCIQ, Reunión – Desayuno Planificación a Largo Plazo	St. Michel, Bonaventure
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth
9:00 – 15:30	CSChE Publications Committee	Réunion du comité des publications de la SCGCh	SCIQ, Comité de Publicaciones	St. Pierre, Bonaventure
12:00 – 12:30	Presidential Reception for Head Table guests	Réception présidentielle pour les invités de la table d'honneur	Recepción Presidencial para participantes en Mesas de Honor	Suite,* Queen Elizabeth
12:30 – 14:15	Congress Luncheon: European Federation	Déjeuner de la Fédération européenne	Almuerzo: Federación Europea	Grand Salon Queen Elizabeth
12:30 – 14:15	Air & Ammonia Keynote Speaker Luncheon	Déjeuner avec conférencier invité de air & ammoniac	Almuerzo, con Orador invitado del grupo Aire y Amoníaco	Le Royer, Hyatt
14:00 – 16:00	CIC Finance Committee	Réunion du comité des finances de l'ICC	Comité de Finanzas CIC	St. Laurent, Bonaventure
14:00 – 17:00	Professional Development Committee	Réunion du comité du perfectionnement professionnel	Comité de Desarrollo Profesional	St. Léonard, Bonaventure

Event	Activité	Actividad	Location
Tuesday, October 6	Le mardi 6 octobre	Martes, 6 de Octubre	
17:30 CSChE Industrial Policy Committee	Réunion du comité de stratégie industrielle	Comité de Política Industrial, SCIQ	St. Laurent, Bonaventure
17:30 CSChE Manpower and Employment Committee	Réunion du comité de la main-d'oeuvre et emploi de la SCGCh	SCIQ, Comité de Empleo y Recursos Humanos	St. Michel, Bonaventure
19:00 Exposition Wine & Cheese	Vins et fromages à l'exposition	Vino de Honor en la Exposición	Place Bonaventure
18:30 Catalysis Division CIC Annual General Meeting	Réunion annuelle des membres de la division de catalyse de l'ICC	División de Catalisis, CIC, Reunión Anual	Hampstead, Bonaventure
Wednesday, October 7	Le mercredi 7 octobre	Miércoles, 7 de Octubre	
8:00 Speakers' Breakfast	Petit déjeuner des conférenciers	Desayuno de Oradores	Duluth, Queen Elizabeth; Côte St. Luc, Bonaventure; Le Royer, Hyatt
8:30 CSChE Dept. of Chem. Eng. Chairmen Breakfast Meeting	Petit déjeuner d'affaires des directeurs de départements du génie chimique (SCGCh)	Desayuno SCIQ de Directores de Departamentos de Ing. Quím.	St. Laurent, Bonaventure
9:15 Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon, Queen Elizabeth
18:00 CIC Board of Directors Meeting	Réunion du Conseil d'administration de l'ICC	CIC Reunión de Comité Directivo	St. Pierre, Bonaventure
12:00 CSChE Continuing Conference Program Committee	Réunion du Comité des congrès et symposia de la SCGCh	SCIQ Reunión de Comité Permanente de Conferencias	St. Laurent, Bonaventure
12:30 Presidential Reception for Head Table guests	Réception présidentielle pour les invités de la table d'honneur	Recepción Presidencial para participantes en Mesas de Honor	Suite,* Queen Elizabeth
14:15 Congress Luncheon: Asian Pacific Confederation	Déjeuner de la Confédération Pacifique-Asie	Almuerzo: Confederación de Asia y el Pacífico	Grand Salon, Queen Elizabeth
19:30 Reception for Chairmen & Heads of Chem. Eng., Applied Chem. & Ind. Chem. Departments	Réception pour les directeurs des départements du génie chimique et de chimie appliquée et chimie industrielle	Recepción para Directores de Departamentos de Ing. Quím., Quím. Ind. y Quím. Aplicada	Mount Royal, Bonaventure
20:00 Gala Québécois Evening	Soirée de gala québécois	Noche de Gala en Quebec	Grand Salon, Queen Elizabeth
Thursday, October 8	Le jeudi 8 octobre	Jueves, 8 de Octubre	
10:00 Speaker's Breakfast	Petit déjeuner des conférenciers	Desayuno de Oradores	Duluth, Queen Elizabeth; Côte St. Luc, Bonaventure; La Pause, Hyatt
9:15 Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon, Queen Elizabeth
15:15 Mixing Session Luncheon	Déjeuner du groupe sur les mélanges	Almuerzo grupo de Mezclado	St. Pierre, Bonaventure
14:15 Exposition Luncheon	Déjeuner de l'exposition	Almuerzo de Exposición	Place Bonaventure
16:00 CSChE Conference and Symposium Committee Debriefing	Réunion sur le déroulement du Congrès (comité des Conférences et Symposia de la SCGCh)	SCIQ, Comité de Conferencia y Simposio. Información	Chaudière, Queen Elizabeth
19:00 Chem. Tech. '81 - Cocktails	Chem. Tech. '81 - Cocktail	Tecnol. Quím. '81 - Cocktail	St. Pierre, Bonaventure
Friday, October 9	Le vendredi 9 octobre	Viernes, 9 de Octubre	
20:00 Chem. Tech. '81	Chem. Tech. '81	Tecnol. Quím. '81	St. Pierre, Bonaventure
* By invitation only	* Sur invitation seulement	* Solo con invitación	

EVENTS

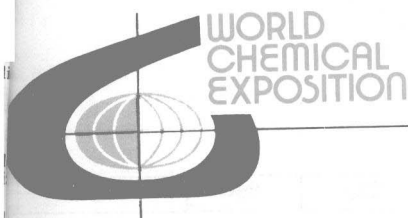
Event	Activité	Actividad	Location
Sunday, October 4	Le dimanche 4 octobre	Domingo, 4 de Octubre	
17:00 Spouses Hospitality Lounge	Salon de Réception des conjoints	Salón de Recepción de Cónyuges	St. Charles, Queen Elizabeth
19:30 Opening Ceremony	Cérémonies d'ouverture	Ceremonia de Abertura	Grand Salon, Queen Elizabeth
21:00 World Congress Reception	Réception du Congrès Mondial	Recepción al Congreso Mundial	Grand Salon, Queen Elizabeth

Time	Event	Activité	Actividad	Location
<u>Monday, October 5</u>				
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth II
8:30 – 17:30	Spouses Hospitality Lounge	Salon de Réception des Conjoints	Salón de Recepción de Cónyuges	St. Charles Queen Elizabeth II
9:30 – 13:30	Sightseeing tour of Cosmopolitan Montreal	Visite guidée de Montréal	Visita guiada del Montreal Cosmopolita	(1)
12:30 – 14:15	Congress Luncheon Interamerican Confederation	Déjeuner du Congrès Confédération Interaméricaine	Almuerzo del Congreso Confederación Interamericana	Grand Salon Queen Elizabeth II
19:30 – 22:00	Canadian Chemical Engineering Banquet	Banquet du génie chimique canadien	Banquete de la Ingeniería Química Canadiense	Ouremont Wetmount Bonaventure
<u>Tuesday, October 6</u>				
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth II
8:30 – 17:30	Spouses Hospitality Lounge	Salon de Réception des conjoints	Salón de Recepción de Cónyuges	St. Charles Queen Elizabeth II
9:30 – 16:30	Excursion to the Laurentians	Excursion dans les Laurentides	Visita a los Laurentidas	(1)
10:00 – 15:00	Guided Art Tour	Visite des Musées	Museos y Galerías de Arte	(1)
12:00 – 18:00	Visit to IREQ	Visite à IREQ	Visita a IREQ	(1)
11:30 – 19:00	Visit to QIT-FER et TITANE	Visite à QIT-FER et TITANE	Visita a QIT-FER et TITANE	(1)
12:30 – 14:15	Congress Luncheon European Federation	Déjeuner du Congrès Fédération Européenne	Almuerzo del Congreso Federación Europea	Grand Salon Queen Elizabeth II
13:00 – 18:00	Visit to PAPRICAN	Visite à PAPRICAN	Visita a PAPRICAN	(1)
17:00 – 19:00	Exposition Wine and Cheese	Dégustation de vins et fromages	Degustación de vinos y quesos en la Exposición	Place Bonaventure
<u>Wednesday, October 7</u>				
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth II
8:30 – 17:30	Spouses Hospitality Lounge	Salon de Réceptions de Conjoints	Salón de Recepción de Cónyuges	St. Charles, Queen Elizabeth II
9:30 – 11:30	Walking Tour of Old Montreal	Visite du Vieux Montréal	Caminata por el Viejo Montreal	(1)
12:30 – 14:15	Congress Luncheon Asian Pacific Confederation	Déjeuner du Congrès Confédération Pacifique-Asie	Almuerzo del Congreso Confederación de Asia y el Pacífico	Grand Salon Queen Elizabeth II
13:00 – 18:00	Visit to PAPRICAN	Visite à PAPRICAN	Visite a PAPRICAN	(1)
13:30 – 16:45	Guided Tour of the Olympic Park & Botanical Gardens	Visite des installations olympiques et du Jardin Botanique	Visita al Parque Olímpico y Jardín Botánico	(1)
19:30 – 23:30	Gala Québécois Evening	Soirée de gala québécois	Noche de Gala en Quebec	Grand Salon Queen Elizabeth II
<u>Thursday, October 8</u>				
8:30 – 9:15	Plenary Session	Séance plénière	Sesión Plenaria	Grand Salon Queen Elizabeth II
8:30 – 17:30	Spouses Hospitality Lounge	Salon de Réception des Conjoints	Salón de Recepción de Cónyuges	St. Charles, Queen Elizabeth II
12:30 – 14:15	Exposition Luncheon	Déjeuner	Almuerzo de la Exposición	Place Bonaventure
<u>Friday, October 9</u>				
7:00 – 19:30	Visit to EMR, Bells Corners Laboratories, Ottawa	Visite à EMR, Bells Corners Laboratories, Ottawa	Visita a EMR, Bells Corners Laboratorios, Ottawa	(1)
<u>Saturday, October 10</u>				
7:45 – 21:45	Visit to James Bay Hydro electric Complex	Visite au Complexe Hydro- électrique de la Baie James	Visita a al Complejo Hidro- eléctrico de Baie James	(1)

1. Participants in the Tours should meet at the main Dorchester Blvd. entrance of the Queen Elizabeth Hotel half an hour before the indicated departure time.

1. Les personnes participant aux excursions devront se réunir à l'entrée principale Boul Dorchester de l'hôtel Reine Elizabeth une demi-heure avant le départ.

1. El punto de reunión para los participantes de las excursiones (Programa para Cónyuges y visitas industriales) será la entrada principal del hotel Queen Elizabeth, sobre la F. Dorchester, media hora antes de la partida indicada.



WEST EXHIBITION HALL Place Bonaventure

October 6, 7, 8, 1981

WELCOMES

Delegates to the
World Congress of Chemical Engineering

BIENVENUE

aux congressistes
du 2^e Congrès mondial du génie chimique

BIENVENIDOS

Delegados al
2^o Congreso Mundial de Ingeniería Química

We invite you to visit the

EXPOSITION

October 6, 7, 8, 1981

Nous vous invitons à visiter

le Salon de la chimie industrielle

les 6, 7 et 8 octobre 1981

Lo invitamos a visitar la

EXPOSICION

6, 7, 8 de Octubre, 1981

Heures

Mardi	11:00 – 20:00
Mercredi	11:00 – 18:00
Jeudi	11:00 – 18:00

SALON OUEST D'EXPOSITION Place Bonaventure

Événements spéciaux
pour les congressistes
au salon d'exposition

le mardi 6 octobre 17:00 – 19:00
Dégustation de vins et fromages

le jeudi 8 octobre 12:30 – 14:15
Déjeuner, type buffet, pour les congressistes

Ce qui sera exposé:

Produits et services reliés au:

génie chimique, métallurgique, nucléaire,
et de l'environnement; instrumentation et
appareils de contrôle; chimie appliquée
et sciences biologiques.

Horas

Martes	11:00 – 20:00
Miércoles	11:00 – 18:00
Jueves	11:00 – 18:00

SALON DE EXHIBICION OESTE Plaza Bonaventure

FUNCIONES ESPECIALES
para delegados
en el NIVEL DE EXHIBICION

Martes, 6 de Octubre 17:00 – 19:00
Vino de Honor para Delegados al Congreso

Jueves, 8 de Octubre 12:30 – 14:15
Almuerzo Buffet para Delegados el Congreso

Qué se Exhibirá:

Productos y servicios relacionados con:

Ingeniería química, metalúrgica, mecánica,
nuclear y ambiental; instrumentación y
control; química aplicada y ciencias bio-
lógicas.

Tuesday	11:00 – 20:00
Wednesday	11:00 – 18:00
Thursday	11:00 – 18:00

WEST EXHIBITION HALL Place Bonaventure

Delegates
SPECIAL EVENTS
at the EXHIBITION FLOOR

Tuesday, October 6 17:00 – 19:00
Fine & Cheese Party for Congress Delegates

Thursday, October 8 12:30 – 14:15
Buffet Luncheon for Congress Delegates

What will be Exhibited:

Products and services related to:

chemical, metallurgical, mechanical, nuclear
and environmental engineering; instrumen-
tation and control; applied chemistry and
biological sciences.

Admission to the Exposition is included in
the Congress registration fee.

Les droits d'entrée au Salon sont inclus dans
les frais d'inscription au Congrès.

La entrada a la Exposición está incluida en
el precio de la inscripción al Congreso.

For further details call Show Office

Pour de plus amples renseignements, veuillez
communiquer avec le bureau du Salon
395-6101

Para mayor información llamar a la Oficina
de Exhibición
395-6101

Queen Elizabeth										
	Marquette	Joliet	Duluth	Mackenzie	Richelieu - Peribonca	Bersimis	Gatineau	Saint Laurent	Galerie 4	Galerie 1 - 3
Sunday, October 4										
19:00 - 19:30	Opening Ceremony									
19:30 - 21:00	World Congress Reception, Queen Elizabeth - Le Grand Salon									
Monday, October 5										
8:30 - 9:15	Plenary Session, Queen Elizabeth - Le Grand Salon									
9:30 - 12:30	1.1 Chemical Industry Outlook: Economic	7.1 Nuclear Energy for Industry	9.2 Foam Separation and Properties	9.1 Supercritical Fluid Extraction	6.1 Thermal Energy Storage (I)	14.1 Pyrometallurgical Processes (I)	15.1 Extrudate Swell	6.3 Combustion (I)	9.3 Unit Operations: Selected Topics	9.6 Poster Fluidization
12:30 - 14:15	Congress Luncheon, Queen Elizabeth - Le Grand Salon									
14:30 - 17:30	1.2 Chemical Industry Outlook: Technological	7.2 Nuclear Fuel Cycle	9.7 Large Fluidized Beds		6.2 Thermal Energy Storage (II)	14.2 Pyrometallurgical Processes (II)	15.2 Rheology of Polymer Systems	6.4 Combustion (II)	18.1 Student Competition (I)	7.4 Poster Energy
19:30 - 22:00	Canadian Chemical Engineering Banquet, Hotel Bonaventure - Outremont - Westmount									
Tuesday, October 6										
8:30 - 9:15	Plenary Session, Queen Elizabeth - Le Grand Salon									
9:30 - 12:30	3.1 Innovative Secondary Industries in Canada	7.3 Heavy Water and Tritium	5.1 Petrochemical Process Technology	2.1 Technology Transfer (I)	6.5 Solar Energy: Eng. Applications (I)	14.3 Chloride and Hydro-Metallurgy	15.3 Film and Fibre Processing	4.1 Conf. Inter-Americana: Alimentos	18.2 Student Competition (II)	8.5 Poster Transport Phenomena
12:30 - 14:15	Congress Luncheon, Queen Elizabeth - Le Grand Salon									
14:30 - 17:30	1.3 Economics of Energy and Technology	9.11 Coal Liquefaction Processes	3.2 Unconventional Challenge Energy	2.2 Technology Transfer (II)	6.6 Solar Energy: Eng. Applications (II)	14.4 Water/Energy Conservation in Pulp and Paper (I)	15.4 Structure in Flowing Polymers	4.2 Conf. Inter-Americana: Energia	18.3 Student Session: Career & Development	8.4 Poster Thermodynamics 16.11 Biofuels
17:00 - 19:00	Exposition Wine and Cheese Party, Place Bonaventure - Exposition Reception Area									
Wednesday, October 7										
8:30 - 9:15	Plenary Session, Queen Elizabeth - Le Grand Salon									
9:30 - 12:30	6.10 Energy from Biomass	5.4 Fluidized Bed Coal Combustion	5.2 New Sources and Uses for Energy (I)	2.3 International Practice of Ch.E. (I)	6.7 Energy Conservation and Analysis in CPI (I)	14.5 Water/Energy Conservation in Pulp and Paper (II)	15.9 Reactive Polymer Processing (I)	4.3 Conf. Inter-Americana: Alcohol	18.4 R&D Arrangements: University & Industry	16.5 Poster Biochemical
12:30 - 14:15	Congress Luncheon, Queen Elizabeth - Le Grand Salon									
14:30 - 17:30	16.6 Biofuels (I) - Liquid Fuels	5.5 Coal Gasification	5.3 New Sources and Uses for Energy (II)	2.4 International Practice of Ch.E. (II)	6.8 Energy Conservation and Analysis in CPI (II)	15.5 Instability in Fiber/Film Processing	15.10 Reactive Polymer Processing (II)	4.4 Conf. Inter-Americana: Petroquimica	18.5 Trends in Ch.E. Education	9.19 Poster Unit Operations (I)
19:30 - 23:30	Gala Quebecois Evening, Queen Elizabeth - Le Grand Salon									
Thursday, October 8										
8:30 - 9:15	Plenary Session, Queen Elizabeth - Le Grand Salon									
9:30 - 12:30	16.7 Biofuels (II) - Gaseous Fuels	5.6 Coal Liquefaction	5.8 Feedstock Trends for Petrochemicals	2.5 International Practice of Ch.E. (III)	6.9 Energy Conservation and Analysis in CPI (III)	15.7 Plastics Processing	15.11 Reactive Polymer Processing (III)	4.5 Conf. Inter-Americana: General	18.6 Innovative Course & Teaching Techniques	10.7 Poster Control 13.11 Environment 15.6 Polymer
12:30 - 14:15	Exposition Luncheon, Place Bonaventure - Exposition Reception Area									
14:30 - 17:30	16.10 Chemicals from Biomass	3.3 Chamber of Commerce Montreal Urban Community	5.9 Heavy Oil Resources	5.7 Solid Fuel Processing	6.11 Hydrogen as Fuel	15.8 Rheological Behaviour of Polymers	15.12 Reactive Polymer Processing (IV)	9.24 Process Equipment: Design and Analysis	18.7 Challenges to Ch.E. Curriculum	11.10 Poster Reaction Engineering Unit Operations (II) 9.25

SS AT A GLANCE

Hyatt agency	Hotel Bonaventure								Place Bonaventure	
	Lassalle	Lachine	Verdun	Outremont	Westmount	Mount Royal	Hampstead	Cote St Luc	Exposition Hall	
Sunday, October 4										
Opening Ceremony								19:00 - 19:30		
World Congress Reception, Queen Elizabeth - Le Grand Salon								19:30 - 21:00		
Monday, October 5										
Plenary Session, Queen Elizabeth - Le Grand Salon								8:30 - 9:15		
	8.1 Thermodynamics of Non-Electrolytes	9.4 Crystallization from Solutions (I)	9.8 Solid-Liquid Separation (I)	16.1 Fermentation Design	13.2 Acidic Gaseous Emissions (I)	10.1 Control of Chemical Processes (I)	13.1 Toxic Organics in Gaseous Emissions	17.1 Physiological Transport Phenomena		9:30 - 12:30
Congress Luncheon, Queen Elizabeth - Le Grand Salon								12:30 - 14:15		
2.1 Safety in Ammonia Plants (I)	8.2 Thermodynamics of Heavy Hydrocarbons	9.5 Crystallization from Solutions (II)	9.9 Solid-Liquid Separation (II)	16.2 Enzyme Technology	13.3 Acidic Gaseous Emissions (II)	10.2 Control of Chemical Processes (II)	11.1 Hydrogenation of Hydrocarbons	17.2 Implants & Artificial Organs		14:30 - 17:30
Canadian Chemical Engineering Banquet, Hotel Bonaventure - Outremont - Westmount								19:30 - 22:00		
Tuesday, October 6										
Plenary Session, Queen Elizabeth - Le Grand Salon								8:30 - 9:15	Exposition 11:00 - 20:00	
2.2 Safety in Ammonia Plants (II)	8.3 Thermodynamics of Electrolytes	9.12 Membrane Separation Processes (I)	9.10 Solid-Liquid Separation (II)	16.3 Biological Waste Treatment	13.4 Toxic Solid Wastes	10.3 Computer Design & Control (I)	11.2 Reaction Engineering (I)	9:30 - 12:30		
Congress Luncheon, Queen Elizabeth - Le Grand Salon								12:30 - 14:15		
2.3 Safety in Ammonia Plants (III)	8.6 Particle Mechanics	9.13 Membrane Separation Processes (II)	9.14 Novel Separation Processes	16.4 Biochemical Engineering: Selected Topics	13.5 International Regulations on Toxic Substances	10.4 Computer Design & Control (II)	11.3 Reaction Engineering (II)	14:30 - 17:30		
Exposition Wine and Cheese Party, Place Bonaventure - Exposition Reception Area								17:00 - 19:00		
Wednesday, October 7										
Plenary Session, Queen Elizabeth - Le Grand Salon								8:30 - 9:15	Exposition 11:00 - 18:00	
12.4 Safety in Ammonia Plants (IV)	8.7 Interfacial Phenomena	9.17 Desalination (I)	9.15 Distillation (I)		13.6 Hazardous Organics in Wastewater	10.5 Process Dynamics (I)	11.4 Electrochemical Reaction Engineering (I)	1.4 Innovation Management		9:30 - 12:30
Congress Luncheon, Queen Elizabeth - Le Grand Salon								12:30 - 14:15		
12.5 Safety in Ammonia Plants (V)	8.8 Bubbling Systems	9.18 Desalination (II)	9.16 Distillation (II)		13.7 Toxic Inorganics in Aqueous Emissions	10.6 Process Dynamics (II)	11.5 Electrochemical Reaction Engineering (II)	18.8 University - Industry Cooperation		14:30 - 17:30
Gala Quebecoise Evening, Queen Elizabeth - Le Grand Salon								19:30 - 23:30		
Thursday, October 8										
Plenary Session, Queen Elizabeth - Le Grand Salon								8:30 - 9:15	Exposition 11:00 - 18:00	
12.6 Safety in Ammonia Plants (VI)	8.9 Mathematical Application in Ch.E. (I): Numerical	9.20 Mixing (I)	9.22 Liquid-Liquid Extraction (I)		13.8 Occupational Hygiene	11.7 Plasma Technology (I)	11.6 Heterogeneous Reactions	16.8 Unconventional Foods		9:30 - 12:30
Exposition Luncheon, Place Bonaventure - Exhibition Reception Area								12:30 - 14:15		
	8.10 Mathematical Application in Ch.E. (II): Analytical	9.21 Mixing (II)	9.23 Liquid-Liquid Extraction (II)	13.9 Uncontrolled Releases of Hazardous Materials	13.10 Water Pollution Control	11.8 Plasma Technology (II)	11.9 Catalysis	16.9 Food Processing		14:30 - 17:30



CHEMICAL ENGINEERING FOR WORLD DEVELOPMENT

LE GENIE CHIMIQUE AU SERVICE DU DEVELOPPEMENT MONDIAL

INGENIERIA QUIMICA PARA UN MUNDO EN DESARROLLO

Detailed Technical Program

The speaker's name is in *italics*

1. ECONOMIC AND TECHNOLOGICAL OUTLOOKS

Organized by the Economics and Business Management Division of the Chemical Institute of Canada

Co-ordinator: Dr. J.F.C. Dixon, C.I.L. Inc., Canada

QUEEN ELIZABETH
MARQUETTE

MONDAY, OCTOBER 5

1.1 CHEMICAL INDUSTRY OUTLOOK IN THE 80'S: - ECONOMIC

Chairman - J. Buckham, Allied-General Nuclear Services, U.S.A.

Chairman - W.O. Munns, Canada Packers Ltd., Canada

1.1.1

9:30 - 10:00

The Economic Outlook for the 80's (Keynote Introduction), *C.E. Beigie*, President, C.D. Howe Research Institute, Canada

The decade of the 1970s produced one major shock to the world economy namely the shift to producer-country control of the energy supply situation, and a series of disruptive trend-line developments. If these shocks and disruptions are to be accommodated within a tolerable level of distress, governments and general publics must formulate, accept, and implement a series of adjustments in life styles and expectations with a sense of commitment in the 1980s. Countries vary widely in terms of their past approaches to the tasks of adjustment. A review of progress through 1981 in the context of the adjustments required, with particular emphasis on capital formation, will signal what can be expected from the 1980s.

1.1.2

10:00 - 10:30

The Outlook for the Chemical Process Industries in the Developed World in the 80's, *R.J. Richardson*, Senior Vice President, E.I. Du Pont de Nemours and Company, U.S.A.

Faced with the prospects of slowed world economic growth, the challenge to chemical processing companies in the 1980's is to select the most promising market niches and then to commit the necessary strengths and resources to capitalize on these opportunities. Key to the success of this strategy will be a stronger commitment to research and development and the availability of capital for substantial investment in new plants and equipment. While high volume production of basic chemicals will continue as the number one business for many chemical companies, higher costs and heightened competition will lead many managements to diversify further and to withdraw from weaker product lines.

1.1.3

10:30 - 11:00

The Outlook for the Chemical Process Industries in the Developing World in the 80's, *E. Beckerboost*, Director, UNIDO/World Bank Cooperative Program, Vienna, Austria

ABSTRACT NOT AVAILABLE

1.1.4

11:00 - 11:30

Economic Impact of Energy and Raw Materials in the 80's, *R. Hirono*, Seikei University, Japan

ABSTRACT NOT AVAILABLE

1.1.5

11:30 - 12:00

Future Changes in the Chemical Industry, *G.G. Betts*, British Petroleum Chemicals, *F.J. Plenard*, L'Air Liquide, United Kingdom/France

An E.F.C.E. Committee has commented on developments taking place in the world raw materials and energy situation and the ways in which the basic organic chemical industry engaged in manufacture in Western Europe might prepare to adapt to such changes from the year 2000. The Report is set against the background of the industry in Western Europe today.

1.1.6

12:00 - 12:30

The Impact and Implications of the Management of Chemicals, *the Honourable John Roberts*, Minister of the Environment and Minister of State for Science and Technology, Canada.

QUEEN ELIZABETH
MARQUETTE

MONDAY, OCTOBER 5

1.2 CHEMICAL INDUSTRY OUTLOOK IN THE 80'S - TECHNOLOGICAL

Chairman - D. Behrens, Dechema, West Germany

Chairman - M.B. Selman, Dow Chemical of Canada Limited, Canada

1.2.1

14:30 - 15:00

The Strategic Management of Technology in the 80's in the Chemical Industry, *J.M. Hay*, President, Dow Chemical of Canada Limited, Canada

In this decade and beyond, strategic management of technology in the chemical industry must be approached from an international viewpoint rather than purely nationalistic. Identification of the areas for technological opportunity depends on a careful assessment of a complex array of business, economic and political factors as much as the input from research and development. Technological development and business entrepreneurship must capitalize on the inherent strengths of the host nation in such a way as to make a substantial contribution to the nation's economic and social health. That is already being done in Canada but we have only scratched the surface of opportunity. The essential prerequisite for future growth is a widespread recognition that technological innovation and research stems from a profitable private sector operating in an economic climate conducive to investment in high technology ventures.

1.2.2**15:00 - 15:30**

Technological Impact of Energy and Raw Materials in the 80's, *C.W. Suckling*, General Manager, C.N. Beard, Consultant, Corporate Research and Technology, Imperial Chemical Industries Limited, United Kingdom

As oil becomes more expensive the raw materials most appropriate as fuels and feedstocks may vary between different regions of the world and in consequence the technology of the chemical industry may differ between regions more than it has done in the past. That trend may be intensified by the wish of the developing world to establish its own industry particularly where there is cheap indigenous gas or coal. Under those influences the world wide disposition of the heavy chemical industry may begin to adjust in the 1980's.

1.2.3**15:30 - 16:00**

The Role of Research in the 80's, *S.W. Tinsley*, Director of Corporate Technology, Union Carbide Corporation, U.S.A.

The impressive increases in R&D in our industry over the last five years signal great expectations on the part of management - great expectations that this investment will demonstrate process options that will place the "family jewels" in a favorable international competitive stance and product options that will ensure the growth of the firm.

This paper will attempt to portray the needs and opportunities which must be fulfilled by research in our industry in the eighties as well as the tugs and pressures of international and national issues which will determine our operational climate.

1.2.4**16:00 - 16:30**

Technologies for Developing Nations, *L.K. Doraiswamy*, Director, National Chemical Laboratory, India

An attempt has been made to briefly review some of the problems of development, technologies for development and the Indian experience in technology generation, technology transfer and foreign collaboration. Problems of technology transfer within and between countries at various stages of development have also been discussed.

1.2.5**16:30 - 17:00**

Technological and Social Relevance of Research in Chemical Engineering, *F. Moser*, Professor, Technological University, Graz, Austria

ABSTRACT NOT AVAILABLE**1.2.6****17:00 - 17:30**

Possible Changes in Chemical Feedstocks, *J.M. Solbett*, United Kingdom

The paper reviews the processes available for the production of chemical feedstocks from coal and biomass. It concludes that the syngas route offers the greatest opportunities, with methanol emerging as a key commodity, and that fermentation ethanol can provide a low investment approach to chemicals manufacture in some developing countries.

**QUEEN ELIZABETH
MARQUETTE****TUESDAY, OCTOBER 6****1.3 ECONOMIC ASPECTS OF ENERGY AND
TECHNOLOGY**

Chairman - T. Mizushima, Kyoto University, Japan
Chairman - J.F.C. Dixon, C.I.L. Inc., Canada

1.3.1**14:30 - 15:00**

Optimisation énergétique ou optimisation économique des procédés industriels, *P. Le Goff*, CNRS-ENSIC, Lorraine, France

We propose using a new type of diagram called «Energy-Cost-Characteristics» (= CAREC) to compare the various possible optimal choices, for a given technical decision. The monetary cost (either in national currency or in foreign currency) is plotted as a function of the total «costs» in primary energy, (including energy embodied in equipments). Two examples are presented.

1.3.2**15:00 - 15:30**

The Challenges to Energy Technology Development, *J.P. Henry Jr.*, Booz Allen and Hamilton Inc., U.S.A.

Energy technology development and commercialization is an issue which has broad international interest. The confusion in energy trade following the oil embargo of 1973-1974 and the subsequent price hikes and periodic shortages have prompted both users and suppliers to exercise options that were often unexpected. This paper discusses these topics and addresses the methodology for assessing the commercial potential of new energy systems in this climate of unparalleled opportunity but with significant risks.

1.3.3**15:30 - 16:00**

Brazilian Chemical Technology Outlook, *A.P. Da Silva Filho, Lucio Cesar Sattamini*, Brazil

Presentation of Brazilian chemical industry growth in the last two decades, and parallel with qualifications for chemical plant projects; discussion on process know-how available for licensing, and Brazilian experience of industry on alcohol-based processes. Policies for the Brazilian chemical technology in the present decade.

1.3.4**16:00 - 16:30**

International Chemical Engineering Development Consultancy Bank, *A.K. Lal*, Tanzania Industrial Studies and Consulting Organization, Tanzania

The paper suggests furthering chemical engineering for world development through establishment of a chemical engineering know-how bank. This network of professionals will ensure unbiased flow of knowledge, advice, aid and problem solving capabilities. Immediately a committee of specialist consultant members to co-ordinate with International Development system is envisaged.

1.3.5 **16:30 - 17:00**
Horizons of Chemical Industries 1985-2000, *M.G. Desensy*,
President, Comprimio B.V., The Netherlands

To meet the challenges of the future it is of essence to study the developments related to oil, gas and alternative energy resources. The expected changes of refinery and chemical products together with the developments of these industries will be discussed with the objective to provide an outlook till the end of the century.

1.3.6 **17:00 - 17:30**
Growth of the Chemical Industry in the Philippines, 1950-1980, *L.G. Tansinsin*, The Philippines.

ABSTRACT NOT AVAILABLE

HOTEL BONAVENTURE WEDNESDAY, OCTOBER 7
COTE ST LUC

1.4 INNOVATION MANAGEMENT IN THE CHEMICAL INDUSTRY

Chairman - O. Hentschel, Pemex, Mexico

Chairman - W.F.M. Brown, Vice-President, Innovation Canada, Inc., Canada

1.4.1 **9:30 - 10:00**
The Basic Elements of Innovation Management, *W.O. Munns*,
President, Innovation Canada Inc., Canada

Innovation Canada Inc. has developed the concept of innovation management being a process, and that it can be trained. Innovation management covers the whole gamut of activities from identifying the innovative opportunity to developing and implementing the new product or service that successfully meets this need. This paper addresses this process.

1.4.2 **10:00 - 10:30**
The Technological Needs of the Chemical Industry in the Developing Nations in the 80's, *the Honourable A. Loftus Roker*, Minister of Works and Utilities, Commonwealth of the Bahamas.

ABSTRACT NOT AVAILABLE

1.4.3 **10:30 - 11:00**
The Role of Educational Institutions in Technology Transfer, *R. Blais*, Directeur, Centre Québécois d'Innovation Industrielle, École Polytechnique de Montréal, Canada

Technology transfer (T^2) means moving research results or inventions from the laboratory or the test-bench to the market place most efficiently, in the least time, and with due regard for quality and social needs. To effect T^2 universities and technical colleges must set up distinct structures such as industrial research institutes or innovation centres and have their entrepreneurial innovators academically recognized. This form of T^2 , which calls for technological excellence and societal awareness, is clearly need-oriented. It aims at producing industrial leaders.

1.4.4 **11:00 - 11:30**
Innovative Responses to Economic and Technological Outlooks, *C.H. Ware*, J.P. Krieg, Commercialization Insights, U.S.A.

A comprehensive three-step procedure enabling a company to make more effective use of unfolding technology utilizes within-company interaction, a technical/economic computer program, and R&D goal-setting to meet profitability and technical requirements. Details of the procedure, experience with the method, and implications for R&D and corporate management are presented.

1.4.5 **11:30 - 12:00**
An Assessment of Policies to Address the Impacts of T.S.C.A. on Chemical Innovation, *C.T. Hill*, R.A. Andrews, R. Frenkel, G.R. Heaton, C.S. Mitchell, W.C. Priest, N.A. Ashford, Center for Policy Alternatives, M.I.T., U.S.A.

This paper examines 32 policy options that might reduce the unnecessary impacts of the U.S. Toxic Substances Control Act on chemical innovation while upholding the law's goals. A heuristic model for policy assessment based on magnitude estimation techniques is used to rank the options on seven criteria. The effectiveness of the options is judged based on knowledge of the chemical innovation process and on earlier studies of the effects of regulation on innovation. Private and public costs and indirect effects of the options are also judged. A resulting program package, including six complementary options, is described.

1.4.6 **12:00 - 12:30**
A Different View of the Future, *W.H.C. Simmonds*, National Research Council of Canada, Canada

ABSTRACT NOT AVAILABLE