THE ROYAL SOCIETY OF CHEMISTRY

ENVIRONMENTAL CHEMISTRY GROUP

Newsletter

Issue No.5 January 1997

CONTENTS

ECG Newsletter No. 5 January 1997

This Issue of the ECG Newsletter may also be seen on the Internet at

http://chemistry.rsc.org/rsc/ecg.htm

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Chairman's Report on Activities during 1996

Environmental chemistry, and in particular pollution issues, remain high in the political, educational and scientific agenda. The role of the RSC's Environmental Chemistry Group is, as in the past, to further the interests of environmental chemists and environmental chemistry, both within and outside the Society. It aims to do this by representing the views of its members wherever possible, by organising symposia on topical and technical issues, by disseminating information through its Newsletter and by acting as a focus for environmental chemistry in the UK.

During March 1996 the Group organised a "Young Environmental Chemists Meeting" at Leicester, attended by over 100 young scientists and a symposium on "Urban Air Pollution" in London attended by 150 (young and not quite young). This latter meeting included the Group's Distinguished Guest Lecture and the Society's John Jeyes Lecture for 1996, given by Professor Roy Harrison of the University of Birmingham.

The Group played a minor role in organising a two-day meeting at Hatfield in July on "Urban Air Quality: Monitoring and Modelling" and held its own symposium on "Air Pollution in the UK" at Lancaster in September, attended by 90 people. The NW Region of the Analytical Division assisted with the organisation of the latter meeting, and the RSC will publish the proceedings as a book in 1997.

The group also assisted the Institution of Chemical Engineers with the organisation of a two day symposium on BATNEEC III, held in Manchester again in September.

The Group's Newsletter, now in its 5th issue, goes from strength to strength and is universally judged to be a useful addition to our communications armory.

Other activities during the year have included making inputs to the Society's Environment, Health and Safety Committee and to the Society's responses to requests for information, views and opinions on a range of issues from outside organisations.

Professor C. N. Hewitt
Chairman, December 1996

RSC Environmental Chemistry Group Officers (1996)

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RSC Environmental Chemistry Group (ECG) Symposium and Distinguished Guest Lecture 1997

The 1997 ECG Distinguished Guest Lecture will be given by Dr. Dick Derwent of the Meteorological Office, and will be held on Tuesday 4th March 1997 at the Royal Society, Carlton House Terrace, London SW1 in the Wellcome Lecture Hall.

The title of Dr. Derwent's talk is **"Atmospheric Chemistry and Climate Change"**, and it will be accompanied by two further presentations on topics related to climate change: **"Greenhouse Gas Emissions, Abatement and Control Options"** (Ms. Irene Smith, IEA Coal Research) and **"Sustainable Development"** (Dr. Jan Pentreath, Environment Agency).

The full programme will commence at 1.30 pm, and is also scheduled to include the **AGM of the Environmental Chemistry Group.**

The 1997 ECG Distinguished Guest Lecturer - A Profile of Dr Dick Derwent

The 1997 Distinguished Guest Lecturer, Dick Derwent, graduated from Cambridge University, and subsequently obtained a PhD in physical chemistry, also at Cambridge, in 1972. He then worked in the areas of air pollution and atmospheric chemistry research, initially at the Warren Spring Laboratory in Hertfordshire, and subsequently for fifteen years at the Harwell Laboratory in Oxfordshire.

Dr Derwent's period at Harwell included two years in the Energy Technology Support Unit, and culminated with his management of the Modelling and Assessments Department. During this time he made significant contributions to the development of numerical models for application to a series of air pollution issues, ranging from acid deposition and photochemical oxidant formation to global climate change and stratospheric ozone depletion, and he became internationally recognised for his contributions to the understanding of the formation and long-range transport of tropospheric pollutants. His models have been widely applied on behalf of the Department of the Environment for understanding the control of emissions and thereby assisting UK air pollution policy decisions.

In 1990 Dr Derwent was appointed Head of the Technical Policy Branch of the Department of the Environment's Air Quality Division where he guided and supported a number of air pollution research programmes, including the setting up of the automatic urban monitoring networks which deliver continuous data on a range of key airborne pollutants. After a brief spell at Her Majesty's Inspectorate of Pollution, Dick Derwent moved to the Meteorological Office in Bracknell in 1993 where he has continued the formulation, development and application of atmospheric chemistry models.

His recent work has concentrated particularly on the refinement of models describing the formation of photochemical pollutants (*e.g.* ozone) in the planetary boundary layer on a regional scale, and the development of a 3-dimensional global tropospheric chemistry model. He continues to publish his work prolifically, and has in excess of 100 publications.

Dick Derwent has also made a distinguished contribution to numerous national and international reviews and assessments in the field of atmospheric chemistry and pollutant formation, and has represented the United Kingdom in EC and UNECE policy negotiations. He is the founder Chairman and a current member of the Department of the Environment's Photochemical Oxidants Review Group (PORG). He is also a member of the Department's Quality of Urban Air Review Group (QUARG), Review Group on Acid Rain (RGAR) and its Expert Panel on Air Quality Standards (EPAQS). He is a leading contributor on the Intergovernmental Panel on Climate Change (IPCC), and has also made notable contributions to reports of the World Meteorological Organisation (WMO) and the Alternative Fluorocarbon Environmental Acceptability Study (AFEAS).

Erratum

Issue No. 4 of the Environmental Chemistry Group Newsletter stated that the RSC was offering to sell *Issues in Environmental Science and Technology* at £7.50 per volume to members of the RSC Environmental Chemistry Group. In fact, the RSC is offering a **year's subscription at half-price**. This means that subscribers belonging to the ECG will receive the two books published in 1997 for a total price of just £14.75. Full details are given below.

Issues in Environmental Science and Technology - **Half-Price Subscription Offer**

The *Issues in Environmental Science and Technology* series has been created by the RSC to meet the acute need for concise, authoritative and up-to-date reviews of current environmental issues. Two volumes are published each year, each containing a collection of review articles addressing a specific theme or topic.

We are pleased to announce that the RSC have agreed to make a one-year subscription to *Issues in Environmental Science and Technology* available to members of the **RSC Environmental Chemistry Group** at half-price. For **just £14.75** you will receive the following two books, hot-off-the-press each time, at no effort to yourself.

Issue No. 7 (due Spring 1997): **Contaminated Land and Its Reclamation**

Issue No. 8 (due Autumn 1997): **Air Quality Management**

For further details, or to place your subscription order, contact Jenny McCluskey, Sales and Promotion Executive at The Royal Society of Chemistry on (Tel) 01223 420066, (Fax) 01223 423429, (e-mail) sales@rsc.org

Environmental Chemistry at the University of York

An Environmental Chemistry programme was established in York in 1976 with the formation of the BSc degree course Chemistry, Resources and the Environment. The degree is one of five course variants that are taught side-by-side, and that share a common element of core chemistry and are accredited by the Royal Society of Chemistry. The Chemistry courses have recently undergone revision alongside the transition to a modular structure, and the creation of four year MChem degrees in each of the course variants. The courses serve a large number of able students (the current first year comprises 114 students with an average point score of 23.4).

The recent developments in Chemistry, Resources and the Environment have followed a key strategy adopted during inception of the subject at York. Specifically, the course content has been determined according to the availability of in-house expertise, with recruitment of staff in key environmental areas to supplement existing expertise. Necessarily, this approach dictates that the course is illustrative rather than comprehensive in its treatment of Environmental Chemistry. The focus of the course is on providing students with an appreciation of environmental issues and the relevance of chemistry to these. In-depth treatment of selected topics encourage students to acquire skills and understanding that can be applied widely throughout their studies and later in their working lives. Material is taught within the context of a developing understanding of basic chemical principles and skills, equipping students to practise as chemists, or to specialise in environmental areas.

A major benefit of this approach is that it allows for close integration between the environmental modules and the core chemistry. Members of staff who teach the environmental options are also active in teaching core chemistry. Furthermore, selected aspects of environmental chemistry are introduced to all students through the core teaching, especially during the first and second years of study.

Course Framework

The BSc and MChem degrees are identical in first and second years. In the first year all students take the same courses in core chemistry, supplemented by ancillary courses in relevant areas of maths, physics and biology. This provides all students with a common base from which more advanced aspects of chemistry can be developed. In the second year the common core is supplemented by choice of two optional modules (see Environmental Modules below). The BSc and MChem programmes diverge after the second year.

BSc

BSc students choose two further options (see below) in their third year. In addition to the taught courses students carry out a research project in year 3, equivalent to 1/6 th of the credit total for the year. A wide range of projects in environmental chemistry are available for students to choose from.

MChem

The MChem places a stronger emphasis on training for research than does the BSc. In the third year, MChem students choose two options (see below), and devote a significant proportion of their time (1/6th) to courses in advanced practical techniques, in preparation for the research project in year 4. The strong emphasis on research in the MChem is reflected in the project, which accounts for approximately half of year 4. The selection of two additional optional modules allows for a significant element of choice in the taught coursework component of the final year.

Environmental Modules

Key aims of the course are to show the importance of chemistry in understanding the functioning of the natural environment, to illustrate the challenges presented by society's demand for natural resources, and to show how human activities impact on the environment and how both negative and positive impacts can be assessed and minimised or optimised.

The key environmental options are as follows:

Earth Science; Natural Resources; Catalysis; Atmospheric Chemistry; Analytical Chemistry; Chemistry of Natural Products

A diverse range of individual topics are addressed within the Environmental options. These include geochemistry, aquatic chemistry, mineral resource exploitation, cosmochemistry, energy demand and supply, water resources and treatment, catalysis and waste minimisation, atmospheric chemistry, climate change, statistics in sampling and analysis, sample treatment, data processing, and natural products as source materials. A variety of teaching methods are used to deliver the course material including lectures, tutorials, seminars, workshops and site visits.

BSc and MChem Research Projects

Research projects for both the BSc and MChem programmes link closely with research activities in the Department (see below). Students are offered a wide range of topics from which to choose, or may design their own topics in collaboration with a member of staff. Recent projects include topics such as polymer recycling, environmentally-friendly catalysis, bioremediation of wastes, palaeo-environmental assessment, measurement of river water quality and spectroscopic studies of atmospheric species.

Research

Environmental research in York covers a wide range of subject areas and many of the activities involve collaborative projects with industrial partners. The Department has major interests in Clean Technology (led by Professor James Clark and supported by Duncan Macquarrie and Chris Rhodes) and is a leading exponent in the development of environmentally friendly catalysts to minimise waste in industrial processes and to avoid the use of toxic or undesirable solvents. Other activities in clean technology include the development of oxidation catalysts to replace heavy metal oxidants.

Strategies to process industrial wastes and to remediate contaminated land/ sediments are also being developed.

These include the recycling of polymers, and novel strategies for extraction of metals from industrial wastes (John Ramsden and Paul Walton). Research in environmental organic chemistry (Brendan Keely) encompasses a broad range of topics including: the development of combined chemical and biological strategies for remediation of industrial waste and contaminated areas; development of chemical approaches for use in enhanced oil recovery; and study of the mechanisms of transformation of natural products in the environment, particularly with regard to their use in palaeoenvironmental assessment.

Research into the chemistry of the natural and polluted atmosphere encompasses atmospheric modelling and studies of emission inventory (Chris Anastasi). These studies are focused on assessing influences on global climate change. Complementary studies of heterogeneous catalysis on surfaces (Andy Horn) are examining the role of cold particulates (*e.g.* ice) in the stratospheric destruction of ozone.

For further information on Environmental Chemistry at the University of York please contact Dr. Brendan Keely, Department of Chemistry, University of York, Heslington, York, YO1 5DD tel: 01904 432540; email bjk1@york.ac.uk.

Book Review

Dictionary of Environmental Science and Technology, 2nd edition, Andrew Porteous, John Wiley, Chichester, 1996. Pp xvi+635; £12.99 ISBN 0-471-96075-6

The pursuit of a better environment attracts the attentions of many disciplines and not just those with a purely scientific perspective. Communication between practitioners and commentators in environmental matters is essential and an awareness if not a rigorous understanding of the terms used in environmental science and technology should be advocated. The second edition of Andrew Porteous' Dictionary is therefore much welcomed.

Apart from highly readable definitions of all the environmental themes of our times, the Dictionary mentions recent developments in UK environmental legislation (*e.g.* Environment Act 1995 and the work of the new UK Environment Agency; Duty of Care for waste disposal - this latter article and the subsequent sections on waste are particularly useful).

Augmenting the text are numerous diagrams including drawings of industrial engineering processes which for a paperback of a relatively small page size have been reproduced with remarkable clarity (*e.g.* the diagram of a roller gate incinerator p. 282 included in a lengthy discussion on incineration).

The text often provides the unexpected. For example the late Simon Wolff's comments on the present uncertainty regarding the health effects of low level (non-occupational) exposure to benzene are mentioned in the article on this solvent. (The reference for these views is unfortunately incomplete. It should read: S.P. Wolff, *Experientia*, 1992, **48**, 301). Professor Porteous' comment that the use of herbicides 'is yet another example of man changing ecosystems to suit himself' also reveals a green tinge to this Dictionary.

Some topics are not properly covered. For example there is no separate section on indoor air pollution, and EMAS (Eco-Management and Audit Scheme Regulation - see ECG Newsletter No.4) is omitted. The inclusion of common toxicology definitions is patchy and a future edition of this Dictionary could perhaps extract information from the Glossary of Terms Used in Toxicology (*Pure Appl. Chem.*, 1993, **65**, 2003).

Complementing the main text is a useful Appendix containing the names and addresses of organisations concerned with the environment (mainly UK governmental and non-governmental).

While the strength of the Dictionary is in its coverage of environmental engineering techniques, a few minor quibbles concern some of the chemistry content. Dioctyl adipate is not a phthalate (p. 416), and the inclusion of molecular or structural formulae (*e.g.* for furfural and furans respectively, p. 240) is not worth the effort. The definition for enzymes (p. 212) could also perhaps be rethought.

Nonetheless this Dictionary is a valuable source for information on the environment and more than fulfils the author's aim of 'contributing to environmental literacy'. Its price is affordable to all students of the environmental sciences, and future (expanded) editions with an accompanying CD-ROM version should be considered.

Rupert Purchase, December 1996

Society for Environmental Geochemistry and Health (SEGH)

Environmental geochemistry and health is an interdisciplinary field of science that has existed for more than 50 years. **The Society for Environmental Geochemistry and Health (SEGH)** was formed between 1968 and 1973 with the objective of relating environmental chemistry to the well being of plant, animal and human life. **SEGH** acts as a forum for scientists from different disciplines and has a diverse membership including of geologists, geochemists, plant physiologists, zoologists, nutritionists and physicians.

In recent years, the subject has expanding rapidly as witnessed by the number of conferences encompassing environmental geochemistry and health, the number of participants attending these conferences and increased membership of **SEGH**. There are presently two branches of **SEGH**, a North American branch and European branch with a third, southern hemisphere branch planned for the near future. In addition to publishing a journal, a Newsletter and organising conferences on all scales from local to international, the society also establishes task forces to promote a better understanding of contemporary issues. Previous task forces have dealt with lead in soil and arsenic in drinking water.

Although the roots of **SEGH** are firmly established in trace element deficiencies and toxicities, it is by no means restricted to trace elements. Previous issues discussed by the society include the link between cardiovascular disease and soft water and the effects of radioactivity, both in terms of environmental radon and radioactive waste disposal. In addition, there is now considerable interest in the health effects of trace amounts of certain organic contaminants in soil, groundwater and drinking water.

For more information about the society (including membership forms) and conferences, contact either myself, the secretary, Malcolm Brown or the Membership Secretary, Anthea Lumb, both at the British Geological Survey, Keyworth, Nottingham NG12 5GG. Tel: 01159 363477, Fax: 01159 363200, E-mail: mjbro@bgs.ac.uk.
Details of meetings arranged by **SEGH** for 1997 are given below.

Janet Cotter-Howells
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e-mail: j.cotter-howells@abdn.ac.uk

[Editor's note: SEGH was briefly mentioned in the second Issue of this Newsletter]

SEGH Meetings Arranged for 1997

The Society for Environmental Geochemistry and Health (SEGH) has arranged the following three meetings for 1997.

SEGH 15th European Meeting

Organisers: Society for Environmental Geochemistry and Health and The Geological Survey of Ireland
Location:Dublin
Dates: 24-26th March 1997

Contact: Malcolm J. Brown
Secretary SEGH
British Geological Survey
Keyworth
Nottingham NG12 5GG UK
Tel: 01159 363477
Fax: 01159 363200
E-mail: mjbro@wpo.nerc.ac.uk

Environmental Geochemistry and Health

A one-day meeting focusing on analytical techniques in environmental geochemistry and health.

Organisers: Society of Environmental Geochemistry and Health and the Analytical Division (Scotland) of the Royal Society of Chemistry
Location: Riccarton Campus, Heriot-Watt University, Edinburgh
Date: 12th June 1997

Contact: Dr. John G. Farmer
Environmental Chemistry Unit
Department of Chemistry
The University of Edinburgh
Edinburgh EH9 3JJ
Tel: 0131 650 4757
Fax: 0131 650 4743
E-mail: jgf01@ed.ac.uk

4th International Symposium on Environmental Geochemistry

Organisers: US Geological Survey,
Association of Exploration Geochemists
and
Society of Environmental Geochemistry and Health
Location: Vail, Colorado
Dates: October 5-10th 1997

Contact: Drs. R.C. Severson or L.P. Gough
4th International Symposium on Environmental Geochemistry
c/o US Department of the Interior
USGS
MS 973
Box 25046
Federal Center
Denver, CO 80225-0046
Tel: + 303 236 5514 or 5513
Fax: + 303 236 3200
E-mail: iseg@helios.cr.usgs.gov

Meeting Report: Urban Air Quality - Monitoring and Modelling

The first international conference on urban air quality to be organised by the Institute of Physics (Environmental Physics Group) was held on the 11th and 12th July 1996 at the University of Hertfordshire, Hatfield, UK. The meeting was supported by the Royal Society of Chemistry, the Royal Meteorological Society and the National Society for Clean Air and Environmental Protection. Over 100 scientists attended from various countries. The forty oral and poster presentations included invited talks by Professor Roy Harrison (University of Birmingham, UK) and Dr Andreas Skouloudis (ISPRA, Italy). The papers presented at the conference will be peer-reviewed and published as a special issue of the *International Journal of Environmental Monitoring and Assessment.*

A second international conference on air quality is planned by the Institute of Physics for 1998. If you are interested in participating at this meeting please contact:

Dr Ranjeet S. Sokhi
Head of the Atmospheric Science Research Group
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Email: r.s.sokhi@herts.ac.uk

Meeting Report: Air Pollution in the United Kingdom

With the recent publication of the Consultative Draft of the Government's Air Quality Strategy it was timely that the Environmental Chemistry Group and the NW Region of the RSC's Analytical Chemistry Division should hold a symposium on September 23rd on Air Pollution in the United Kingdom. Despite the threat of disruption to rail travel on that day ninety people attended the meeting at Lancaster University.

The programme covered the whole area of air pollution from indoor air (Dr David Crump, Building Research Establishment), through urban and rural air (Prof Roy Harrison and Prof David Fowler of the University of Birmingham and the Institute of Terrestrial Ecology respectively), to global air pollution (Dr Dick Derwent, Meteorological Office). Other lectures followed on the health effects of air pollution (Prof Jon Ayres, Birmingham Heartlands Hospital), air pollution legislation (Dr Martin Williams, DoE), the changing role of local authorities in air pollution control (Mr David Purchon, Sheffield City Council) and new developments in measuring air pollutants (Mr Stephen Hoskin, Enviro Technology plc). Lively discussion followed each lecture and overall the symposium was judged a success. The RSC will publish the proceedings of this meeting in 1997 and this will give the most authoritative and up-to-date account of air pollution in the UK available.

Nick Hewitt
Lancaster University

Meeting Report – BATNEEC III

A two-day symposium, BATNEEC III, was held in association with the Institute of Chemical Engineers, North Western Branch, and a number of other supporting groups at UMIST on 24-25 September 1996. This meeting focused on Best Available Techniques Not Entailing Excessive Cost for the prevention, minimisation and clean-up of waste from industrial processes, with a special emphasis on dealing with volatile organic compounds (VOCs).

The following review has been kindly provided by Mr Harry Cripps, IChemE, North Western Branch. The Proceedings of the meeting, entitled *'Case Studies in Environmental Technology'*, have been published and are available price £39.00 from IChemE Book Sales, Davis Building, 165-189 Railway Terrace, Rugby CV21 3HQ.

BATNEEC III Meeting, Manchester, September 1996

Waste minimisation requires commitment and expertise; a systematic approach and a knowledge of available technologies are both important. Where it is technically and economically feasible, the elimination of harmful discharges should be achieved at the design stage of a process.

Systematic design of distributed effluent treatment optimises trade-offs between end of pipe and decentralised pre-treatment or recovery. A case study demonstrated how this solved effluent problems at minimum cost. As with traditional Pinch methodology, if such analysis is technically applicable, perhaps it should be mandatory before a process is confirmed as BATNEEC. The 3Es approach, Emissions, Efficiencies and Economics, featured co-operation between HMIP and manufacturer in determining what is BATNEEC. Causes of emissions on the site were identified systematically, using guide words similar to HAZOP. Priority areas were selected, action plans developed in a rational manner and savings were realised. Similar approaches have been adopted elsewhere but seldom reported. A hierarchical methodology for optimum design of batch processes was shown, addressing environmental implications at all stages from reactor recycle design to cleaning and scheduling. How this develops to optimise trade-offs between

levels in the hierarchy will be interesting.

A waste minimisation exercise, driven both by IPC requirements and operating costs, saw water selected as top priority from over 150 different wastes identified. Though annual savings of £800,000 were targeted, uncertainty in the site water balance was frankly admitted. Lack of reliable balances is still widespread in the process industry and remains an obstacle to optimum pollution control. Perhaps a legal requirement for heat and material balances should be added to those for financial audit.

The expensive option of bunding is often seen as the ultimate environmental protection for storing non-volatile liquids. An interesting case was presented where risk-based analysis showed cheaper alternatives to be no less effective.

Efficient separation processes are crucial to economic environmental protection. Ultra-stable nanofiltration membranes now permit very specific separations even at extreme pH. Examples range from high value antibiotics to spent dairy cleaning solutions. Membranes are often a viable alternative to energy intensive traditional technology. Recovering wastes outside the plant generating them may be economically and environmentally appropriate. Solvent recovery specialists with separation and recovery expertise can also exploit opportunities for downgrading used solvents into less demanding applications or for reprocessing to meet demanding specifications as fuels. Large fluctuations in the price of virgin solvents, though, are problematic.

Fuelling cement kilns with materials formerly wastes from other processes remains controversial. If the material burnt conforms to a tight set of specifications, should it be treated as a fuel? Alternatively, as a form of incineration, the kiln discharge should be subject to the much more stringent conditions applied to waste incinerators. In reality, some wastes are less harmful than the coal normally fired, whilst others are potentially worse. Public confidence might be greater without the secrecy surrounding specifications for these "fuels"; it is difficult even for chemical engineers to make a judgement. Kiln disposal apart,properly designed and operated incinerators effectively destroy the majority of organic wastes but it is hard to see how they can be BATNEEC unless energy recovery is optimised.

A systematic approach to solvent management with better understanding of its use leads to reduced consumption and minimises VOC emissions. A shoe manufacturer has targeted almost total elimination and has already reduced solvent consumption by 50% with a good return on investment. Operating costs and the need for expensive abatement plant were both reduced. Low temperature liquid nitrogen systems can facilitate economic recovery of VOCs from process vents, particularly attractive when high concentration sources are inerted with nitrogen rather than diluted with air to below the LEL. Additional refrigeration costs are avoided; energy needed to evaporate liquid nitrogen generally exceeds the cooling duty to bring VOC bearing exhausts within UK guideline concentrations. Material condensed is often treated for reuse or as a fuel.

If recovery or recycling are not practicable, flameless oxidation may be. Proprietary ceramic bed technology operating at around 850 deg C has potential for 99.99% destruction of many VOCs. Major driving forces are minimal generation of incompletely oxidised residues from chlorinated VOCs and negligible flame generated NOX or CO. Moving from established to developing technologies, microwave generated plasmas at atmospheric pressure have achieved 95-99+% VOC destruction. The development team hopes to have an economic industrial package within 1-2 years.

Oxidising NOx to nitric acid using hydrogen peroxide both removes NOx and recovers useful acid. In steel pickling, in-situ application suppresses NOx formation at source with no adverse effect on the product. These applications are now considered BATNEEC in appropriate circumstances. A further application of hydrogen peroxide eliminates NOx and minimises effluent disposal with nitric acid free pickling.

Odour nuisance can be a serious problem, carbon adsorption for long being one of the methods of tackling it. Traditionally, activated or impregnated carbon have been used, the latter achieving a high loading but hard to regenerate. A new enhanced catalytic capability activated carbon is available and claimed to combine ease of regeneration with loading capability approaching that of impregnated material. Until recently smells could only be detected and identified by nose. Multiple element sensors now respond to different aroma components, producing a characteristic aroma profile. Feeding data to an artificial neural network, the system can identify a wide range of odours with considerable reliability. This technology is already seeing applications from nuisance issues to quality control.

Compliance monitoring, an important part of IPC, is hindered by lack of standards; it is often difficult to determine what constitutes BATNEEC monitoring. The Environment Agency's National Centre for Regulatory Monitoring (NCRM) is working to overcome this, the establishment of a recognised Monitoring Certification Scheme (MCERTS) being a significant objective.

For further details, the full Proceedings of this Symposium are strongly recommended and are now available from the IChemE (details above).

Harry Cripps, December 1996

Symposium

Second Young Environmental Chemists Meeting at De Montfort University, Leicester, Tuesday, 18 March 1997, 9.30 - 5.00

This second one-day symposium for younger workers in environmental chemistry is organised by De Montfort University and the RSC Environmental Chemistry Group in conjunction with the UK Science Engineering and Technology (SET) week 1997. The programme will consist of two plenary talks, by Professor K.J. Irgolic and Dr J. Ashley Smith respectively, and the presentation of new work in environmental chemistry by younger environmental chemists (MPhil/ PhD students and postdoctoral workers). There will also be the opportunity to take part in a poster session - posters will be displayed throughout the day with a plenary poster session in the afternoon.

Young chemists who are working on a chemistry project with an environmental theme or implication are invited to attend and should contact Professor Peter Craig for details. As with the successful meeting organised in 1996 this meeting is intended to allow fruitful exchanges of information in the field of environmental chemistry, to give experience in the presentation of work to an audience and will also provide an opportunity to meet fellow workers in the environmental field.

Registration for the meeting will be about £15.00 and it is hoped to provide a small number of bursaries to assist with attendance.

Professor Peter Craig
Professor of Environmental Chemistry
Department of Chemistry, De Montfort University
Leicester LE1 9BH

Tel: 0116 2577102
Fax: 0116 2577135
e-mail: pjcraig@dmu.ac.uk

Symposium

New Initiatives for Regulatory Monitoring of Industrial Processes

Organised by the RSC Environmental Chemistry Group, this one-day symposium is arranged for Tuesday 25 March 1997 at Imperial College, London.

The programme and speakers will include:

Dr John Tipping (Environment Agency)
Present Regulatory Requirements and MCERTS

Mr Mike Woodfield (AEA **Technology)**
Latest Developments in Standard Reference Methods

Mr Simon Medhurst (CRE Group Ltd.)
Implementation of Monitoring Methods and Accreditation

Dr John Fleming (LGC) *VAM: An Approach to Underline Quality*

Dr Ian Taylor (Water Research Centre)
AQUACHECK: Practical Experience of a Proficiency Testing Scheme

Mr Chris Chubb (Environment Agency)
Regulation of Discharges into the Water Environment

Dr Trudie McMullan (DOE)
Update on Air Quality Initiatives

Mr Anthony Hobley (McKenna & Co.)
EMS: Managing for Environmental Excellence The Legal Framework

The meeting wii be chaired by Mr Stuart Newstead (Head, National Centre for Regulatory Monitoring, Environment Agency).

For further details of this meeting please contact: Dr Robert Gemmill, Environment Agency, Government Buildings, Burghill Road, Westbury-on-Trym, Bristol BS10 6EZ Tel: 0117 987 3267; Fax: 0117 987 3272; e-mail rob.gemmill@environment-agency.gov.uk

Environmental Organisations on the Internet

from Portico - The British Library Online Information Service
http://portico.bl.uk/sris/eis/orgs1.html

Alfred-Wegener-Institute
http://www.awi-bremerhaven.de/

The Alfred-Wegener-Institute is a German national research centre for Polar and Marine research.

Alpha Analytical Labs
http://world.std.com/~alphalab/

Alpha is a full service environmental analytical laboratory.

AquaNIC
http://thorplus.lib.purdue.edu/Aquanic/ahome2.html

The Aquaculture Network Information Center (AquaNIC) is intended to be a gateway to the world's electronic resources in aquaculture.

Australian Oceanographic Data Centre
http://www.Aodc.Gov.Au/aodc.html

The primary activity of the AODC is the development of Navy's Marine Environmental Database (MEDB) which provides the basis of most products produced within AODC. The AODC is

also responsible for acquiring, managing and disseminating marine environmental data to the civilian marine science community and the general public.

Base de Dados Tropical from Brazil
http://www.ftpt.br/

The Base de Dados Tropical (Tropical Data Base BDT) is a department within the Fundacao Tropical de Pesquisas e Tecnologia "Andre' Tosello", a Brazilian not-for-profit, private foundation.

BENE
http://straylight.tamu.edu/bene/bene.html

The Biodiversity and Ecosystems Network, BENE, is designed to foster enhanced communications and collaborations among those interested in biodiversity conservation and ecosystem protection, restoration, and management.

British Columbia Environment
http://www.env.gov.bc.ca/

British Columbia Ministry of Environment, Lands and Parks World Wide Web Server.

CEDAR: Central European Environmental Data Request Facility
http://pan.cedar.univie.ac.at/

Provides computing and Internetwork facilities to support international data exchange with the Central and Eastern European environmental community.

CERES: California Environmental Research Evaluation System
http://agency.resource.ca.gov/

CERES is an information system being developed by the Resources Agency to facilitate access to a variety of electronic data describing California's rich and diverse resources.

CIESIN
gopher://infoserver.ciesin.org/

The Consortium for International Earth Science Information Network (CIESIN, pronounced "season") was established in 1989 as a private, nonprofit membership corporation with members from leading universities and non-government research organizations.

Cornell University Center for the Environment
http://www.cfe.cornell.edu/

The Center for the Environment (CfE) addresses pressing environmental issues in their full interdisciplinary complexity, through teaching, research and outreach.

The Daily Planet
http://www.atmos.uiuc.edu/

Brought to you by the Department of Atmospheric Sciences at the University of Illinois. This is the location of our fully developed environmental information server (EIS), The Daily Planet. In addition to weather images and MPEG animations, there are links to our online electronic textbook, and a number of other locally developed resources.

Earthwatch
http://gaia.earthwatch.org

Earthwatch sponsors expeditions that improve the quality and management of life's resources.

ECN
http://www.nmw.ac.uk/ecn/

Founded in 1992, ECN is the UK's integrated long-term environmental monitoring network. It is designed to collect, store, analyse and interpret long-term data based on a set of key physical, chemical and biological variables which drive and respond to environmental change.

EcoNet
http://www/igc.apc.org/igc/en.html

EcoNet serves organizations and individuals who are working for environmental preservation and sustainability.

EcoWeb
http://ecosys.drdr.virginia.edu/EcoWeb.html

EcoWeb is devoted to facilitating access to local recycling and environmental information as well as more comprehensive environmental resources.

EKN Canada
http://ekn.sid.ncr.doe.ca/

Environment Canada is committed to supporting Canadians in their efforts to sustain the environment to ensure that a positive environmental legacy is passed on to future generations.

Energy & Environmental Research Center
http://eerc.und.nodak.edu/

The EERC is one of the world's leading energy and environmental facilities.

Environment Canada Green Lane
http://www.ns.doe.ca/

The Green Lane will provide interactive access to Environment Canada services, products, information holdings, programs and policies.

Environment at MIT
http://web.mit.edu/org/c/ctpid/www/tbe/tbe-home.html

The Technology, Business and Environment Program was founded to help companies meet the dual challenges of achieving environmental excellence and business success.

Environmental Web Resources
http://envirolink.org/envirowebs.html

The Environmental World Wide Web Listing at EnviroLink. This is a listing of all of the environmental World Wide Web services that we are aware of.

EPA WWW
http://www.hpcc.gov/blue94/section.4.9.html

Use EPA web server.

Environmental Resource Centre
http://ftp.clearlake.ibm.com/erc/homepage.html

The Environmental Resource Center (ERC) is an innovative cooperative between private industry and multiple levels of government. Directed and developed by industry, the ERC will provide an effective means to assimilate, enhance, and distribute existing environmental knowledge.

EPA Environmental Gopher
gopher://gopher.epa.gov/11/other/gophers

US Environmental Protection Agency Gopher.

EnviroWeb
http://envirolink.org/

The EnviroWeb is the EnviroLink Network's World Wide Web server.

ERIN Australia
http://kaos.erin.gov.au/erin.html

The Environmental Resources Information Network [ERIN] aims to provide geographically related data of an extent, quality and availability required for planning and decision making.

FireNet Information Network
http://www.anu.edu.au/forestry/fire/firenet.html

FireNet as an on-line information service for everyone interested in rural and landscape fires. The information concerns all aspects of fire science and management including fire behaviour, fire weather, fire prevention, mitigation and suppression, plant and animal responses to fire and all aspects of fire effects.

Friends of the Earth
http://www.foe.co.uk/

The largest international network of environmental groups in the world, represented in 52 countries and one of the leading environmental pressure groups in the UK.

Gateway to Antarctica
http://icair.iac.org.nz/

The International Centre for Antarctic Information and Research (ICAIR) collects, analyses, distributes and co-ordinates scientific, environmental and educational information relating to Antarctica. ICAIR is an international, politically neutral institution incorporated within the science academy The Royal Society of New Zealand.

GENIE
http://www-genie.mrrl.lut.ac.uk/

The GENIE project will provide a user-sympathetic system for locating and accessing relevant information on Global Environmental Change.

Global Futures Foundation
http://www.quicknet.com/globalff/globalfu.html

Global Futures Foundation (GFF), an innovative environmental non-profit foundation. GFF focuses on systematically integrating programs which lead to source reduction, pollution prevention, low-cost market development, and incentive market driven regulatory structures which tend to reduce both economic and environmental costs.

Global Recycling Network
http://grn.com/grn

GRN is the most comprehensive Recycling Information Resource available on the Internet. Besides a wide variety of general recycling reference material, GRN offers a virtual market-place intended to help businesses around the world in finding possible trading partners for the sale of recyclable goods.

Greenpeace International (Amsterdam)
http://www.greenpeace.org/

Greenpeace International is the international coordinating body for the 43 national offices in 30 countries.

ICE: University of California
http://ice.ucdavis.edu/#top of list

The Information Center for the Environment (ICE) is a cooperative effort of an interdepartmental team of environmental scientists at the University of California, Davis and collaborators at over thirty private, state, federal, and international environmental organizations.

INFOTERRA
http://pan.cedar.univie.ac.at/gopher/unep/unep.html

INFOTERRA The Global Environmental Information Exchange Network, established in 1975 by a decision of the third session of the Governing Council of UNEP. The main direction given to INFOTERRA was to develop a mechanism to "facilitate the exchange of environmental information within and among nations".

Institute of Terrestrial Ecology
http://www.nmw.ac.uk:80/ite/

One of four Institutes which form the Centre of Ecology and Hydrology, a part of the UK Natural Environment Research Council responsible for research into all aspects of the terrestrial environment and its resources.

LEAD International Leadership for Environment and Development Program
http://www.lead.org/

Linkages
http://www/mbnet.mb.ca:80/linkages/

Linkages is provided by the International Institute for Sustainable Development (IISD), publishers of the Earth Negotiations Bulletin. It is designed to be an electronic clearing-house for information on past and upcoming international meetings related to environment and development.

National Environmental Information Resources Center
http://www.gwu.edu/~greenu/

National Institute for the Environment
http://www.inhs.uiuc.edu/cnie.html

The Committee for the National Institute for the Environment (CNIE) is a national, non-profit organization working to improve the scientific basis for making decisions on environmental issues, through creation of a new, non-regulatory environmental science and education agency, the National Institute for the Environment (NIE).

Natural Environment Research Council
http://www.nerc.ac.uk/

The mission of the Natural Environment Research Council is: to promote and support, by any means, high quality basic, strategic and applied research, survey, long-term environmental monitoring and related post-graduate training in terrestrial, marine and freshwater biology and Earth, atmospheric, hydrological, oceanographic and polar sciences and Earth observation;

Natural History Museum
http://www.nhm.ac.uk

The Natural History Museum is dedicated to furthering the understanding of the natural world through its unrivalled collections, its world class exhibitions and education, and through its internationally significant programme of scientific research.

NOAA ESDIM Home Page
http://www.esdim.noaa/gov/

National Oceanic and Atmospheric Administration Environmental Information Services.

NREL's Gopher/WWW Server
http://www.nrel.gov/

National Renewable Energy Laboratory, a national laboratory of the US Department of Energy.

Oak Ridge National Laboratory (ORNL)
http://www.ornl.gov/

ORNL is a Department of Energy multiprogram laboratory managed by Lockheed Martin Energy Systems, Inc. Scientists at ORNL to conduct a wide range of basic and applied research and development to advance in several Core Competencies the nation's energy resources, environmental quality, scientific knowledge, educational foundations, and economic competitiveness.

Oceanic Information Centre
telnet://delocn.udel.edu/info

Pesticide Action Network North America (PANNA)
gopher://gopher.igc.apc.org/11/orgs/panna

The PANNA Update Service (PANUPS) is a weekly news service featuring articles on pesticide use and sustainable agriculture from around the world, as well as action alerts and conference reports. The Pesticide Information Service (PESTIS) is an online database that contains pesticide reform-related material generated by NGOs, including articles, newsletters, reports and action alerts, all of which can be full-text searched.

Royal Botanic Gardens/Kew
http://www.rbgkew.org.uk/

The mission of the Royal Botanic Gardens, Kew is to enable better management of the earth's environment by increasing knowledge and understanding of the plant kingdom.

Seashepherd Gopher
gopher://envirolink.org/11/enviroorgs/.eorgs/.seashepherd

The Sea Shepherd Conservation Society is a non-profit organization involved with the investigation and documentation of violations of international laws, regulations and treaties protecting marine wildlife species.

Solstice
http://solastice.crest.org

Solstice, the site for energy efficiency, renewable energy, and sustainable technology information and connections.

Sustainable Earth Electronic Library
http://www.envirolink.org/pubs/

A unique collection devoted exclusively to materials that educate people on ways to preserve and restore our natural environment. The Sustainable Earth Electronic Library (SEEL) is a project of Sustainable Earth, Inc., a nonprofit organization devoted to the creation of environmentally-related information tools and services.

UK Government (CCTA)
http://www.open.gov.uk/

CCTA is the UK Government Centre for Information Systems, part of the Office of Public Service and Science, which works to improve government's services to the public. It contains information from:
Ministry of Agriculture, Fisheries and Food (MAFF)
Countryside Commission
The Department of the Environment (DoE)
Department of Trade and Industry (DTI)
Her Majesty's Inspectorate of Pollution (HMIP)
Ordnance Survey
Pesticides Safety Directorate

United Nations
gopher://nywork1.undp.org/

United Nations Gopher Server.

United Nations Development Programme
http://www.undp.org/

United Nations Development Programme World Wide Web Server.

Universities Water Information Network
http://www.unwin.siu.edu/

UNWIN is designed to aid the flows of water information along the information superhighway. UNWIN maintains many information services of interest to managers, researchers, consultants, and teachers throughout the water resources community.

University of East Anglia: Environment
http://www.env.uea.ac.uk

In the School of Environmental Sciences physical, chemical, biological and social science methods are applied to the study of natural and human environments and man's role in them.

Virginia: Environment WWW Virtual Library Environment
http://ecosys.drdr.virginia.edu/environment.html

World Conservation Monitoring Centre
http://www.wcmc.org.uk/

WCMC provides information services on the conservation and sustainable use of species and ecosystems, and supports others in the development of their own information management systems.

World Health Organization
http://www.who.ch/

The objective of WHO is the attainment by all peoples of the highest possible level of health. Health, as defined in the WHO Constitution, is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

This list of environmental organisations which can be contacted *via* the Internet is taken from a chapter on the acquisition of environmental data by Mike Hannant (Royal Society of Chemistry, Cambridge) and Paula Owen (British Library Environmental Information Service) and published in *Environmental Impact of Chemicals: Assesssment and Control*, ed. M. Quint *et al*, Royal Society of Chemistry, Cambridge, 1996. We are grateful to the RSC for permission to publish this list.

Forthcoming Symposia

Details of many meetings related to the environmental sciences to be held in the UK in the first half of 1997 are given in the leaflet *Environmental Science and Technology Meetings* which accompanies this issue of the ECG Newsletter.

Other symposia on environmental topics for this period which have come to our attention are as follows:

Volatile Organic Compounds, 6th Annual Conference

Organised by IBC UK Conferences Ltd, 20/21 February 1997, Hyatt Regency Hotel, Birmingham (0171 453 2702 for details)

Greenhouse Gases and Sustainable Development

RSC Environmental Chemistry Group Distinguished Guest Lecture plus supporting programme, 4 March 1997, 1.30pm, Royal Society Wellcome Lecture Theatre, London

Pesticides and their Impact on the Aquatic Environment

Organised by IBC UK Conferences Ltd, 10/11 March 1997, Radisson SAS Portman Hotel, London (0171 453 2702 for details)

Transgenic Crops: New Perspectives in Crop Protection

Organised by the SCI Pesticides Group, 11th March 1997, SCI 14/15 Belgrave Square, London (0171 823 1698 for details)

Second Young Environmental Chemists Meeting

Organised by De Montfort University and the RSC Environmental Chemistry Group, 18 March 1997, De Montfort University (0116 2577102 for details)

Oestrogenic Substances in the Environment: General and Analytical Aspects

Organised by the RSC Analytical Division, 20 March 1997, 9.30 am, Scientific Societies Lecture Theatre, London (Secretary, RSC Analytical Division, 0171 437 8656 for details)

New Initiatives for Regulatory Monitoring of Industrial Processes

Organised by the RSC Environmental Chemistry Group, 25 March 1997, Imperial College, London (Dr Robert Gemmill, Environment Agency, Government Buildings, Burghill Road, Westbury-on-Trym, Bristol BS10 6EZ Tel: 0117 987 3267; Fax: 0117 987 3272; e-mail rob.gemmill@environment-agency.gov.uk for details)

Recycling of Plastics

Organised by the SCI Materials Chemistry Group, 24 April 1997, SCI 14/15 Belgrave Square, London (Dr T.P. Murphy 01865 873366 for details)

Analytical Science and the Environment

Organised by the RSC Analytical Division, 30 June to 3 July 1997, University of Northumbria, Newcastle (Secretary, RSC Analytical Division, 0171 437 8656 for details)

Recent Books on the Environment and on Toxicology at the RSC Library

The following books and monographs on environmental topics have been acquired by the RSC library, Burlington House, during the period June - December 1996. Recent additions on toxicology are also included in this list.

Agricultural Chemicals and the Environment: RSC Issues in Environmental Science and Technology No. 5

Cambridge, Royal Society of Chemistry, 1996, ISBN:0854042202, 127 pp., Accession No: IEST965

Biotransformations: A Survey of the Biotransformations of Drugs and Chemicals in Animals

Hawkins, D. R. (ed.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854044035, 486 pp., Accession No: 960604, West Gallery, 615.015.4:636

Chlorinated Organic Micropollutants: RSC Issues in Environmental Science and Technology No. 6

Cambridge, Royal Society of Chemistry, 1996, ISBN:0854042253, 183 pp., Accession No: IEST966

Detergents in the Environment: Surfactant Science Series Vol. 65

Schwuger, M. J. (ed.), New York, Marcel Dekker, 1996, ISBN:082479396X, 317 pp., Accession No: 960619,West Gallery 668.1:628.5

Dictionary of Environmental Science and Technology, 2nd edition

Porteous, A., Chichester, John Wiley & Sons, ISBN:0471960756, 635 pp., Accession No: 960538 Reference Shelves REF 030.3:628.5:5/6 R

Dictionary of Plant Toxins

Harborne, J. B. *et al* (eds.), Chichester, John Wiley & Sons, 1996, ISBN:0471951072, 523 pp., Accession No: 960468 Reference Shelves REF 030.3:615.371 R

Digest of Environment Statistics No. 18 1996

London, HMSO, 1996, ISBN:0117532975, 226 pp., Accession No: 960548, Reference Shelves REF 628.5:502.3 R

Environment Act 1995 (Consequential and Transitional Provisions) (Scotland) Regulations 1996

London, HMSO, 1996, ISBN:0110553616 6 pp., Accession No: 960371, SI 1996/973(S.104)

Environmental Assessment: Scoping Handbook for Projects

London, HMSO, 1996, ISBN:0113101112, 23 pp., Accession No: 960399, West Gallery 628.5:371.279.7

Environmental Hazard Assessment: Phenol

Watford, BRE, 1996, ISBN:1860810659, 98 pp., Accession No: 960405, West Gallery REF 628.5 R

Environmental Impact of Chemicals: Assessment and Control: RSC Special Publication No. 176

Quint, M. *et al* (eds.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854047956, 243 pp., Accession No: 960449, West Gallery 628.5:661:061.3

Environmental Protection (Applications, Appeals and Registers) (Amendment No. 2) Regulations 1996

London, HMSO, 1996, ISBN:0110545508, 2 pp., Accession No: 960370, SI 1996/979

Environmental Protection (Applications, Appeals and Registers) (Amendment) Regulations 1996

London, HMSO, 1996, ISBN:0110543092, 6pp., Accession No: 960393, SI 1996/667

Environmental Protection (Controls on Substances that Deplete the Ozone Layer) Regulations 1996

London, HMSO, 1996, ISBN:0110541839, 7 pp., Accession No: 960397, SI 1996/506

Environmental Xenobiotics

Richardson, M. (ed.), London, Taylor & Francis, 1996, ISBN:074840399X, 492 pp., Accession No: 960539, West Gallery 628.5:615.011.17

Evaluation of Certain Food Additives and Contaminants: Forty-Fourth Report of the Joint FAO/WHO Expert Committee on Food Additives

Geneva, WHO, 1995, ISBN:9241208597, 56 pp., Accession No: 960439, West Gallery 664:615.9

Financial Assistance for Environmental Purposes Order 1996

London, HMSO, 1996, ISBN:0110541812, 1 p., Accession No: 960396, SI 1996/505

Financial Assistance for Environmental Purposes (No. 2) Order 1996

London, HMSO, 1996, ISBN:0110553810, 2 pp., Accession No: 960558, SI 1996/1431 (s.130)

Fundamental Toxicology for Chemists

Duffus, J. H. *et al* (eds.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854045295, 327 pp., Accession No: 960606, West Gallery 615.9

Genetically Modified Organisms (Risk Assessment) (Records and Exemptions) Regulations 1996

London, HMSO, 1996, ISBN:0110545877, 3 pp., Accession No: 960395, SI 1996/1106

Geochemical Approaches to Environmental Engineering of Metals

Reuther, R. (ed.), Berlin, Springer-Verlag, 1996, ISBN:3540588485, 221 pp., Accession No: 960642 West Gallery 628.5:550.4

Guide to the Mersey Measure

London, HMSO, 1996, ISBN:0117526916, 64 pp., Accession No: 960403, West Gallery, 628.5

Hydrophilic Polymers: Performance with Environmental Acceptance: ACS Advances in Chemistry No. 248

Washington, American Chemical Society, 1996, ISBN:0841231338, 516 pp., Accession No: 960494, Reading Room, 541.64:628.5:061.3

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Dry Cleaning, Some Chlorinated Solvents and Other Industrial Chemicals (IARC Monograph Volume 63)

Lyon, IARC, 1995, ISBN:9283212630, 551 pp., Accession No: 960566, West Gallery 616-006.6:061.3

Impact of Land Use on Salmonids: a Study of the River Torridge Catchment

London, HMSO, 1996, ISBN:0113101104, 48 pp., Accession No: 960362, West Gallery 628.5:597.553.2

Indicators of Sustainable Development for the United Kingdom

London, HMSO, 1996, ISBN:011753174X, 196 pp., Accession No: 960596, Reference Shelves, REF 628.5:311.42 R

Inorganic Lead: Environmental Health Criteria No. 165

Geneva, WHO, 1995, ISBN:9241571659, 300 pp., Accession No: 960527, Reference Shelves, REF 546.815 R

IRPTC Legal File 1994-1995: Regulations and Guidelines on Pesticides: Volume 1

New York, United Nations, 1996, ISBN:9280715410, 500 pp., Accession No: 960529, Reference Shelves, REF 620.266.1 R

IRPTC Legal File 1994-1995: Regulations and Guidelines on Pesticides: Volume 2

New York, United Nations, 1996, ISBN:9280715429, 436 pp., Accession No: 960530, Reference Shelves, REF 620.266.1 R

IRPTC Legal File 1994-1995: Regulations and Guidelines on Pesticides: User's Guide

New York, United Nations, 1996, ISBN:9280715437, 128 pp., Accession No: 960531, Reference Shelves, REF 620.266.1 R

Manual of Environmental Policy: the EC and Britain

Haigh, N. (ed.), London, Cartermill Publishing, 1996, ISBN:1860670369, Accession No: 960576, Reference Shelves, REF 628.5.008.1 R

Natural Antioxidants and Food Quality in Atherosclerosis and Cancer Prevention: RSC Special Publication No. 181

Kumpulainen, J. T. *et al* (eds.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854047121, 449 pp., Accession No: 960545, West Gallery, 615.7:061.3

Natural Selection of the Chemical Elements: Environment and Life's Chemistry

Williams, R. J. P. *et al*, Oxford, OUP, 1996, ISBN:0198558430, 646 pp., Accession No: 960612, Reading Room, 546:628.5

Occurrence and Fate of Blue-Green Algal Toxins in Freshwaters

London, HMSO, 1996, ISBN:0113101120, 32 pp., Accession No: 960361, West Gallery, 626.881

Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival? - a Scientific Detective Story

Colborn, T. *et al*, Boston, Little, Brown & Co, 1996, ISBN:0316875465, 306 pp., Accession No: 960490 West Gallery, 628.5:661

Patty's Industrial Hygiene and Toxicology: Volume 3, Part a, 3rd edition

New York, John Wiley, 1995, ISBN:0471530662, 849 pp., Accession No: 960357, West Gallery, 615.9

Patty's Industrial Hygiene and Toxicology: Volume 3, Part b, 3rd edition

New York, John Wiley, 1996, ISBN:0471530654, 765 pp., Accession No: 960358, West Gallery, 615.9

Pollution: Causes, Effects and Control, 3rd edition

Harrison, R. M. (ed.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854045341, 480 pp., Accession No: 960584, West Gallery, 628.52

Reduction of Nitrogen Oxide Emissions: ACS Symposium Series No. 587

Washington, ACS, 1995, ISBN:0841231508, 237 pp., Accession No: 960498, West Gallery, 661.98:628.5:061.3

Regulatory Toxicology

Chengelis, C. P. *et al* (eds.), New York, Raven Press, 1995, ISBN:0781701910, 239 pp., Accession No: 960437, Reference Shelves, REF 331.14:615.9 R

Released Substances and their Dispersion in the Environment: Guidance for Applicants for Process Authorisation under Integrated Pollution Control

London, HMSO, 1996, ISBN:0117020109, 136 pp., Accession No: 960375, West Gallery, 614.7:628.5

Royal Commission on Environmental Pollution: Nineteenth Report: Sustainable Use of Soil

London, HMSO, 1996, ISBN:0101316526, 260 pp., Accession No: 960384, West Gallery, 628.515

Simple Guide on Management and Control of Wastes

Cambridge, Royal Society of Chemistry, 1996, ISBN:0854049908, 61 pp., Accession No: 960447, West Gallery, 628.5:622'17

Special Waste Regulations 1996

London, HMSO, 1996, ISBN:0110545656, 29 pp., Accession No: 960373, SI 1996/972

This Common Inheritance: UK Annual Report 1996

London, HMSO, 1996, ISBN:0101318820, 163 pp., Accession No: 960364, REF 06.055.5:628.5 R

Toxic Impacts of Wastes on the Aquatic Environment: RSC Special Publication No. 193

Tapp, J. F. *et al* (eds.), Cambridge, Royal Society of Chemistry, 1996, ISBN:0854047816, 295 pp., Accession No: 960636, Reading Room, 547.64:625.8:061.3

Waste Management Licensing (Amendment) Regulations 1996

London, HMSO, 1996., ISBN:0110547055, 2 pp., Accession No: 960392, SI 1996/1279

Waste Management Licensing (Scotland) Regulations 1996

London, HMSO, 1996, ISBN:0110553489, 3 pp., Accession No: 960372, SI 1996/916(S.100)

Waste Management Regulations 1996

London, HMSO, 1996, ISBN:0110543246, 6 pp., Accession No: 960391, SI 1996/634

World Resources 1996-1997

OUP Inc, USA, 1996, ISBN:019521160X, 365 pp., Accession No: 960597, Reference Shelves, REF 628.5:339.5 R

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