THE CONCENTRATIONS OF PCDDS & PCDFS IN THE POWDERED MILK MARKETTED IN KOREA.

Min kyun Kim, Byoung Eog Kim, Young Sik Seoung, Young Sam Sa and Kyung Tae Kim

Environment & Energy Research Center, Research Institute of Industrial Science & Technology, P.O. BOX 135, Pohang, Korea

Introduction

Recently in Korea, dioxins level contained in food have been investigated. However powdered milk for infant was not investigated. The investigation on concentration of PCDDs and PCDFs contained in powdered milk made from cow milk is very important for infant's health. In Korea, intake percent of powdered milk higher than breast milk for infant. In 2000, it was reported the concentration of dioxins in breast milk of Korea was about 0.8pg-TEQ/mL.

Materials and Methods

Chemicals

13C-labled PCDDs and PCDFs compounds were purchased from Cambridge Isotipe Laboratories, MA, USA. Silica gel(100-200mesh) and Aluminum oxide(-150mesh) were purchased from Alltech, IL, USA and Aldrich, WI, USA. All solvents were purified by reflux.

Samples

The powdered milks from 4 companies were collected from market. Three of these were produced in Korea and one was produced in the other country.

Analytical Method

The powdered milk samples were ground to make fine particle. Each powdered milk sample 10g was well mixed with purified anhydrous sodium sulfate 35g. These mixture samples were spiked with fifteen 13C-labeled compound 1.2ng and then extracted with hexane-methylene chloride mixture (1:1, v/v) using accelerated solvent extractor (Dionex ASE200, USA). Extracts were concentrated to about 5mL and then dried by nitrogen gas. These extracts were treated with concentrated sulfuric acid , silica column and alumina column by USEPA 1613 method. Recovery standards 1.2ng was spiked in these extracts.

HRGC/HRMS analysis

PCDDs and PCDFs were analyzed by HRGC/HRMS (GC : HP6890 series(USA), MS : Micromass Autospec-Ultima (UK)). The fused capillary column used was DB-5ms, 0.32 mm i.d. X 60m, 0.25 ㎛ film thickness (J&W Scientific, USA). The column temperature was maintained at 100℃ for 3min., heated to 200℃ at the rate of 20℃/min.. heated to 260℃ at the rate of 3℃/min., and maintained at 260℃ for 22min.. The injection temperature, source temperature and interface temperature were maintained at 260℃. The carrier gas flow pressure was 20 psi. The trap current, electron energy, emission current, filament current and detector voltage were 500 ㎂, 32eV, 0.88 ㎃, 4.32A and 300V, respectively. The concentrated samples 1 ㎕ were injected.

Results and Discussions

Table 1 shows lipid contents contained in powdered milk. As result, lipid contents were 24 ~ 28%.

Table 1 The lipid contents contained in powdered milk.

Company	A	B	C	D
Lipid (%)	26.2	26.0	24.0	28.0

Table 2 shows the concentrations of PCDDs and PCDFs contained in powdered milk marketed in Korea. The PCDDs and PCDFs levels of powdered milk were 0.26 ~ 0.34 and 0.18 ~ 0.42pg-TEQ/g, respectively. The total levels were 0.44 ~ 0.76 pg-TEQ/g. But it was not possible to investigate habitat of cow used in production of powdered milk because all samples were purchased from market. These levels were similar amounts with breast milk of Korean mothers. The recovery percentage of fifteen 13C-labeled compounds were 63 ~ 128.2%.

Table 2 The TEQ levels of PCDDs and PCDFs in powdered milk produced from four companies.

Congener	A	B	C	D
	pg-TEQ/g			
2,3,7,8-TCDD	0.07	0.08	0.09	0.09
1,2,3,7,8-PeCDD	0.13	0.10	0.09	0.08
1,2,3,4,7,8-HxCDD	0.03	0.02	0.02	0.02
1,2,3,6,7,8-HxCDD	0.04	0.03	0.03	0.03
1,2,3,7,8,9-HxCDD	0.05	0.04	0.04	0.04
1,2,3,4,6,7,8-HpCDD	0.01	0.00	0.00	0.00
OCDD	0.01	0.00	0.00	0.00
Total PCDD	0.34	0.27	0.27	0.26
2,3,7,8-TCDF	0.01	0.01	0.01	0.01
1,2,3,7,8-PeCDF	0.01	0.01	0.01	0.01
2,3,4,7,8-PeCDF	0.18	0.11	0.11	0.09
1,2,3,4,7,8-HxCDF	0.05	0.03	0.03	0.03
1,2,3,6,7,8-HxCDF	0.04	0.02	0.02	0.02
2,3,4,6,7,8-HxCDF	0.07	0.03	0.02	0.01
1,2,3,7,8,9-HxCDF	0.03	0.01	0.01	0.01
1,2,3,4,6,7,8-HpCDF	0.02	0.00	0.00	0.00
1,2,3,4,7,8,9-HpCDF	0.01	0.00	0.00	0.00
OCDF	0.00	0.00	0.00	0.00
Total PCDF	0.42	0.22	0.21	0.18
Total	0.76	0.49	0.48	0.44

References

1. Takao Iida et al., Chemosphere, 38(12), 2767, 1999
2. L. Ramos et al., Chemosphere, 38(13), 3141, 1999