

Characteristics of the abundance of polychlorinated dibenzo-p-dioxin and dibenzofurans, and dioxin-like polychlorinated biphenyls in sediment samples from selected Asian regions in Can Gio, Southern Vietnam and Osaka, Japan

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Abstract: The levels of polychlorinated dibenzo-p-dioxin and dibenzofuran (PCDD/PCDFs), and dioxin-like polychlorinated biphenyls (DL-PCBs) were determined in sediment samples from Can Gio, South Vietnam, and Osaka, Japan. Can Gio is known for the defoliation of its mangrove forests by aerial spraying with Agent Orange during the Vietnam War, whereas Osaka is renowned for a PCDD/PCDF pollution accident at a municipal solid-waste incinerator. For comparison, we also analyzed PCDD/PCDFs and DL-PCBs in sediment samples from Hue and Hanoi, Vietnam. The toxic equivalent quantity (TEQ) values in Can Gio were as high as those in Hue, Hanoi, and suburban areas of Osaka, but much lower than those in urban areas of Osaka. The proportion of the World Health Organization (WHO)-TEQ value contributed by 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (TCDD) in Can Gio was approximately 30%, higher than the values in the other sample areas. These data suggest that residual sedimentary TCDD that originated from aerial spraying of Agent Orange occur in only low concentrations in Can Gio. The main contributors to WHO-TEQ values in Can Gio are natural sources, as in Hue. In contrast, commercial PCBs are the dominant contributors to WHO-TEQ values in Hanoi. In Osaka, agrochemicals used in rice cultivation, the incineration of solid waste, and commercial PCBs equally contributed to WHO-TEQ values at suburban locations. The dumping of incinerator-related materials and/or the inadequate management of commercial PCBs have resulted in significantly elevated WHO-TEQ values of 240-370 ng kg⁻¹ dw at urban locations in Osaka. © 2009 Elsevier Ltd. All rights reserved.

Author Keywords: Agent Orange; Can Gio; Commercial PCBs; Incineration of solid wastes; Natural origin; Osaka

Index Keywords: Aerial spraying; Can Gio; Commercial PCBs; Dibenzo p dioxins; Dibenzofurans; Dioxin-like polychlorinated biphenyls; DL-PCBs; Low concentrations; Mangrove forest; Natural sources; Osaka, Japan; PCDD/PCDFs; Polychlorinated dibenzo-p-dioxins; Polychlorinated dibenzo-p-dioxin and dibenzofuran; Rice cultivation; Sediment samples; Suburban areas; Suburban location; Toxic equivalent quantities; Urban areas; Urban locations; Viet Nam; Vietnam War; Waste incinerator; World Health Organization; Agricultural chemicals; Air pollution; Herbicides; Organic pollutants; Polychlorinated biphenyls; Printed circuits; Refuse incinerators; Sedimentology; Solid wastes; Waste incineration;

polychlorinated biphenyl; polychlorinated dibenzodioxin; polychlorinated dibenzofuran; agrochemical; cultivation; incineration; mangrove; PCB; PCDD; PCDF; sediment pollution; solid waste; suburban area; World Health Organization; article; chemical analysis; controlled study; defoliation; geographic distribution; incineration; Japan; sediment; solid waste; suburban area; urban area; Viet Nam; 2,4,5-Trichlorophenoxyacetic Acid; 2,4-Dichlorophenoxyacetic Acid; Asia; Benzofurans; Geologic Sediments; Incineration; Japan; Polychlorinated Biphenyls; Polymers; Soil Pollutants; Tetrachlorodibenzodioxin; Vietnam; Japan; Polychlorinated Biphenyls; Printed Circuits; Sediments; Solid Wastes; Vietnam; Asia; Eurasia; Far East; Honshu; Japan; Kinki; Osaka [Kinki]; Southeast Asia; Viet Nam

Year: 2010

Source title: Chemosphere

Volume: 78

Issue: 2

Page : 127-133

Cited by: 2

Link: Scopus Link

Chemicals/CAS: 2,4,5-Trichlorophenoxyacetic Acid, 93-76-5; 2,4-Dichlorophenoxyacetic Acid, 94-75-7; Agent Orange, 39277-47-9; Benzofurans; Polychlorinated Biphenyls; Polymers; Soil Pollutants; Tetrachlorodibenzodioxin, 1746-01-6; polychlorodibenzo-4-dioxin; polychlorodibenzofuran

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ISSN: 456535

CODEN: CMSHA

DOI: 10.1016/j.chemosphere.2009.10.003

PubMed ID: 19892385

Language of Original Document: English

Abbreviated Source Title: Chemosphere

Document Type: Article

Source: Scopus

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