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Apportioning Variability of Polycyclic Aromatic Hydrocarbons (PAHs) and Chlordanes in Indoor and Outdoor Environments

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Electronic Supporting Information

Table S1. Target PAHs and chlordanes measured in RIOPA. CAS = Chemical Abstracts Service; MW = Molecular weight; BP = Boiling point; VP = Vapor pressure.

PAHs	Abbreviation	CAS No.	No. of Rings	MW	BP (°C)	VP (mmHg)
Naphthalene*	NAP	91-20-3	2	128	221	0.159
Acenaphthylene*	ACY	208-96-8	3	152	299	0.002
Acenaphthene*	ACE	83-32-9	3	154	279	0.007
Fluorene*	FLR	86-73-7	3	166	294	0.003
1-Methyfluorene*	1MFL	1730-37-6	3	180	314	0.00091
Dibenzothiophene	DBT	132-65-0	3	184	333	0
Phenanthrene	PHE	85-01-8	3	178	337	0
Anthracene	ANT	120-12-7	3	178	337	0
2-Methylanthracene	2MA	613-12-7	3	192	354	7.27E-05
1-Methylanthracene	1MA	610-48-0	3	192	363	3.89E-05
1-Methylphenanthrene	1MP	832-69-9	3	192	354	7.27E-05
9-Methylanthracene	9MA	779-02-2	3	192	347	0
4,5-Methylenephenanthrene	4,5MP	203-64-5	4	190	353	7.52E-05
3,6-Dimethylphenanthrene	3,6DMP	1576-67-6	3	206	363	3.89E-05
9,10-Dimethylanthracene	9,10DMA	781-43-1	3	206	371	2.30E-05
Fluoranthene	FLT	206-44-0	4	202	375	0
Pyrene	PYR	129-00-0	4	202	404	0
Benzo[a]fluorene	BaFLR	238-84-6	4	216	398	3.43E-06
Retene	RET	483-65-8	3	234	392	0
Benzo[b]fluorene	BbFLR	243-17-4	4	216	398	3.43E-06
Benzo[b]naphtho[2,1-d]thiophene	BNT	239-35-0	4	234	434	2.44E-07
Cyclopenta[c,d]pyrene	CPP	27208-37-3	5	226	438	1.80E-07
Benz[a]anthracene	BaA	56-55-3	4	228	437	0
Chrysene+triphenylene	CHR/TRI	218-01-9	4	228	448	0
		217-59-4	4	228	425	0
Benzo[b+k]fluoranthene	BFLTs	205-99-2	5	252	468	0
			5			
Benzo[e]pyrene	BeP	192-97-2	5	252	468	1.81E-08
Benzo[a]pyrene	BaP	50-32-8	5	252	495	0
Perylene	PER	198-55-0	5	252	468	0
Indeno[1,2,3-c,d]pyrene	IP	193-39-5	6	276	497	1.56E-09
Dibenz[a,c+ah]anthracene	DBA	53-70-3	5	278	525	0
		215-58-7	5	278	518	2.55E-10
Benzo[g,h,i]pyrene	BghiP	191-24-2	6	276	501	0
Coronene	COR	191-07-1	7	300	526	0
Chlordanes						
Oxychlordane	OCD	27304-13-8		424	442	1.33E-07
trans-Chlordane	tCD	5103-74-2		410	425	5.02E-07
cis-Chlordane	cCD	5103-71-9		410	425	5.02E-07
Chlordane MC5	MC5					
trans-Nonachlor	tNC	39765-80-5		444	451	6.53E-08
cis-Nonachlor	cNC	5103-73-1		444	451	6.53E-08

*: These PAHs were not included in the analyses in this paper due to significant breakthrough in PUF sampling.

Table S2. Variance components (in %) of gas-phase PAH concentrations measured in indoor and outdoor air. σ^2_C = between-city variation; σ^2_T = between-tract variation; σ^2_R = between-residence variation; σ^2_S = seasonal variation; σ^2_M = measurement uncertainty; SD = standard deviation. Summary statistics excluded compounds with σ^2_M >20% and PAH sums. Full PAH names are listed in Table S1.

PAHs	Indoors					Outdoors				
	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M
DBT	0.0	35.5	0.0	63.6	0.9	19.1	26.3	0.0	51.5	3.1
PHE	9.2	31.7	0.0	58.7	0.4	28.9	12.7	10.7	47.2	0.4
ANT	2.7	27.8	0.0	66.6	2.9	20.3	13.3	7.7	57.4	1.4
2MA	4.8	0.0	12.8	79.2	3.2	23.0	13.3	0.0	60.6	3.1
1MA	1.6	21.0	0.0	76.8	0.6	23.4	9.8	37.7	26.3	2.8
1MP	10.7	22.6	0.0	65.4	1.3	21.5	20.4	15.5	0.0	42.7
9MA	0.0	16.0	0.4	54.8	28.7	9.1	11.0	0.0	72.3	7.6
4,5MP	3.9	24.5	0.0	67.4	4.3	22.4	9.8	16.0	50.8	1.1
3,6DMP	9.6	24.0	0.0	64.3	2.1	19.6	19.1	31.4	25.8	4.1
9,10DMA	8.4	5.0	42.6	0.0	44.1	12.8	8.3	17.8	6.0	55.0
FLT	12.9	19.8	0.0	61.7	5.5	28.6	11.5	16.9	41.8	1.1
PYR	4.9	23.8	0.0	68.0	3.3	13.8	0.0	34.3	49.5	2.3
BaFLR	18.6	11.1	0.0	66.5	3.8	8.7	2.1	12.7	73.1	3.3
RET	17.4	9.8	0.0	71.5	1.3	27.2	5.7	0.0	48.9	18.2
BbFLR	0.7	13.0	0.0	79.8	6.5	2.8	5.6	2.5	80.2	8.9
BNT	6.1	12.0	0.0	0.0	81.9	8.1	14.4	0.0	68.7	8.8
CPP	0.0	3.8	30.6	58.8	6.7	8.0	14.6	0.0	47.3	30.2
BaA	8.1	5.2	18.5	57.3	10.8	0.0	14.0	0.0	63.6	22.4
CHR/TRI	9.3	21.8	0.0	63.7	5.2	23.8	13.2	0.0	59.9	3.2
ΣPAH34	12.2	29.1	0.0	57.9	0.8	29.7	12.4	20.9	36.5	0.4
ΣPAH567	3.7	3.9	19.2	37.8	35.4	10.2	5.8	18.9	29.3	35.7
ΣPAH	12.3	29.1	0.0	57.8	0.8	29.7	12.4	21.0	36.5	0.4
Summary										
Average	7	18	4	67	4	19	11	11	54	5
SD	6	10	9	7	3	8	6	13	16	5

Table S3. Variance components (in %) of particulate-phase PAH concentrations measured in indoor and out air. Summary statistics excluded compounds with σ^2_M >30% and PAH sums. Otherwise as Table S2.

PAHs	Indoors					Outdoors				
	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M
PHE	38.0	10.9	0.0	49.7	1.4	37.8	6.1	0.0	55.0	1.1
3,6DMP	25.0	15.1	0.0	55.1	4.8	34.0	5.3	0.0	58.4	2.3
FLT	43.5	8.5	0.0	47.9	0.1	44.2	5.1	0.0	50.4	0.2
PYR	29.6	13.8	0.0	55.8	0.7	38.1	0.5	0.0	61.0	0.4
CPP	28.7	5.1	0.0	49.2	17.0	22.0	1.9	0.0	71.5	4.7
BaA	29.2	11.1	0.0	57.6	2.2	33.4	0.6	0.0	49.5	16.6
CHR/TRI	2.1	17.5	0.0	78.7	1.8	16.2	0.0	0.0	83.1	0.6
BFLTs	24.8	14.3	0.0	60.5	0.3	20.6	4.1	0.0	75.0	0.4
BeP	18.4	18.0	7.8	37.0	18.7	22.5	1.7	0.0	75.4	0.4
BaP	10.2	27.2	0.0	55.8	6.8	15.9	5.4	0.0	78.3	0.4
PER	0.7	21.3	5.6	48.8	23.5	10.0	1.8	1.4	0.0	86.8
IP	10.5	17.9	0.0	60.0	11.6	13.7	5.2	0.0	72.1	9.0
DBA	6.3	19.1	0.0	41.0	33.5	0.7	17.2	0.0	64.7	17.4
BghiP	18.9	12.0	0.0	53.7	15.5	18.0	7.4	0.0	70.9	3.7
COR	19.9	15.2	1.4	54.7	8.9	13.4	9.2	0.0	37.0	40.4
ΣPAH34	23.7	14.7	0.0	60.6	1.0	28.6	5.2	0.0	66.0	0.2
ΣPAH567	20.3	17.4	0.0	56.5	5.8	16.6	5.5	0.0	74.5	3.4
ΣPAH	18.5	18.1	0.0	58.6	4.8	21.5	3.8	0.0	73.1	1.6
Summary										
Average	21	15	1	55	8	24	5	0	67	4
SD	12	6	2	9	8	12	4	0	11	6

Table S4. Variance components (in %) of gas-phase chlordane concentrations measured in residential indoor and outdoor air. Summary statistics excluded OCD which had an extremely high σ^2_M. Otherwise as Table S2.

Chlordanes	Indoors					Outdoors				
	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M	σ^2_C	σ^2_T	σ^2_R	σ^2_S	σ^2_M
Indoors										
OCD	0.0	1.6	53.2	0.0	45.2	0.0	12.8	0.0	69.5	17.8
tCD	13.0	9.6	66.1	10.1	1.2	20.3	8.9	14.9	48.6	7.3
cCD	10.3	5.5	62.7	19.1	2.3	20.3	8.0	15.0	47.1	9.5
MC5	16.8	3.5	55.0	19.9	4.8	35.2	4.8	0.0	29.4	30.5
tNC	13.0	0.4	68.8	14.6	3.2	25.8	4.6	16.1	28.7	24.9
cNC	23.6	10.6	32.4	27.5	5.9	41.6	0.0	17.9	30.1	10.4
ΣChlordane	12.2	8.0	66.8	10.6	2.4	21.5	8.6	8.7	55.2	6.0
Summary										
Average	15	6	57	18	3	24	7	10	44	15
SD	5	4	15	7	2	13	4	8	16	9

Figure S1. Schematic chart of the nested design of the RIOPA study.