

Occupational Exposure to Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans, Dioxin-like Polychlorinated Biphenyls, and Polychlorinated Naphthalenes in Workplaces of Secondary Nonferrous Metallurgical Facilities in China

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Table S1 Recoveries of labeled standards for PCDD/Fs, PCBs and PCNs.

Internal Standard	Recovery Standard	Recovery	
		Workplace	Stack gas
<i>PCDD/Fs</i>			
¹³ C ₁₂ -2378-TCDF	¹³ C ₁₂ -1234-TCDD	50-89%	50-114%
¹³ C ₁₂ -12378-PeCDF ^a	¹³ C ₁₂ -1234-TCDD	89-112%	87-108%
¹³ C ₁₂ -23478-PeCDF	¹³ C ₁₂ -1234-TCDD	69-108%	50-110%
¹³ C ₁₂ -123478-HxCDF	¹³ C ₁₂ -123789-HxCDD	68-87%	89-104%
¹³ C ₁₂ -123678-HxCDF	¹³ C ₁₂ -123789-HxCDD	70-88%	92-107%
¹³ C ₁₂ -234678-HxCDF	¹³ C ₁₂ -123789-HxCDD	53-79%	40-94%
¹³ C ₁₂ -123789-HxCDF ^a	¹³ C ₁₂ -123789-HxCDD	58-70%	72-90%
¹³ C ₁₂ -1234678-HpCDF	¹³ C ₁₂ -123789-HxCDD	74-93%	80-92%
¹³ C ₁₂ -1234789-HpCDF ^a	¹³ C ₁₂ -123789-HxCDD	68-89%	76-97%
¹³ C ₁₂ -2378-TCDD	¹³ C ₁₂ -1234-TCDD	73-91%	83-117%
¹³ C ₁₂ -12378-PeCDD	¹³ C ₁₂ -1234-TCDD	89-116%	81-111%
¹³ C ₁₂ -123478-HxCDD	¹³ C ₁₂ -123789-HxCDD	71-108%	73-103%
¹³ C ₁₂ -123678-HxCDD	¹³ C ₁₂ -123789-HxCDD	65-94%	73-112%
¹³ C ₁₂ -1234678-HpCDD	¹³ C ₁₂ -123789-HxCDD	95-115%	58-92%
¹³ C ₁₂ -OCDD	¹³ C ₁₂ -123789-HxCDD	96-120%	57-89%
<i>PCBs</i>			
¹³ C ₁₂ -CB77	¹³ C ₁₂ -CB52	61-99%	68-82%
¹³ C ₁₂ -CB81	¹³ C ₁₂ -CB52	62-93%	70-81%

¹³ C ₁₂ -CB105	¹³ C ₁₂ -CB101	50-79%	92-110%
¹³ C ₁₂ -CB114	¹³ C ₁₂ -CB101	46-90%	74-86%
¹³ C ₁₂ -CB118	¹³ C ₁₂ -CB101	55-95%	91-104%
¹³ C ₁₂ -CB123	¹³ C ₁₂ -CB101	48-97%	88-98%
¹³ C ₁₂ -CB126	¹³ C ₁₂ -CB101	59-99%	89-101%
¹³ C ₁₂ -CB156	¹³ C ₁₂ -CB138	54-111%	93-107%
¹³ C ₁₂ -CB157	¹³ C ₁₂ -CB138	45-84%	70-81%
¹³ C ₁₂ -CB167	¹³ C ₁₂ -CB138	44-73%	70-82%
¹³ C ₁₂ -CB169	¹³ C ₁₂ -CB138	54-73%	70-83%
¹³ C ₁₂ -CB189	¹³ C ₁₂ -CB194	40-68%	50-57%
<i>PCNs</i>			
¹³ C ₁₀ -CN27	¹³ C ₁₂ -CN64	46-96%	43-97%
¹³ C ₁₀ -CN42	¹³ C ₁₂ -CN64	57-108%	50-105%
¹³ C ₁₀ -CN52	¹³ C ₁₂ -CN64	55-110%	78-110%
¹³ C ₁₀ -CN67	¹³ C ₁₂ -CN64	60-112%	49-83%
¹³ C ₁₀ -CN73	¹³ C ₁₂ -CN64	52-86%	62-105%
¹³ C ₁₀ -CN75	¹³ C ₁₂ -CN64	61-105%	68-115%

^a Sampling standard in the stack gas samples.

Table S2 Relative potency factors (RPFs) of the dl-PCN congeners summarized by Noma et al.¹.

PCN congener	RPFs	PCN congener	RPFs
CN48/35	2.1×10^{-5}	CN64/68	1.0×10^{-3}
CN38/40	8.0×10^{-6}	CN69	2.0×10^{-3}
CN50	6.8×10^{-5}	CN71/72	3.5×10^{-6}
CN54	1.7×10^{-4}	CN63	2.0×10^{-3}
CN57	1.6×10^{-6}	CN70	1.1×10^{-3}
CN56	4.6×10^{-5}	CN73	3.0×10^{-3}
CN66/67	2.5×10^{-3}		

(1) Noma, Y.; Yamamoto, T.; Sakai, S. I., Congener-specific composition of polychlorinated naphthalenes, coplanar PCBs, dibenzo-p-dioxins, and dibenzofurans in the halowax series. *Environ. Sci. Technol.* **2004**, *38*, (6), 1675-1680.

Table S3 PCDD/F, PCB and PCN concentrations in stack gas of plants investigated (pg/m³).

		PCDD/Fs			PCBs		PCNs ^a	
		Σ2378-PCDD/Fs	ΣWHO-TEQ	ΣI-TEQ	Σdl-PCBs	ΣWHO-TEQ	ΣPCNs	ΣTEQ
SeCu	TY	2671	135	158	3820	41.1	39719	16.9
	CX	2950	421	466	9584	57.2	404776	12.5
	YD	143	10.1	12.1	996	8.04	62411	3.90
SeAl	SC	1708	107	123	7010	6.23	127644	28.0
	QY	1364	88.7	107	24124	6.36	165438	1.97
	HY	626	48.3	54.4	1784	4.29	237580	1.77
	TF	143	11.5	13.5	8838	3.95	20772	0.622
SePb	JA	40.2	2.20	2.46	94.1	0.383	3374	0.130

^a Includes tri- to octa-chlorinated PCNs.

Table S4 The concentrations of PCDD/Fs and dl-PCBs in workplace air of plants investigated (pg/m³).

PCDD/Fs	TY	CX	YD	SC	QY	HY	TF	JA
2378-TCDF	6.00	8.03	0.37	6.29	0.52	1.14	3.95	0.30
12378-PeCDF	13.6	17.2	0.42	9.83	0.32	1.52	2.50	0.36
23478-PeCDF	32.3	17.9	0.68	19.7	0.44	1.33	3.62	0.53
123478-HxCDF	41.2	49.7	0.75	35.5	0.33	1.53	2.57	0.71
123678-HxCDF	46.0	39.7	0.71	33.1	0.30	1.20	2.98	0.63
234678-HxCDF	87.8	44.0	0.99	43.4	0.34	0.94	4.93	0.85
123789-HxCDF	3.42	2.27	0.037	3.71	0.042	0.079	0.26	0.13
1234678-HpCDF	233	273	4.59	177	0.69	2.11	7.93	3.25
1234789-HpCDF	35.0	52.8	0.54	44.5	0.17	0.26	1.88	0.43
OCDF	167	757	7.83	155	0.45	1.11	5.95	2.52
2378-TCDD	0.62	0.58	0.041	0.18	0.034	0.14	0.41	0.040
12378-PeCDD	3.73	2.65	0.091	0.68	0.071	0.32	1.52	0.11
123478-HxCDD	3.70	2.56	0.060	0.61	0.034	0.11	0.87	0.091
123678-HxCDD	8.64	4.70	0.11	1.23	0.068	0.16	2.29	0.21
123789-HxCDD	4.29	3.22	0.053	0.83	0.038	0.097	1.10	0.12
1234678-HpCDD	50.0	31.7	0.76	7.22	0.32	0.47	8.01	0.97
OCDD	63.6	96.8	2.89	17.9	1.11	0.84	7.27	1.48
Σ WHO1998-TEQ	44.5	32.1	0.86	26.0	0.52	1.75	5.94	0.78
Σ WHO2005-TEQ	37.8	28.4	0.72	21.9	0.43	1.46	5.17	0.67
Σ I-TEQ	42.8	31.5	0.82	25.8	0.49	1.60	5.19	0.73

PCBs	TY	CX	YD	SC	QY	HY	TF	JA
PCB-77	9.65	5.67	1.66	46.6	40.6	1.89	32.4	1.44
PCB-81	6.33	2.03	0.95	16.6	34.3	0.85	17.2	0.43
PCB-105	30.7	17.0	5.11	142	131	6.41	176	2.74
PCB-114	14.9	9.07	0.82	21.1	13.7	1.64	17.1	0.87
PCB-118	21.1	29.9	13.0	339	280	11.5	407	6.25
PCB-123	10.4	6.48	2.77	44.2	30.1	1.99	60.3	1.03
PCB-126	47.6	14.2	1.15	8.10	1.40	2.03	6.46	0.65
PCB-156	37.4	14.3	2.67	42.0	24.5	2.75	30.5	0.83
PCB-157	23.3	4.97	0.60	11.1	5.39	0.84	7.48	0.30
PCB-167	9.58	6.91	0.95	25.9	6.79	1.25	11.1	0.32
PCB-169	26.2	5.42	0.37	5.40	0.09	0.47	2.10	0.21
PCB-189	42.2	12.0	0.90	24.1	1.23	0.88	2.28	0.40
Σ WHO1998-TEQ	5.07	1.50	0.12	0.96	0.21	0.21	0.76	0.070
Σ WHO2005-TEQ	5.56	1.59	0.13	1.00	0.17	0.22	0.74	0.072

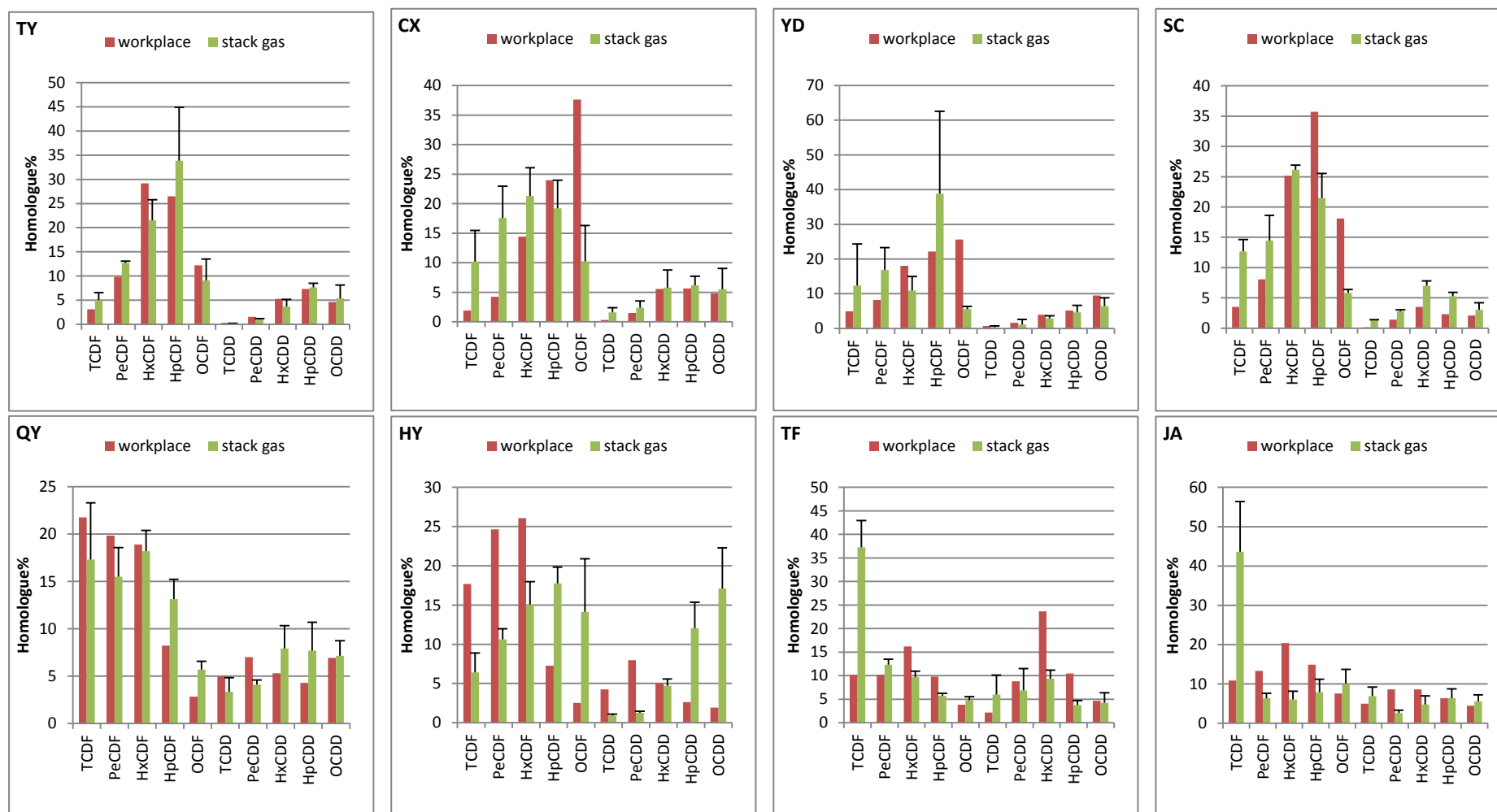


Figure S1 Homolog profiles of PCDD/Fs in workplace air and stack gas from plants investigated.

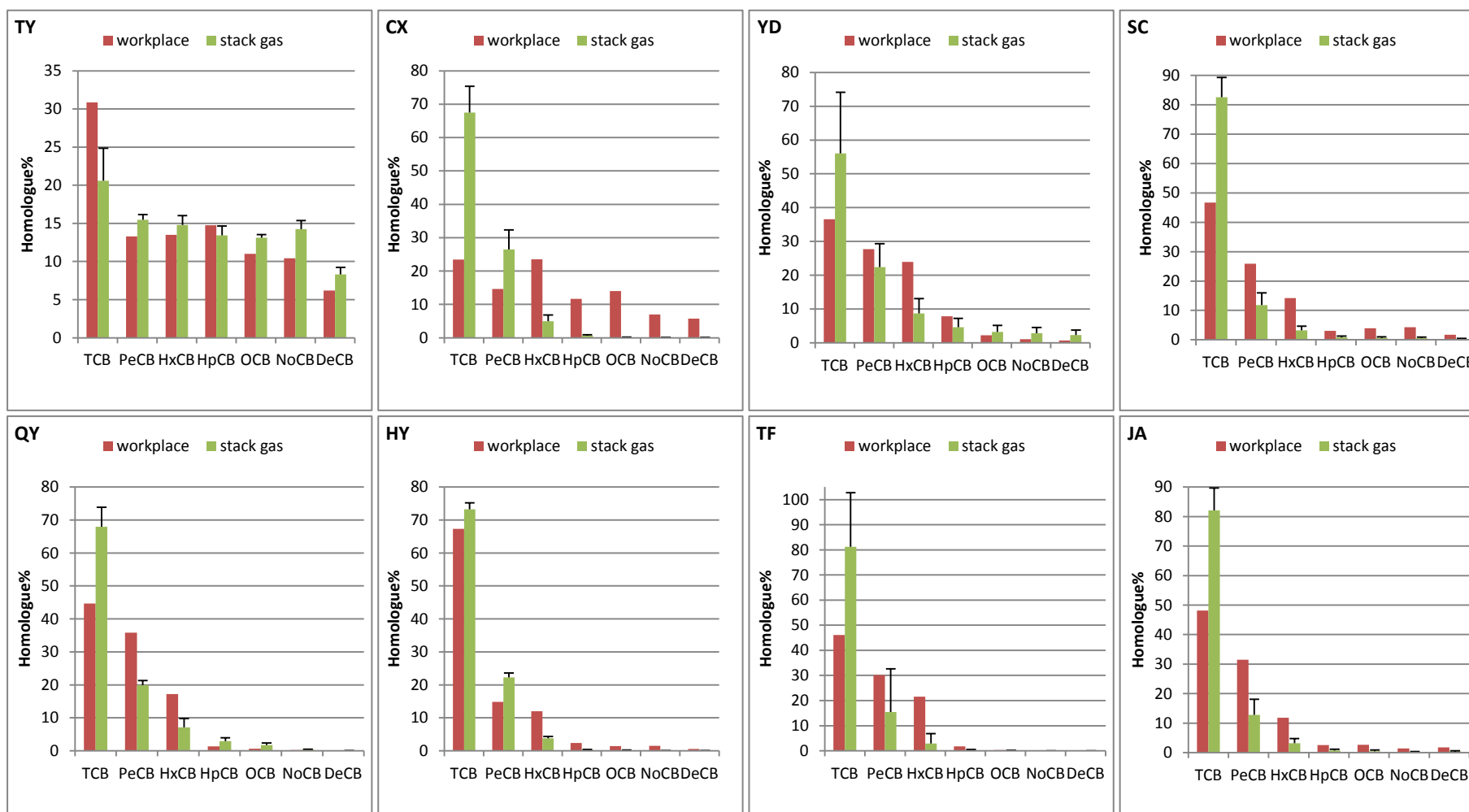


Figure S2 Homolog profiles of PCBs in workplace air and stack gas from plants investigated.

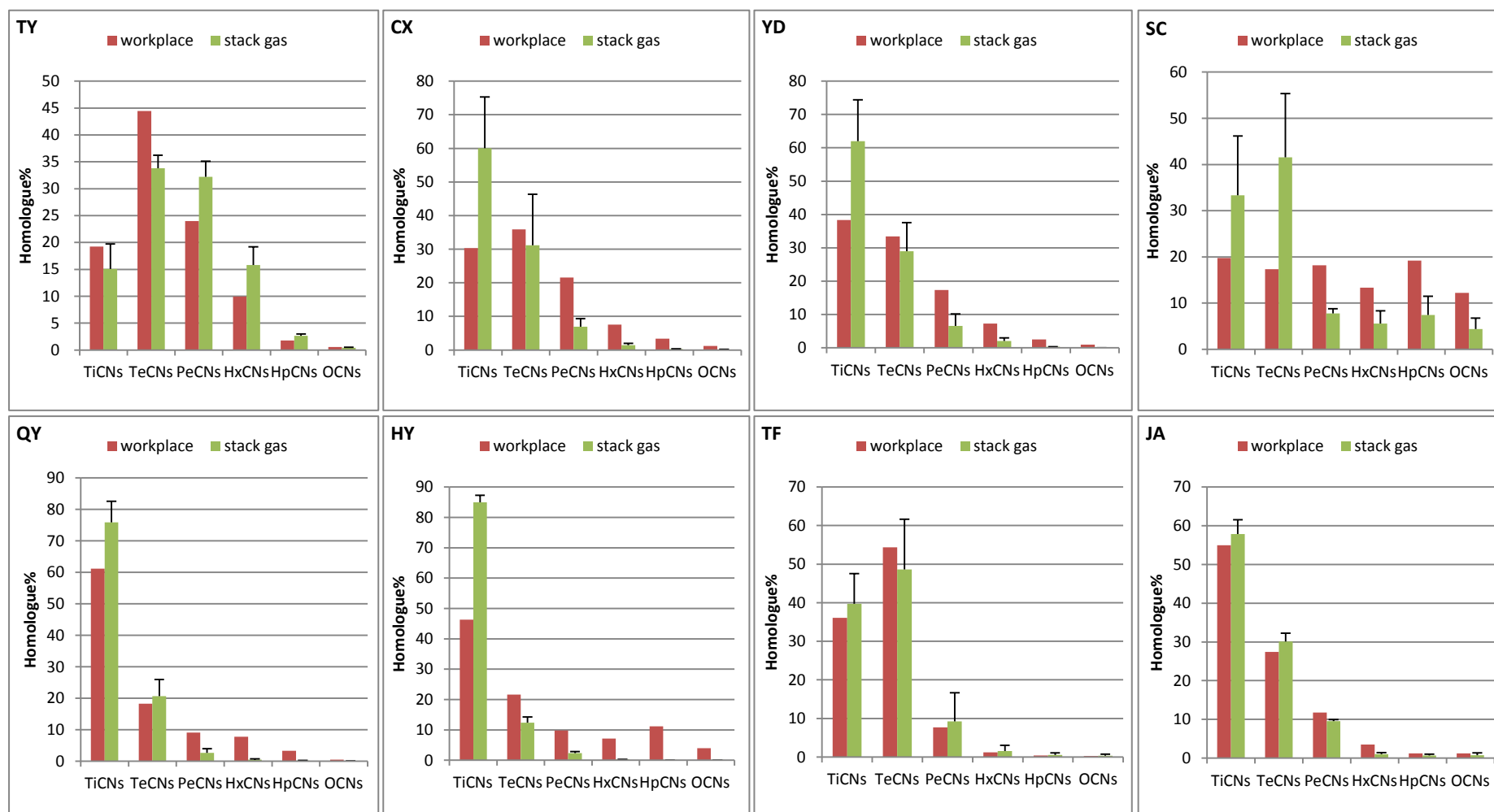


Figure S3 Homolog profiles of PCNs in workplace air and stack gas from plants investigated.