Inhalt

FATTY-ACID

FATTY-ACID METHYLESTER DISSOLVED IN SEAWATER AND ASSOCIATED WITH SUSPENDED PARTICULATE MATERIALM.
Ehrhardt, C. Osterroht and G. Petrick
Mar. Chem., 10: 67-76 1980

Evidence for dissolution of fatty acids in sediment traps:Impact on flux estimates
Arne Koerzinger, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Journal of Geophysical Resarch, Vol.99, No.C2, pp 3407-3415,1994

Geochemistry

Methane and Methane Carbon Isotope Ratios in the Northeast Atlantic including the Mid-Atlantic Ridge (50°N)
R.Keir, J.Greinert, M.Rhein, G.Petrick, J.Sueltenfuss, and K.Fürhaupter
submitted to Deep Sea Resarch

Hydrocarbon

Aliphatic hydrocarbons in particulate matter from the Baltic Sea
C. Osterroht and G. Petrick
Mar. Chem., 11: 55-70

Seasonal variation of particulate hydrocarbons in relation to biological parameter
C. Osterroht and G. Petrick and A.Wenck
Mar. Chem., 14: 175-194

The sensitized photo- oxidation of n- Pentad cane as a model for abiotic decomposition of aliphatic hydrocarbons in seawater
M. Ehrhardt and G. Petrick
Mar. Chem., 16: 227-238

PAH

Vertical Profile of Polychlorinated Dibenzo-p-dioxins, Dibenzofurans, Naphthalene's, Biphenyls, Polycyclic Aromatic Hadrocarbons and Alkylphenols in a Sediment Core from Tokyo Bay, Japan
N.Yamashita, K.Kannan, T.Imagawa, D.Villeneuve, S.Hashimoto, A.Miyazaki and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

PCB

Multidimensional Gas Chromatography with Electron Capture Detection for the Determination of Toxic Congeners in Polychlorinated Bipenyl Mixtures
Jan C. Duinker, Detlef E. Schulz and Gert Petrick
Analytical Chemestry, 1988, 60 478

Selction of Chlorinated Biphenyl Congeners for Analysis in Environmental Samples
Jan C. Duinker, Detlef E. Schulz and Gert Petrick
Marine Pollution Bulletin, Volume 19, No.1, pp. 19-25, 1988

Chlorinted Biphenyls in North Atlantic Surface and Deep Water
Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Marine Pollution Bulletin, Volume 19, No 10, pp 526-531, 1988

Clean-up of environmental samples by high-performance liquid chromatography for analysis of organochlorine compounds by gas chromatography with electron-capture detection
Gert Petrick Detlef E. Schulz and Jan C. Duinker
Journal of Chromatography, 435 (1988) 241-248

Complete Characterization of Polychlorinated Biphenyl Congeners in Commercial Aroclor and Chlophen Mixtures by Multidimensional Gas Chromatography-Electron Capture Detection
Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Science and Technology, Vol. 23 Page 852, July 1989

Analysis and Interpretation of Chlorobiphenyls: Possibilities and Problems
Jan C. Duinker, Detlef E. Schulz and Gert Petrick
Chemosphere, Vol.23, Nos.8-10, pp 1009-1028, 1991

A Comparison between Activated Charcoals and Multidimensional GC in The Separation and Determination of (non-Ortho CL Substituted) Toxic Chlorobiphenyls
Narayanan Kannan, Gert Petrick, Detlef E. Schulz and Jan C. Duinker
Chemosphere, Vol.23, Nos.8-10, pp1055-1076, 1991

Polychlorinated biphenyls in North Sea water
Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Marine Chemestry, 36 (1991) 365-384

High Resolution PCN Analysis of Kanochlor, Phenochlor and Sovol Mixtures using Multidimensional Gas Chromatogrphy
Narayanan Kannan, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Intern. J. Environ. Anal. Chem. Vol.47, pp.201-215, 1992

Analyses of polychlorinated biphenyls and organic contaminants in drinking water
Gert Petrick Detlef E. Schulz and Jan C. Duinker
Z. Wasser- Abwasser- Forsch. 25,115-121 (1992)

Chlorinated Biphenyls in Open Ocean Wares: Sampling, Extraction, Clean-Up and Instrumental Determination
Jan C. Duinker, Detlef E. Schulz and Gert Petrick
Intergovernmental Oceanographic Commision, No.27, UNESCO 1993

Distribution of individual chlorobiphenyls (PCB) in solution and suspension in the Baltic Sea
Detlef E. Schulz, Gert Petrick, Narayanan Kannan and Jan C. Duinker
Marine Chemistry 48 (1995) 245-270

Chlorobiphenyls: Model Compounds for Metabolism in Food Chain Organisms and Their Potential Use as Ecotoxicological Stress Indicators by Application of the Metabolic Slope Concept
Narayanan Kannan, Thorsten B.H. Reusch, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Environmental Science and Technology, Vol.29, 1995

Chlorinated Biphenyls in Marine Environmentr: Recenr Advances in Sampling, Determination and Data Interpretation
Narayanan Kannan, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
International Conference on Pollution Processes in Coastel Environments, Argentinia 1995

CB Pattern in the Harbour Porpoise: Bioaccumulation, Metabolism and Evidence for Cytochrome P450 IIB Activity
Regina Bruhn, Narayanan Kannan, Gert Petrick, Detlef E. Schulz and Jan C. Duinker
Chemosphere, Vol.31, No.7, 3721-3732, 1995

Chlorinated Biphenyls and p,p-DDE in Mediterrean Surface Waters
Detlef E. Schulz, Gert Petrick, Hergen Johannsen and Jan C. Duinker
CROATICA CHEMICA ACTA No. 70, 309-321, 1997

Mass balance calculation of chlorinated biphenyls into the Oderhaff
Blanz Thomas, Emeis Kay, Petrick Gert, D.E. Schulz- Bull
Meyniana, 49, 47-58, 1997

Polychlorinatred Biphenyls and Nonylphnols in the Sea of Japan
Narayanan Kannan, Nobuyoshi Yamashita, Gert Petrick and Jan C. Duinker
Environ. Sci. Technol. 1998, 32, 1747-1753

Chlorobiphenyls (PCB) and PAHs in water masses of the northern North Atlantic
Detlef E. Schulz, Gert Petrick,Regina Bruhn and Jan C. Duinker
Marine Chemistry 61 (1998) 101-114

Structure-Dependent Separation Method for Non-Ortho PCBs with Matrix- Interated Quality Control: A Multidimensional Analytical Approach
Narayanan Kannan, Gert Petrick, Regina Bruhn, Detlef E. Schulz
Chemosphere, Vol.37, No.9-12, pp.2385-2393, 1998

Chlorobiphenyls in suspension and sediment of the southern Baltic Sea: a mass balance calculation sincs the onset of PCB-production
T. Blanz, D.E. Schulz- Bull, Emeis Kay, Petrick Gert and J.C.Duinker
Continental Shelf Resarch 19 (1999) 891-910

Persisten chlorinated organic contaminants in harbour porpoises from the Noeth Sea, the Baltic Sea and Arctic waters
Regina Bruhn, Narayanan Kannan, Gert Petrick, Detlef E. Schulz and J.C. Duinker
The Science of the Total Environment 237/238 (1999) 351-361

Polychlorinated Naphthalenes and Plychlorinated Biphenyls in Fishes from Michigan Waters Including the Grat Lakes
K.Kannan, N.Yamashita, T.Imagawa, W.Decoen, J.Seon Khim, Robert M.Day, Cheryl L.Summer and John P.Giesy
Environmental Science & Technology Vol.34 No.4, 2000

Concentrations and Profiles of Polychlorinated Naphthalene Congeners in Eighteen Technical Polychlorinated Biphenyl Preparations
N. Yamashita, K.Kannan, T. Imagawa, A. Miyzaki and John P. Giesy
Environmental Science & Technology Vol.34 No.19, 2000

Vertical Profile of Polychlorinated Dibenzo-p-dioxins, Dibenzofurans,Naphthalenes, Biphenyls, Polycyclic Aromatic Hadrocarbons and Alkylphenols in a Sediment Core from Tokyo Bay, Japan
N.Yamashita, K.Kannan, T.Imagawa, D.Villeneuve, S.Hashimoto, A.Miyazaki and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

Differentiel Effects of Two Lots of Arochlor 1254: Congener-Specific Analysis and Neurochemical End Points
Prasada Rao S. Kodavnti, Narayanan Kannan, Nobuyoshi Yamashita.
Envitonmental Health Perspectives, Volume 109, Number 11 November, 2001

Polychlorinated Naphthalenes, -Biphenyls, -Dibenzo-p-dioxins, and –Dibenzofurans in Double-Crested Cormorants and Herring Gulls from Michigan Waters of the Great Lakes
K.Kannan, K.Hilscherova, T.Imagawa, N.Yamashita, Lisa L. Williams and John P. Giesy
Environ. Sci. Technol. 2001, 35 441-447

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubek, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita Kenneth M.Aldous
Environmental Pollution 126 (2003) 169-178

Polychlorinated Naphthalene Contamination of Some Recently Manufactured Industrial Products and Commercial Goods in Japan
N.Yamashita, S.Taniyasu, N.Hanari, and J.Falandysz
Journal of Environmental Science and Health: Vol. A38, No.9, 1745-1759, 2003

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubeb, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita, K.Aldous
Environmental Pollution 126 (2001) 169-178

Ecological Risk Assessment Using High Resolution Analysis of Polychlorinated Biphenyls (PCBs)
Narayanan KANNAN1 and Gert PETRICK2
xSouth Sea Research Institute, Korea Ocean Research and Development Institute,
391 Jangbuk-ri, Jangmok-myon, Geoje, Republic of Korea
2Leibniz-Institut fiir Meereswissenschaften (IFM-GEOMAR),
Dusternbrooker Weg 20, 24105 Kiel, Germany
(Received 10 January 2009; accepted 11 March 2009)

Polychlorinated biphenyls (PCBs) in Common Eider (Somateria mollissma L.) from North and Baltic Sea Coasts of Germany
Narayanan Kannan1*, Gert Petrick2 and Roland Kallenborn3
1 South Sea Research Institute, Korea Ocean Research and Development Institute,
391 Jangbuk-ri, Jangmok-myon, Geoje, Republic of Korea
2 Leibniz-Institut für Meereswissenschaften (IFM-GEOMAR), Düsternbrooker Weg 20,
24105 Kiel, Germany
3 University Centre in Svalbard, Environmental Technology, P.O. Box 154, NO – 9171,
Longyearbyen, Norway.
(Received 10 January 2009; accepted 11 March 2009)

PCDD

Vertical Profile of Polychlorinated Dibenzo-p-dioxins, Dibenzofurans, Naphthalene's, Biphenyls, Polycyclic Aromatic Hadrocarbons and Alkylphenols in a Sediment Core from Tokyo Bay, Japan
N.Yamashita, K.Kannan, T.Imagawa, D.Villeneuve, S.Hashimoto, A.Miyazaki and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

Vertical Profiles of Dioxin-like and Estrogenic Activities associated with a Sediment Core from Tokyo Bay, Japan
K.Kannan, D.Villeneuve, N.Yamashita, T.Imagawa, S.Hashimoto, and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

Polychlorinated Naphthalenes, -Biphenyls, -Dibenzo-p-dioxins, and –Dibenzofurans in Double-Crested Cormorants and Herring Gulls from Michigan Waters of the Great Lakes
K.Kannan, K.Hilscherova, T.Imagawa, N.Yamashita, Lisa L. Williams and John P. Giesy
Environ. Sci. Technol. 2001, 35 441-447

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubek, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita Kenneth M.Aldous
Environmental Pollution 126 (2003) 169-178

Polychlorinated Naphthalene Contamination of Some Recently Manufactured Industrial Products and Commercial Goods in Japan
N.Yamashita, S.Taniyasu, N.Hanari, and J.Falandysz
Journal of Environmental Science and Health, Vol. A38, No.9, 1745-1759, 2003

Dioxin-Like compounds in pine needles around Tokyo Bay, Japan in 1999
N. Hanari, Y.Horii, T.Okazawa, J.Falandysz, I.Bochentin, A.Orlikowska, T. Puzyn, B.Wyrzykowska and N.Yamashita
J. Environ. Mental., 2004, 6, 305-312

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubeb, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita, K.Aldous
Environmental Pollution 126 (2001) 169-178

PCN

Polychlorinated Naphthalenes and Plychlorinated Biphenyls in Fishes from Michigan Waters Including the Grat Lakes
K.Kannan, N.Yamashita, T.Imagawa, W.Decoen, J.Seon Khim, Robert M.Day, Cheryl L.Summer and John P.Giesy
Environmental Science & Technology Vol.34 No.4, 2000

Concentrations and Profiles of Polychlorinated Naphthalene Congeners in Eigtheen Technical Polychlorinated Biphenyl Preparations
N. Yamashita, K.Kannan, T. Imagawa, A. Miyzaki and John P. Giesy
Environmental Science & Technology Vol.34 No.19, 2000

Vertical Profile of Polychlorinated Dibenzo-p-dioxins, Dibenzofurans, Naphthalene's, Biphenyls, Polycyclic Aromatic Hadrocarbons and Alkylphenols in a Sediment Core from Tokyo Bay, Japan
N.Yamashita, K.Kannan, T.Imagawa, D.Villeneuve, S.Hashimoto, A.Miyazaki and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

Polychlorinated Naphthalenes, -Biphenyls, -Dibenzo-p-dioxins, and –Dibenzofurans in Double-Crested Cormorants and Herring Gulls from Michigan Waters of the Great Lakes
K.Kannan, K.Hilscherova, T.Imagawa, N.Yamashita, Lisa L. Williams and John P. Giesy
Environ. Sci. Technol. 2001, 35 441-447

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubek, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita Kenneth M.Aldous
Environmental Pollution 126 (2003) 169-178

Polychlorinated Naphthalene Contamination of Some Recently Manufactured Industrial Products and Commercial Goods in Japan
N.Yamashita, S.Taniyasu, N.Hanari, and J.Falandysz
Journal of Environmental Science and Health, Vol. A38, No.9, 1745-1759, 2003

Concentrations and Fluxes of Chloronaphthalenes in Sediment from Lake Kitaura in Japan in Past 15 Centuries
Y.Horii, J.Falandysz, N.Hanari, P.Rostkowski, T.Puzym, M.Okada, K.Amano, T. Naya, S.Taniyasu and N.Yamashita
Journal of Environmental Science and Health Vol. A39, No.3, pp. 587-609, 2004

Isomer-specific analysis of chlorinated biphenyls, naphthalenes and dibenzofurans in Delor: polychlorinated biphenyl preparations from the former Czechoslovakia
S.Taniyasu, K.Kannan, I.Holoubeb, A.Ansorgova, Y.Horii, N.Hanari, N.Yamashita, K.Aldous
Environmental Pollution 126 (2001) 169-178

Separation of closely eluting chloronaphthalene congeners by two-dimensional gas chromatography/quadrupole mass spectrometry:
An advanced tool in the study and risk analysis of dioxin-like chloronaphthalenes
a Nobuyasu Hanaria, b Jerzy Falandyszb, c Takeshi Nakanoc, d Gert Petrick, d Nobuyoshi Yamashitae
a National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology (NMIJ/AIST), 1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan
b University of Gda´nsk, 63 Wita Stwosza Street, Gda´nsk, 80-952, Poland
c Research Center for Environment Preservation, Osaka University, 2-5 Yamadaoka, Suita, Osaka 565-0871, Japan
d Department of Marine Chemistry, Leibniz-Institute of Marine Sciences, 20 Dusternbrooker Weg, Kiel D-24105, Germany
e Research Institute for Environmental Management Technology, National Institute of Advanced Industrial Science and Technology (EMTECH/AIST), 16-1 Onogawa, Tsukuba,Ibaraki305-8569,Japan

Pesticides

Chlorinated Biphenyls and p, p- DDE in Mediterranean Surface Waters
Detlef E. Schulz, Gert Petrick, Hergen Johannsen and Jan C. Duinker
CROATICA CHEMICA ACTA No. 70, 309-321, 1997

Petroleum

Ralative Concentration of Dissolved/ Disperded Fossil Fuel Residues in Mediterranean Surface Waters as Measured by UV Fluorescence
Manfred Ehrhardt and Gert Petrick
Marine Pollution Bulletin, Volume 20, No.11 pp.560-565, 1989

On the composition of dissolved and particle-associated fossil fuel resuides in Mediterranean surface water
Manfred Ehrhardt and Gert Petrick
Marine Chemestry, 42 (1993) 57-70

PFO

Analysis of Perfluorinated Acids at Parts-Per-Quadrillion Levels in Seawater Using Liquid Chromatography-Tandem Mass Spectrometry
N. Yamashita, K.Kannan, S. Tanyiasu, Y. Horii, T. Okazawa, G. Petrick, and T. Gamo
Environ. Sci. Technol. 2004, 38 5522 – 5528

A Survey of Perfluorooctane Sulfunate and Related Perfluorinated Organic Compounds in Water, Fish, Birds, and Humans from Japan
S.Taniyasu, K.Kannan, Y.Horii, N.Hanari and N.Yamashita
Environ. Sci. Technol. 2003, 37 2634-2639

Analysis of per fluorinated Acids at Parts-Per-Quadrillion Levels in Seawater Using Liquid Chromatogrphy- Tandem Mass Spectrometry
N. Yamashita, K.Kannan, S. Tanyiasu, Y. Horii, T. Okazawa, G. Petrick, and T. Gamo
Environ. Sci. Technol. 2004, 38, 5522-5528

A Survey of Perfluorooctane Sulfonate and Related Perfluorinated Organic Compounds in Water, Fish, Birds and Humans drom Japan
S. Taniyasu, K.Kannan, Y. Horii, N.Hannari, and N. Yamashita
Environ. Sci. Technol. 2003, 37, 2634-2639

A Global Survey of Perfluorinated Acids in Oceans
N.Yamashita, K.Kannan, S.Taniyasu, Y.Horii, G.Petrick, T.Gamo
For submission: Marine Pollution Bulletin

Perfluorinated Compounds in Costal Waters of Hong Kong, South China and Korea
M.K.So, S.Taniyasu, N.Yamashita, J.P.Gisy, J.Zeng, Z.Fang, S.H.Im and P.I.Am
Environmental. Science& Technol. Vol.38, no.15, 2004

PERFLUOROALKYL SUBSTANCES IN THE MEDITERRANEAN SEA
- IN COMPARISON WITH GLOBAL OCEAN STUDY -
Yamashita N1*, Umehara S1,2, Yamazaki E1, Taniyasu S1, Tanhua T3, Petrick G3, Kannan K4, Gamo T5
1 National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba, Ibaraki, Japan,
2 Faculty of Engineering, Hosei University, Kajino-cho 3-7-2, Koganei, Tokyo, Japan,
3 Helmholtz Centre for Ocean Research (GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany,
4 Wadsworth Center, New York State Department of Health and Department of Environmental Health Sciences, State University of New
York, Albany, NY 12201-0509, USA,
5 Atmosphere & Ocean Research Institute, The University of Tokyo 5-1-5, Kashiwanoha, Kashiwa, Chiba 277-8564, Japan

THE ENVIRONMENTAL ALTERATION OF PERFLUOROALKYL SUBSTANCES BY PHOTOCHEMICAL REACTION

Taniyasu S1*, Yamashita N1, Yamazaki E1, Petrick G2, Kwok KY3, Kannan K4
1 National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba, Ibaraki, Japan,
2 Helmholtz Centre for Ocean Research (GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany,
3 City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China,
4 Wadsworth Center, New York State Department of Health and Department of Environmental Health Sciences, State University of New
York, Albany, NY 12201-0509, USA

Available online at www.sciencedirect.com
ScienceDirect
Chemosphere xxx (2007) xxx–xxx
CHEMOSPHERE
www.elsevier.com/locate/chemosphere

Perfluorinated acids as novel chemical tracers of global circulation of ocean waters

Nobuyoshi Yamashita [a,*], Sachi Taniyasu [a], Gert Petrick [b], Si Wei [c], Toshitaka Gamo [d], Paul K.S. Lam [c], Kurunthachalam Kannan [e]

[a] National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan
[b] Leibniz-Institute of Marine Sciences, Department of Marine Chemistry, Düsternbrooker Weg 20, D-24105 Kiel, Germany
[c] Department of Biology and Chemistry, City University of Hong Kong, Kowloon, Hong Kong, SAR, China
[d] Ocean Research Institute, University of Tokyo, Nakano-ku, Tokyo 164-8639, Japan
[e] Wadsworth Center, New York State Department of Health and Department of Environmental Health Sciences, School of Public Health, State University of New York at Albany, Empire State Plaza, P.O. Box 509, Albany, NY 12201-0509, USA

Received 16 May 2007; received in revised form 19 July 2007; accepted 26 July 2007

PFCs

The environmental photolysis of perfluorooctanesulfonate, perfluorooctanoate, and relatedfluoro chemicals

a Sachi Taniyasua, a Nobuyoshi Yamashitaa, a ErikoYamazakia, b GertPetrick, c Kurunthachalam Kannan,
a National Instituteof AdvancedIndustrial ScienceandTechnology(AIST), 16-1Onogawa, Tsukuba, Ibaraki, Japan
b HelmholtzCentreforOceanResearch(GEOMAR), DüsternbrookerWeg20, 24105Kiel, Germany
c WadsworthCenter, NewYorkStateDepartmentof HealthandDepartmentof Environmental HealthSciences, StateUniversityof NewYork, Albany, NY12201-0509, USA

FLUX OF PERFLUORINATED CHEMICALS THROUGH WET DEPOSITION IN JAPAN, USA, AND SEVERAL OTHER COUNTRIES

KAREN Y. KWOK1,2, SACHI TANIYASU2, LEO W. Y. YEUNG1,2, PAUL K.S.LAM1,**,
YUICHI HORII3, KURUNTHACHALAM KANNAN4, GERT PETRICK5, RAVINDRA K. SINHA6, NOBUYOSHI YAMASHITA2,*

1 State Key Laboratory in Marine Pollution, Department of Biology and Chemistry, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong SAR, China;

2 National Institute of Advanced Industrial Science and Technology (AIST), 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan;

3 Group of Chemical Substances, Center for Environmental Science in Saitama, 914 Kamitanadare, Kisai-machi, Saitama 347-0115, Japan;

4 Wadsworth Center, New York State Department of Health, Department of Environmental Health Sciences, State University of New York at Albany , Empire State Plaza, P.O. Box 509, Albany, NY, 12201-0509 USA;

5 Leibniz-Institute of Marine Sciences, Department of Marine Chemistry, Düsternbrooker Weg 20, D-24105 Kiel, Germany;

6 Environmental Biology Laboratory, Department of Zoology, Patna University, Patna 800 005 India

Sampling

Sampling of dissolved organic material from seawater with reversed- phase techniques
Derenbach, J.B, M. Ehrhardt, C. Osterroht and G. Petrick
Mar. Chem, 6: 351-364

An in-situ filtration/extraction system for the recovery of trace organics in solution and on partikels tested in deep ocean water
Gert Petrick Detlef E. Schulz, Volker Martens and Jan C. Duinker
Marine Chemistry 54 (1996) 97-105

Mass balance calculation of chlorinated biphenyls into the Oderhaff
Blanz Thomas, Emeis Kay, Petrick Gert, D.E. Schulz- Bull
Meyniana, 49, 47-58, 1997

Sampling systems for trace organic substances in sea water and sea ice under arctic conditions
Sven Utschakowski, Detlef E. Schulz, Gert Petrick,
2000

Annual fluxes of particulate chemical trace compounds during the North East Water Polynya experiment.
Schüßler, U., D.E. Schulz-Bull & E. Bauerfeind, 1997
Journal of Marine Systems, 10, 391-400

Sediment

Sea-surface temperatures and the history of monsoon up welling in the northwest Arabian Sea during the last 500.000 years.
Emeis, K.-C., D.A. Anderson, H. Doose, D. Kroon & D.E. Schulz-Bull, 1995.
Quaternary Research, 43, 355-361.

Precision of the current methods to measure the alkenone proxy $U^{K'}_{37}$ and absolute alkenone abundance in sediments: Results of an interlaboratory comparison study
A. Rosell-Melé, E. Bard, K.-C. Emeis, J. O. Grimalt, P. Müller, R. Schneider, I. Bouloubassi, B. Epstein, K. Fahl, A. Fluegge, K. Freeman, M. Goñi, U. Güntner, D. Hartz, S. Hellebust, T. Herbert, M. Ikehara, R. Ishiwatari, K. Kawamura, F. Kenig, J. de Leeuw, S. Lehman, L. Mejanelle, N. Ohkouchi, R. D. Pancost, C. Pelejero, F. Prahl, J. Quinn, J.-F. Rontani, F. Rostek, J. Rullkötter, J. Sachs, T. Blanz, K. Sawada, D. Schulz-Bull, E. Sikes, C. Sonzogni, Y. Ternois, G. Versteegh, J. K. Volkman, and S. Wakeham
G3, Paper number 2000GC000141, Published July 6, 2001

Sediment trap

New type of time- series sediment trap for the reliable collection of inorganic and organic trace chemical substances.
Kremling, K., U. Lentz, B. Zeitzschel, D.E. Schulz-Bull & J.C. Duinker 1996.
Review of Scientific Instruments, 67, 4360-4362.

Azide as a tool to evaluate sediment trap behaviour.
Lundgreen, U., J. Waniek, D.E. Schulz-Bull & J.C. Duinker, 1997.
Deutsche Hydrographische Zeitschrift, 49, 57-69.

Basin-wide particulate carbon flux in the Atlantic Ocean: Regional export patterns and potential for atmospheric CO_2 sequestration Global Biogeochem.
Antia, Avan N. ; Koeve, Wolfgang ; Fischer, Gerhard ; Blanz, Thomas ; Schulz-Bull, Detlef ; Scholten, Jan ; Neuer, Susanne ; Kremling, Klaus ; Kuss, Joachim ; Peinert, Rolf ; Hebbeln, Dirk ; Bathmann, Ulrich ; Conte, Maureen ; Fehner, Uwe ; Zeitzschel,B.2001
Cycles Vol. 15 , No. 4 , p. 845.

Toxic

Structure-Dependent Separation Method for Non-Ortho PCBs with Matrix- Interated Quality Control: A Multidimensional Analytical Approach
Narayanan Kannan, Gert Petrick, Regina Bruhn, Detlef E. Schulz
Chemosphere, Vol.37, No.9-12, pp.2385-2393, 1998

Persisten chlorinated organic contaminants in harbour porpoises from the Noeth Sea, the Baltic Sea and Arctic waters
Regina Bruhn, Narayanan Kannan, Gert Petrick, Detlef E. Schulz and J.C. Duinker
The Science of the Total Environment 237/238 (1999) 351-361

CB Pattern in the Harbour Porpoise: Bioaccumulation, Metabolism and Evidence for Cytochrome P450 IIB Activity
Regina Bruhn, Narayanan Kannan, Gert Petrick, Detlef E. Schulz and Jan C. Duinker
Chemosphere, Vol.31, No.7, 3721-3732, 1995

Chlorobiphenyls: Model Compounds for Metabolism in Food Chain Organisms and Their Potential Use as Ecotoxicological Stress Indicators by Application of the Metabolic Slope Concept
Narayanan Kannan, Thorsten B.H. Reusch, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Environmental Science and Technology, Vol.29, 1995

Toxic Chlorobiphenyls in Adipose Tissue and Whole Blood of an Occupation/Accidentally Exposed Man and the General Polution
Narayanan Kannan, Detlef E. Schulz, Gert Petrick and Jan C. Duinker
Archives of Environmental Health, Vol., 49, No.5, 1994

Vertical Profiles of Dioxin-like and Estrogenic Activities associated with a Sediment Core from Tokyo Bay, Japan
K.Kannan, D.Villeneuve, N.Yamashita, T.Imagawa, S.Hashimoto, and John P.Giesy
Environmental Science & Technology Vol.34 No.17, 2000

Differentiel Effects of Two Lots of Arochlor 1254: Congener-Specific Analysis and Neurochemical End Points
Prasada Rao S. Kodavnti, Narayanan Kannan, Nobuyoshi Yamashita.
Envitonmental Health Perspectives, Volume 109, Number 11 November, 2001

An Automated enantioselective system for the study of estrogenik potencies: Study of the estrogenic activity of hexachlorocyclohexane
S.Hashimoto, T.Yoshimoto, M.Nakao, H.Omura, N.Yamashita, K.Kannan, John P.Giesy
J. Sep. Sci.2003, 26, 903-907

VOC

Oceanic bromoform-sources for the tropical atmosphere
B.Quack, E.Atlas, G.Petrick, V.Stroud, S.Schauffler, D.W.R.Wallace
Geophysical Research Letters, Vol 31, L23SO5, doi: 1029/2004GL020597, 2004

Bromoform and dibromomethane above the Mauritanian up welling: Atmospheric distributions and oceanic emissions
Birgit Quack, Elliot Atlas, Gert Petrick, and Douglas W.R. Wallace
Journal of Geophysical Research, Vol. 112 2007

Bromoform and dibromomethane above the Mauritanian upwelling: Atmospheric distributions and oceanic emissions,
Quack, B., Atlas, E., Petrick, G., Wallace, D.W.R., (**2007**)
Journal of Geophysical Research - Atmospheres, 112, D09312, doi:10.1029/2006JD007614

Oceanic distribution and sources of bromoform and dibromomethane in the Mauritanian upwelling,
Quack, B., Peeken, I., Petrick, G., and K. Nachtigall, (**2007**)
Journal of Geophysical Research - Oceans, 112, C10006, doi:10.1029/2006JC003803

Oceanic bromoform sources for the tropical atmosphere,
Quack, B., Atlas, E., Petrick, G., Schauffler, S., Wallace, D., (**2004**)
Geophysical Research Letters, doi:10.1029/2004GL020597

Seasonal variability of methyl iodide in the Kiel Fjord
Qiang Shi(1), Gert Petrick(1), Birgit Quack(1), Christa Marandino(1), Douglas Wallace(2)
(1) Helmholtz Zentrum für Ozeanforschung Kiel (GEOMAR) Kiel, Germany, Email: qshi@geomar.de, (2) Department of Oceanography, Dalhousie University, Halifax, Canada, Email: Douglas.Wallace@dal.ca

A time-series of incubation experiments to examine the production of CH3I in surface seawater
Qiang Shi(1), Gert Petrick(1), Birgit Quack(1), Christa Marandino(1), Douglas Wallace(2)
(1) Helmholtz Zentrum für Ozeanforschung Kiel (GEOMAR) Kiel, Germany, Email: qshi@geomar.de, (2) Canada Excellence Research Chair in Ocean Science and Technology, Dalhousie University, Halifax, Canada, Email: Douglas.Wallace@dal.ca

Dioxin

USE OF CARBON ISOTOPE COMPOSITIONS OF OCTACHLORINATED DIBENZO-P-DIOXIN (OCDD) AS TRACERS OF NATURAL FORMATION OF DIOXINS IN BALL CLAY

Horii Y1, Kannan K1, Bavel B2, Petrick G3, Nachtigall K3, Miyake Y4, Yamashita N4
1 Wadsworth Center, New York State Department of Health, and State University of New York at Albany, Albany, NY 12201-0509, USA;
2 Örebro University, Örebro, Sweden;
3 Leibniz Institute of Marine Sciences at the University of Kiel, 24105 Kiel, Germany;
4 National Institute of Advanced Industrial Science and Technology, Tsukuba 310-8569, Japan.

ELSEVIER

Available online at www.sciencedirect.com
ScienceDirect
Chemosphere xxx (2007) xxx–xxx

CHEMOSPHERE
www.elsevier.com/locate/chemosphere

Novel evidence for natural formation of dioxins in ball clay

Yuichi Horii [a], Bert van Bavel [b], Kurunthachalam Kannan [a,*], Gert Petrick [c], Kerstin Nachtigall [c], Nobuyoshi Yamashita [d,*]

[a] *Wadsworth Center, New York State Department of Health, and Department of Environmental Health Sciences, School of Public Health, State University of New York at Albany, Empire State Plaza, P.O. Box 509, Albany, NY 12201-0509, USA*
[b] *MTM Research Center, Department of Natural Sciences, Örebro University, 701 82 Örebro, Sweden*
[c] *Leibniz Institute of Marine Sciences at the University of Kiel, Dustembrooker Weg 20, 24105 Kiel, Germany*
[d] *National Institute of Advanced Industrial Science and Technology, 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan*

Received 10 June 2007; accepted 20 July 2007

Semipermeable-Membranen:

Available online at www.ehs.or.kr

TOXEHS

Semi Permeable Membrane Device Reveals Indoor and Outdoor Contamination of Polychlorinated Biphenyls (PCBs)

Narayanan Kannan[1] & Gert Petrick[2]

[1]Oil and POPs Research Group, South Sea Research Institute, Korea Ocean Research and Development Institute, 391 Jangmok-myeon, Geoje 656-830, Korea
[2]Leibniz-Institut für Meereswissenschaften (IFM-GEOMAR), Düsternbrooker Weg 20, 24105 Kiel, Germany
Correspondence and requests for materials should be addressed to N. Kannan (nkannan@kordi.re.kr)

Accepted 2 June 2009

Abstract

Semi Permeable Membrane Device (SPMD) was deployed on an experimental basis for five days inside an Environmental Chemistry Laboratory and two sites outside the building in Kiel, Germany to understand the time-averaged contaminant profiles and concentrations of PCBs. Multi Dimensional High Resolution Gas Chromatography-Electron Capture Detection technique and high resolution clean up techniques were employed to SPMD derived triolein samples. Air concentrations were derived from well established mass transfer coefficients or rate constants for PCBs in SPMD. PCBs profiles in indoor and outdoor samples were distinctly different, exemplified by a particle free clean-up laboratory facility where particle associated higher chlorinated congeners were absent. SPMDs revealed the 'occupational hazard' to workers inside the building from chemical contamination derived from both building materials and chemicals used in the laboratory. Finger printing technique using principle component analysis (PCA) revealed that PCB contamination was derived from German commercial PCB mixtures. SPMD derived air concentrations in outdoor samples resembled levels recorded by similar devices in Europe. Ultimately, a simple sampling technique in combination with high resolution analytical techniques demonstrated the uptake of more than 60 PCB congeners within a short period of time.

Keywords: Passive air samplers, Semi-volatile organochlorines, Health hazard, POPs, Air monitoring, Occupational health

Introduction

Atmospheric transfer of semivolatile organic compounds (SOCs) is an important route of human exposure to chemicals such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs), and various pesticides. These compounds have been implicated in causing a range of health problems in the immune, endocrine, nervous and reproductive systems of animals and humans[1]. Several studies have shown that semipermeable membrane devices (SPMDs) are useful sampling tools for these compounds[2-12]. SPMDs developed by Huckins *et al.*[13] at the U.S. Geological Survey (USGS), Columbia, MO, uses a thin film of the synthetic neutral lipid triolein as the solvent system enclosed in thin-walled (75-90 μm) polyethylene tubing. These USGS SPMDs were initially developed to monitor POP concentrations in water bodies, for which very high replicate reproducibility has been found and sampling rates using constant concentration water exposures have been calculated[14]. Following the discovery of abnormally high concentrations in field and laboratory blanks, the potential of USGS SPMDs for use as passive air samplers was realized[2]. In a laboratory study, it was found that under ambient conditions, a composite of three triolein containing half-standard USGS SPMDs (total of 1.4 g of triolein) could sequester atmospheric polychlorinated biphenyls (PCBs) from 6.5 m^3 of air per day[2]. Since then SPMDs have been successfully deployed in air monitoring studies[2,3,5,6,15-18]. In fact, the linear uptake rates (i.e., volumetric R_ss and k_as) are about a thousand times higher in air than in water. The much larger volumes of air sampled, relative to water, are primarily due to the approximately 10^3 higher diffusion coefficients of vapors relative to aqueous solutes[19].

An experiment was designed in the early development of SPMDs in 1994 to test its potential as an air sampler, especially to understand the indoor pollution of an Environmental chemistry laboratory in Kiel, Germany. SPMDs were deployed in office rooms, in instrumentation room and in particle free clean laboratory where scientists and technicians work. For compara-

An Experimental study of volatile halogcarbon production in seawater

Qiang Shi, Gert petrick, Douglas wallace

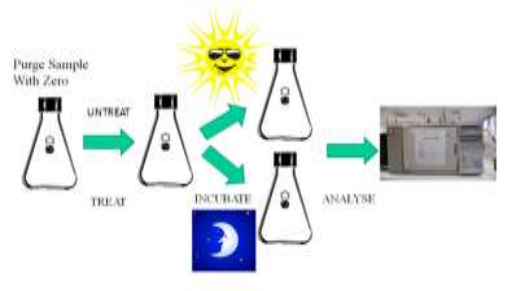
Ifm-geomar, Germany qshi@ifm-geomar.de

IFM-GEOMAR

Abstract:

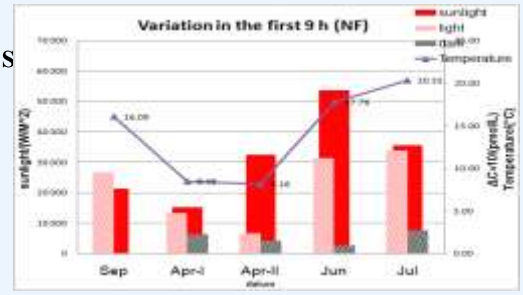
Methyl iodide (CH_3I) and other iodocarbons are major carriers of iodine from the ocean to the atmosphere. CH_3I is highly supersaturated in warm surface seawater [Moore and Groszko, 1999]. Production in the open ocean is via a light-dependent pathway which is not necessarily dependent on biological activity [Richter and Wallace, 2004; Moore and Zafiriou, 1994], Both photochemical [Happell and Wallace, 1998; Yokouchi, 2008] and biological [Smythe-Wright et al., 2006] production mechanisms have been suggested. A set of incubation experiments was designed to identify and quantity the source of methyl iodide in the marine environment.

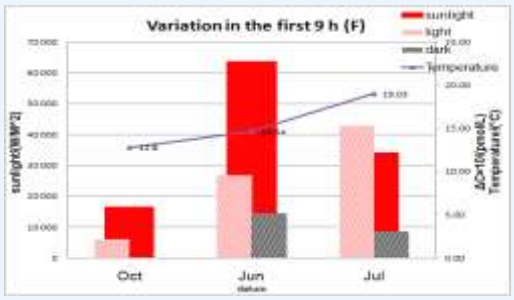
Method:



Quartz-flask incubation :

a) Sea water samples were flushed with synthesis air to remove volatile halocarbon compounds organics (time-zero sample).
b) Samples was filtered step by step through 20 µm membrane , 5 µm membrane and 0.2 µm membrane.
c) Samples incubated in quartz flasks at 50 cm depth (pier side) under natural sunlight or without light.
d) The production rates of compounds are monitored with a purge and trap method.

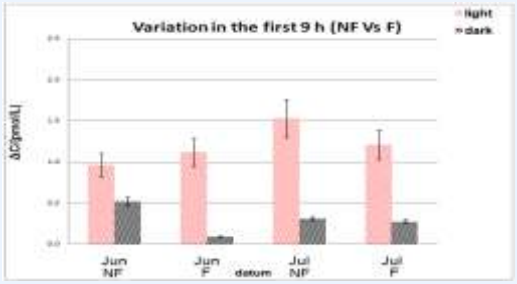




A strong seasonal variation was observed in daytime production

The sunlight as energy plays a role in the production of methyl iodide, and the production rate was correlated with temperature of surface seawater.
Factors affecting daily production rated require further experimental investigation.

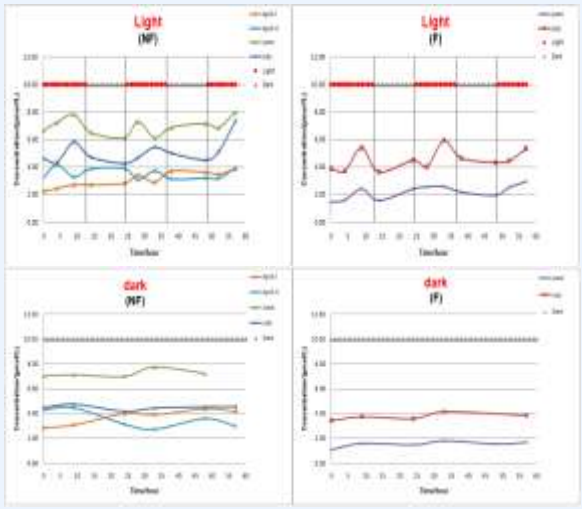
Incubation results (in the first 9 hours):



ΔC :*increasing concentration of CH_3I within the first 9 h*
NF: *non filtered*. **F**: *filtered.*

No significant difference was observed between filtered and non-filtered sample.
Therefore, Production pathway of methyl iodide in marine is not directly biological but rather photochemical.
Samples incubated in the light had higher daily production, compared to samples kept in the dark.

Incubation results (60 hours):



A clear diurnal variation was observed in the light-incubated samples. But removal during the night time was also larger for the samples that had been incubated under daylight.
The net production of methyl iodide over 24 h was low.

Outlook:

In the next stage of my work I will conduct similar experiments from a photochemical buoy deployed in tropical waters off Cape Verde.
And I will do seasonal cycle measurements of iodine species (CH3I, CH2I2, CH2ClI) in Kieler Förde water.