

Questionnaire in regard to assessment of the CHEMRAWN Conference

I. General CHEMRAWN IX

1. Title:

The role of advanced materials in sustainable development: Sustainable production, use, disposal, and recycling of materials

2. Location, date and duration

Location	Date	Duration days
Seoul (Rep. of Korea)	1-6 September 1996	Six

3. Participation

Number of countries represented	Number of participants; Total (local)	Number of lecturers
18	355/237	72

4. Budget

Budget in US\$	Source of financing	Names of major sponsoring organizations (financial support)
326,200	a. Participants 6.9 % b. IUPAC 0 % c. Government organization 5.0 % d. Industry 83.5 %	
Major sponsor	a) 67.6 % b) 6.3 % c) 5.8 % d) 5.0 % e) 3.8 % f) 2.8 %	Korea Petrochemical Industries Association (41 companies) Korea Specialty Chemical Industry Association (14 companies) Ssangyong Oil Refining Co. Korea Science and Engineering Foundation Korea Cement Industry Association (10 companies) UNESCO

II. Conference contribution

1. Scientific leadership

Name of Conference Chairman	Names of Conference Deputy Chairmen	Number of invited lecturers
Dr. Min Che Chon	Dr. Yung Bog Chae	64

2. Conference papers

Number of plenary papers	Number and titles of the oral papers in specialized sessions	Number of oral papers at each session	Number of oral papers authors	Number of poster papers /authors
7	1. Energy session: a) Energy Technology (EnS) b) New and Renewable Energy Sources (EnS) c) Power generation (EnS) 2. Communication session: d) Advanced Communication (ComS) e) Material for electronics (ComS) f) Memory and Computer (ComS) 3. Construction session g) Advanced Iron and Steel Technology (ConS) h) Advanced Inorganic Materials (ConS)	a) 3 b) 10 c) 5 d) 3 e) 10 f) 5 g) 6 h) 6	a) 3 b) 14 c) 5 d) 3 e) 23 f) 5 g) 17 h) 19	13 / 52 10 / 42 9 / 30

	i) Organic materials (ConS) 4. Transportation and General session	i) 6	i) 7	
	j) Future Automobiles (T&GS)	j) 3	j) 5	
	k) Aerospace and Transportation (T&GS)	k) 7	k) 10	17 / 62
	l) Materials and Sustainable Development (T&GS)	l) 8	l) 29	
total		72	140	49 / 186

ES- Energy Session; ComS- Communication Session; ConS- Construction session;
T&G- Transportation & General
General statistics

Total papers (oral + poster)	Oral presentations	Poster presentations	Number of authors (oral)	Number of authors (posters)	Authors/ paper
128	79	49	147	186	~ 2.6

Typology of papers (oral /poster presentations)

Typology	Total (oral /poster)	Review papers	Economic issues	Basic science	Technology/processes
Number	79 / 49	37	10	21	21 / 49

4. Conference strategic issues

The role of advanced materials in the sustainable development:
Sustainable production, use, disposal, and recycling of materials

4.1 Strategic goals of the conference

"Progress in science and technology has much changed living conditions in modern countries. However, the ecological consequences of technological progress in increasing air and water pollution, ozone depletion and deforestation are threatening our common future. The need for sustainable development arose from the realization that there is a limit in the supply of natural resources and that development and production can cause serious environmental problems. At this point sustainable development is no longer just an option but an imperative." Dr. Min Che Chon statement at the opening ceremony.

Therefore the goals of the conference were:

1. Evaluate (a) the state of current production technologies of advanced materials and (b) environmental impacts of the application of advanced materials in the fields of energy, communications, transportation and construction.
2. Clarify the role of technology in reducing the ecological load imposed by these(THESE) activities and in developing advanced ecologically sound materials and the means of their application and in introducing renewable energy resources
3. Elaborate strategies for selection of and search for optimal eco-friendly combinations of materials as well as processes and combinations of processes for advanced materials in the fields of energy, communications, transportation and construction involving a number of different industries.
4. Formulate criteria for estimation of environmental acceptability (sustainability) of current technologies for the production of materials
5. Search for effective ways of in international co-operation and international information exchange in the fields of material design, production and use.

4.2 The conference key-words

- a) sustainable development
- b) technology; eco-advanced, no-waste, zero-waste, non-polluting, life cycle
- c) materials; advanced, eco-friendly, recycling, biodegradable, iron, steel, cement, organic
- d) environment; emission, conservation, education
- e) energy; nuclear, superconductors, fuel cells, solar
- f) communication; systems, memory/computer, optical materials
- g) transportation; automobiles, aerospace, light weight, recycling
- h) construction; benign manufacturing process, recycling, biodegradable polymers

3. The weight of key words in presented papers

Key word	Number of papers related basically to the key-word *\\
a) Sustainable development	a) 21
b) Advanced technology	b) 21
c) Advanced materials	c) 28
d) Environment	d) 15
e) Energy	e) 16
f) Communication	f) 5
g) Construction	g) 8
h) Transportation	h) 10

*\\ papers are related to more than one key word

III. Conference impact

1. Future Action Committee (FAC)

Chairman: Y. B. Chae (R.O.Korea)

Vice Chairman: P. Norling (USA); Y. S. Sohn (R.O.Korea)

Members of the Committee: 21 from which 7 R.O.Korea nationals and 2 from UN organizations

2. Conference findings and recommendations of the conference and their addressee

2.1. Conference findings

- 1). There is a need for increased understanding and use of life-cycle assessments in making decisions on materials and technologies supporting the objectives of sustainable development
- 2). Ways to recycle complex manufactured goods containing advanced materials need to be developed. Designing such goods for recycle may be a top priority
- 3). The importance of conservation of and development of adequate water supplies for agriculture and human consumption cannot be underestimated. Shortages will be the source of major conflicts in the future
- 4). There are opportunities in the upgrading of locally available materials with small amounts of other materials or processing technologies from outside the region
- 5). The opportunities to improve many traditional materials (steel, cement) are consistent with the goals of sustainable development
- 6). The number of advances in energy production can contribute to sustainable development
- 7). Catalysis research offer the potential for routes to sustainable production techniques

2.2 Conference recommendations

Conference recommendations (summary)	Addressee	Modalities of implementation and dissemination
a) We should create a “material for sustainable development” research and development agenda to guide national funding organizations	a) (1), (3)	a) (2), (5)
b) We would like to see the ready transfer of environment technologies across industries, nations, and sectors	b) (2)	b) (5)
c) We urge the protection of Intellectual Property Rights in a way that acts as an important driver to introduction of advanced materials and process technologies that can further sustainable development rather than as a hindrance to increased collaboration for sustainable development	c) (6), (2)	c) (7), (6)
d) We plan to develop a program of technical education	d) (1), (3)	d) (2), (3)

related to sustainable development that can be included in future CHEMRAWN conferences		
e) We will seek to create a series of monographs and articles based on papers from the conference to publicize the “successes” of chemistry and advanced materials towards the goals of sustainable development	e) (1), (2)	e) (2), (3), (7)
f) We will explore ways to focus some existing awards to recognize advances made toward sustainable development in the “materials area”	f)(2),(3),(4)	f) (4), (5), (6)

Addresses: Scientists (1), Industry (2), Universities (3), Governments (4) Adhering Organizations (5), International Organizations (6)

Modality of implementation and dissemination: Conference proceedings (1), Papers in Chemistry International (2), Publication in scientific journals (3), Direct mail to NAO (4), Direct mail to industry or industrial federations (5), Direct mail to Governments (6), Direct mail to International Organizations (7) Publication in newspapers (7)

3. Future Action Committee (FAC) activities

Future Action Committee was active during the Conference and prepared the CHEMRAWN IX summary “Perspectives and Recommendations”. No further actions of the FAC has been denoted. At the Berlin meeting of the CHEMRAWN Committee it has been explained that due to the financial crisis in R.O.Korea it was not possible to collect funds for Action Committee activities.

Source of financing	Number of FAC members (local/foreign)	Number of meetings of FAC	Modality of action (methods used for follow-up)	Results achieved
a. Conference budget			1. scientific follow-up	1. public awareness
b. Supplementary funds			2. record of implementation of recommendations by Governments	2. industry awareness
c. IPUAC support			3. record of industrial implementation	3. scientific development
None	9 / 24	Not recorded (AT LEAST 4)	Not recorded (LETTER FROM IUPAC PRESIDENT TO NAO's)	Not recorded (PARTICIPANT AWARENESS)

4. Free assessment *\\

4.1. General view

The Conference has been organized around the specific fields of endeavour rather than usual chemistry sectorial typology.(NOTE: IS THERE ANOTHER TERM THAT CAN BE USED HERE?) This is very easily observed when the key-words (which were unusually multiple) of conference were analyzed which have the two aspects; field of endeavour and its functional character. Therefore it was possible to classify importance of the advanced materials in various models of the development of the consumers markets. However, due to this approach the coverage of matters could be obviously presented in limited aspects of the matter, although the 24 (30%) papers were presented by industry (international and Korean

companies) in regard to their achievements and expectations. The success of the conference has shown that this approach is fruitful and can attract the attention of scientific society as well as the industry. For CHEMRAWN this typology(?) should remain as leading approach, leaving the sectorial approach to the conferences organized by the Commissions.

The proportions between the different classes of papers were interesting: 37 (47)% papers and oral presentations had the reviewing character, giving the possibility to participants to acquire the knowledge of large areas of research and industrial operations. The technology/processes and basic research results has been presented in the equal manner (21 papers each). Also economic (macro-economic) approach has been discussed in 10 papers.

4.2 Review of findings

In general findings are expressing rather general opinions in relation to some crucial matters rather than reflect the presented papers content and their conclusions (NOTE: THESE WERE DISCUSSED IN SOME PAPERS AND IN THE DISCUSSION PERIODS – AND IN THE MEETINGS OF THE FAC). The water problems in general and in details were not presented in the conference papers (NOTE: THE WATER PROBLEMS WERE BRIEFLY DISCUSSED IN THE PLENARY LECTURE BY C Holliday) as well the upgrading of the local materials had very limited (if none) practical and scientific adherence. It does not mean that findings are disputable, however they could be presented at other conferences with scientific and technical proof of their validity. It seems that scientific and practical validation of the conclusion is of utmost importance when we seek the means of their implementation. The finding related to the energy is too weak in comparison with the content of presentations; much more on the priorities could be concluded giving the insight into future options. Also the finding related to the catalysis is not enough precise: the catalytic processes are introducing new materials unknown by other routes of processing as well as could intensify the chemical processes, however the chemical (bio-chemical) reaction and its thermodynamic parameters and resulting technology which may use different techniques are decisive in profiling zero-waste technologies supported by new unit processes to separate and purify the substances to the applicable quality. The applied shortcut in the finding in some manner changed the presented papers ideas.

However, considering the general context of the findings they were not ?idealistic?, it means there are instruments by industry to assess the usefulness of the findings and they were not against the business interest.

4.3. Review of recommendations.

The recommendations of the conference were more precise than findings and are practical as well as implementable.

1) The recommendation in regard to the R&D is selecting the priority areas for future scientific program and industrial field of application. This is task for NAO to provide the Governments and funding organizations practical proposal for extension or elaboration of new programs.

2) The recommendation in regard to transfer of environment(AL Technologies?) is not clear: the endpipe-treatment technologies are available for any customer, however they are not free of charge. Some new processing technologies with specific patterns of the environment(AL?) protection by omitting the polluting processes due to the market competition are not yet available for dissemination. This could be achieved by different means of industrial co-operation (e.g. joint ventures). It seems that FAC should clarify the matter in the respective contacts with bodies related to the issue.

3) The recommendation does not disclose the difficulty of the matter. The Intellectual Property Rights are advance instrument of the industrial and commercial co-operation.

However, when applied in full rigour when defending the owner of technology they have to be supplemented by the right to purchase the technology on the commercially just conditions.

4) The recommendation is valid and important, however the practical modalities (WAYS TO IMPLEMENT?) are extremely difficult to follow it. The several thousand Universities are involved in teaching matters related to the chemistry for sustainable development The development of adequate curriculum is crucial for the implementation which should be concern of FAC in its actions.

1. The recommendation is valid and important. The contribution of authorities to the wide public in different level of papers in the chemistry is still not adequate to the impact of chemistry to comfort and survival options of the society.

2. The recommendation is valid and practical.

Considering the general context of the recommendations they were not "idealistic", it means there are instruments by industry to assess the usefulness of the findings and they were not against the business interest.

They are still valid and should be acknowledged by industry and/or Governments for implementation.

There is no information if any organizations (international, non-governmental) taken the follow-up actions.

*\ This is made by individual evaluator and should be corrected/supplemented by CHEMRAWN Committee members participating in the Conference.

5. Cost assessment

Conference budget US\$	Cost per paper US\$	Cost per participant US\$	Cost of follow-up US\$
326,200	2,548	919	no data

6. References:

Final Program and Abstracts

Proceedings

Perspectives and Recommendations (copies sent on June 6, 1997 to NAOs, Observer Organizations, Members of the CHEMRAWN Committee, IUPAC Officers and Presidents of Divisions IV and VI)

IV. Conclusions and recommendations emerging from CHEMRAWN assessment

1. Conclusions from review

CHEMRAWN IX Conference has covered the most advanced area of the economic and social development. The wide international participation, the proportions between the different typology (another word???) of papers has given the participants deep insight into the opportunities of sustainable development. It has shown the crucial role of chemistry in establishing new patterns of materials, technology development for particular fields of endeavour and consumers markets decisive for well being of societies.

2. Recommendations from review for future conferences.

- 1). The experience of CHEMRAWN IX Conference has shown that approach to concentrate the issues discussed at the conference around the fields of endeavour is productive and that this cross-section is fertile in interdisciplinary understanding of the development processes as well as (WHAT) contributes to the further implication of the chemistry with the consumers market on the basis of the socially accepted standards.
- 2). The proportions of the review papers, basic science papers and technology/processes seems to be indicative for future conferences of similar character. The inclusion of macro-economic and economic assessments, even considering the weaknesses of some evaluation methods, should be and indicator of impact of the discussed problem on the development process.

- 3) (RESPONSIBILITIES SHOULD BE ASSIGNED TO INDIVIDUALS ON THE FAC TO FOLLOW IMPLEMENTATION OF THE VARIOUS RECOMMENDATIONS; FUNDS SHOULD BE SOUGHT AS NECESSARY FOR THE IMPLEMENTATION)

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