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Anthropogenic VOCs in Abidjan, southern West Africa: from source quantification to atmospheric impacts

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Table S1. Mean VOC to CO emission ratios (ERs, ppbv per ppmv CO) for each emission source analysed in this study.

	MW ($g\ mol^{-1}$)	SOAP value	k_{OH} value	Mean ER VOC/CO ± SD (ppbv/ppmv)									
				HDDV	**TW 2T**	**TW 4T**	**CH**	**FW**	**CHM**	**WB**	**LDDV**	**LDGV**	**HDDV-T**
benzene	78.11	92.9	1.2	0.42 ± 0.03	53.2 ± 10.7	10.5 ± 4.17	1.76 ± 1.80	1.51	0.94	12.75 ± 8.43	3.06 ± 1.17	1.41 ± 0.25	13.74
toluene	92.14	100	5.6	0.26 ± 0.05	117.6 ± 25	15.9 ± 4.33	0.58 ± 0.43	0.83	0.67	18.1 ± 14.6	1.21 ± 0.57	6.90 ± 3.16	4.62
m+p-xylene	106.16	76.3	19	0.21 ± 0.04	102.1 ± 10	8.32 ± 3.77	0.32 ± 0.18	0.58	0.27	1.96 ± 2.22	0.33 ± 0.04	10.0 ± 0.86	3.26
o-xylene	106.16	95.5	14	0.08 ± 0.02	58.3 ± 15.7	3.22 ± 1.32	0.08 ± 0.06	0.06	0.08	0.03 ± 0.04	0.17 ± 0.05	4.82 ± 1.03	1.08
ethylbenzene	106.17	111.6	7.5	0.07 ± 0.02	59.5 ± 15.9	5.57 ± 2.55	0.29 ± 0.32	0.10	0.09	11.66 ± 8.3	0.25 ± 0.08	2.53 ± 0.75	1.26
styrene	104.15	212.3	43	0.06 ± 0.01	37.5 ± 23.8	2.79 ± 2.03	2.79 ± 0.09	0.16	0.16	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.05
iso-propylbenzene	120.19	95.5	6.6	0.01 ± 0.01	8.32 ± 1.87	0.62 ± 0.43	n.d.	0.01	0.01	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.44
1,3,5-trimethylbenzene	120.19	13.5	60	0.06 ± 0.01	30.1 ± 13.0	0.83 ± 0.35	0.00 ± 0.00	0.02	0.04	0.56 ± 0.57	0.13 ± 0.01	1.32 ± 0.07	0.90
1,2,4-trimethylbenzene	120.19	20.6	32	0.19 ± 0.04	65.6 ± 24.5	2.83 ± 1.25	0.02 ± 0.01	0.02	0.10	0.49 ± 0.41	0.42 ± 0.02	4.29 ± 0.54	4.17
1,2,3-trimethylbenzene	120.19	43.9	29	0.07 ± 0.01	20.8 ± 7.58	0.62 ± 0.27	0.65 ± 0.85	0.21	0.14	0.16 ± 0.15	0.17 ± 0.01	0.73 ± 0.12	1.64
isoprene	68.12	1.9	100	0.02 ± 0.01	3.99 ± 1.88	0.68 ± 0.24	0.07 ± 0.04	1.68	0.22	2.08 ± 2.84	0.04 ± 0.04	0.17 ± 0.15	0.29
hexene	84.16	0	37	n.d.	22.7 ± 6.44	0.35 ± 0.28	0.35 ± 0.11	0.00	0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	1.06
pentane	72.15	0.3	3.8	0.01 ± 0.00	42.6 ± 8.85	3.50 ± 0.55	3.50 ± 0.13	0.07	0.07	n.d.	n.d.	n.d.	0.09
2-methylpentane	86.18	0	5.2	0.02 ± 0.01	73.5 ± 0.43	5.91 ± 4.28	5.91 ± 2.26	0.00	0.00	n.d.	n.d.	n.d.	0.49
3-methylpentane[b]	86.18	0.2	5.2	0.01 ± 0.00	61.2 ± 14.9	3.53 ± 2.48	3.53 ± 3.44	0.42	0.42	n.d.	n.d.	n.d.	0.00
hexane	86.18	0.1	5.2	0.02 ± 0.00	75.1 ± 3.90	5.82 ± 4.21	5.82 ± 1.21	0.01	0.01	n.d.	n.d.	n.d.	0.06
2,2-dimethylpentane	100.21	0	4.77	0.00 ± 0.00	7.21 ± 1.95	0.12 ± 0.09	0.12 ± 0.01	0.16	0.16	n.d.	n.d.	n.d.	0.43
2,4-dimethylpentane[a, b]	100.21	0.3	4.77	0.00 ± 0.00	24.3 ± 2.70	0.38 ± 0.27	0.38 ± 0.02	0.02	0.02	n.d.	n.d.	n.d.	0.00
2,2,3-trimethylbutane[a]	100.21	0.3	3.81	0.00 ± 0.00	3.07 ± 0.89	0.06 ± 0.05	0.06 ± 0.01	0.02	0.02	n.d.	n.d.	n.d.	0.06
3,3-dimethylpentane[a, b]	100.21	0.3	4.77	0.01 ± 0.00	8.45 ± 1.75	0.02 ± 0.01	0.02 ± 0.00	0.21	0.21	n.d.	n.d.	n.d.	0.13
cyclohexane	84.16	1	7	0.00 ± 0.00	26.6 ± 15.8	1.66 ± 1.09	1.66 ± 0.35	0.01	0.01	n.d.	n.d.	n.d.	0.05
2-methylhexane[b]	100.21	0	7	0.01 ± 0.00	68.4 ± 14.4	1.81 ± 1.31	1.81 ± 0.00	0.05	0.05	n.d.	n.d.	n.d.	0.17
2,3-dimethylpentane[b]	100.21	0.4	4.77	n.d.	20.6 ± 10.9	0.55 ± 0.40	0.55 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	0.01
heptane	100.21	0.1	6.8	0.13 ± 0.07	40.0 ± 13.1	2.34 ± 1.17	0.09 ± 0.05	0.02	0.53	3.09 ± 3.40	0.06 ± 0.04	0.08 ± 0.04	0.29
octane	114.23	0.8	8.1	0.25 ± 0.12	32.1 ± 13.1	0.94 ± 0.48	0.10 ± 0.05	0.84	0.20	2.02 ± 1.95	0.05 ± 0.02	0.33 ± 0.09	0.89
iso-octane	114.23	0.8	3.34	0.03 ± 0.02	16.8 ± 6.49	0.15 ± 0.05	0.04 ± 0.04	0.13	0.01	0.12 ± 0.13	0.05 ± 0.03	0.01 ± 0.00	0.25
nonane	128.26	1.9	9.7	0.14 ± 0.03	10.6 ± 7.36	0.32 ± 0.23	0.32 ± 0.00	0.02	0.02	n.d.	n.d.	n.d.	3.71
decane	142.29	7	11	0.24 ± 0.06	6.66 ± 3.49	0.15 ± 0.10	0.15 ± 0.02	0.00	0.00	n.d.	n.d.	n.d.	8.26

	MW (g mol $^{-1}$)	SOAP value	k_{OH} value	Mean ER VOC/CO ± SD (ppbv/ppmv)									
				HDDV	TW 2T	TW 4T	CH	FW	CHM	WB	LDDV	LDGV	HDDV-T
undecane	156.31	16.2	12	0.28 ± 0.02	2.05 ± 1.71	0.06 ± 0.04	0.06 ± 0.05	0.00	0.00	n.d.	n.d.	n.d.	0.62
dodecane	170.33	34.5	13.2	0.28 ± 0.02	1.01 ± 1.05	0.03 ± 0.02	0.03 ± 0.00	0.01	0.01	n.d.	n.d.	n.d.	14.72
tridecane[a]	184.36	34.5	15.1	0.02 ± 0.00	0.08 ± 0.05	0.00 ± 0.00	0.00 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	0.17
tetradecane[a]	198.39	34.5	17.9	0.06 ± 0.01	0.24 ± 0.18	0.01 ± 0.00	0.01 ± 0.00	0.01	0.01	n.d.	n.d.	n.d.	2.19
pentadecane[a]	212.41	34.5	20.7	0.02 ± 0.00	0.08 ± 0.08	0.00 ± 0.00	0.00 ± 0.00	0.04	0.04	n.d.	n.d.	n.d.	1.23
hexadecane[a]	226.44	34.5	23.2	0.02 ± 0.00	0.08 ± 0.03	0.00 ± 0.00	0.00 ± 0.00	0.01	0.01	n.d.	n.d.	n.d.	0.85
limonene	136.24	18	164	0.01 ± 0.00	0.41 ± 0.30	0.00 ± 0.00	0.02 ± 0.02	0.47	0.03	10.83 ± 7.9	0.00 ± 0.00	0.00 ± 0.00	0.49
α-pinene	136.23	17.4	52.3	0.01 ± 0.00	1.81 ± 0.73	0.01 ± 0.01	0.05 ± 0.07	0.00	0.00	0.02 ± 0.02	0.00 ± 0.00	0.00 ± 0.00	0.26
β-pinene	136.23	18.1	74.3	0.02 ± 0.01	0.93 ± 0.59	0.01 ± 0.00	0.06 ± 0.09	0.01	0.00	0.20 ± 0.19	0.00 ± 0.00	0.00 ± 0.00	0.28
camphene[a]	136.24	18	53	0.06 ± 0.02	0.34 ± 0.31	0.01 ± 0.01	0.01 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	0.36
myrcene[a]	136.23	18	215	0.00 ± 0.00	0.65 ± 0.41	0.00 ± 0.00	0.00 ± 0.01	0.01	0.01	n.d.	n.d.	n.d.	0.37
3-carene[a]	136.24	18	85	0.00 ± 0.00	0.41 ± 0.45	0.01 ± 0.01	0.01 ± n.d.	0.00	0.00	n.d.	n.d.	n.d.	0.39
α-terpinene[a]	136.23	18	363	0.02 ± 0.01	4.15 ± 2.45	0.19 ± 0.13	0.19 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	1.05
α-ocimene[a]	136.23	18	252	0.02 ± 0.00	12.3 ± 4.10	0.31 ± 0.17	0.31 ± 0.00	0.01	0.01	n.d.	n.d.	n.d.	3.62
γ-terpinene[a]	136.23	18	177	0.05 ± 0.00	0.96 ± 0.75	0.01 ± 0.01	0.01 ± 0.00	0.09	0.09	n.d.	n.d.	n.d.	0.33
terpinolene[a]	136.24	18	225	0.00 ± 0.00	0.62 ± 0.35	0.03 ± 0.03	0.03 ± 0.00	0.01	0.01	n.d.	n.d.	n.d.	0.19
hexanal	100.16	0	30	0.00 ± 0.00	14.2 ± 14.2	0.03 ± 0.03	0.03 ± 0.00	0.05	0.05	n.d.	n.d.	n.d.	0.14
heptanal [a, b]	114.19	0	30	0.01 ± 0.00	n.d.	n.d.	n.d.	0.01	0.01	n.d.	n.d.	n.d.	0.60
benzaldehyde	106.12	216.1	12	0.03 ± 0.03	5.78 ± 4.43	0.10 ± 0.08	0.10 ± n.d.	0.00	0.00	n.d.	n.d.	n.d.	0.01
octanal [a, b]	128.21	0	30	0.03 ± 0.01	n.d.	0.13 ± 0.09	0.13 ± 0.11	0.04	0.04	n.d.	n.d.	n.d.	1.07
nonanal [a, b]	142.24	0	30	0.01 ± 0.01	1.39 ± 0.49	0.12 ± 0.10	0.12 ± 0.26	0.01	0.01	n.d.	n.d.	n.d.	0.16
nopinone[a]	138.21	18	15	0.00 ± 0.00	0.47 ± 0.39	0.03 ± 0.02	0.03 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	1.46
camphor[a]	152.23	18	4.3	0.05 ± 0.00	8.86 ± 4.89	0.20 ± 0.15	0.20 ± n.d.	0.07	0.07	n.d.	n.d.	n.d.	0.02
borneol[a]	154.25	18	49	0.00 ± 0.00	2.31 ± 1.34	0.04 ± 0.04	0.04 ± 0.00	0.00	0.00	n.d.	n.d.	n.d.	1.78
decanal[a, b]	156.20	0	30	0.03 ± 0.00	3.55 ± 2.83	0.11 ± 0.09	0.11 ± 0.05	0.03	0.03	n.d.	n.d.	n.d.	1.75
undecanal[a, b]	170.30	0	30	0.06 ± 0.01	0.36 ± 0.14	0.01 ± 0.01	0.01 ± 0.03	0.05	0.05	n.d.	n.d.	n.d.	4.31
methylethylketone	72.11	0.6	1.2	0.05 ± 0.02	n.d.	0.02 ± 0.01	0.02 ± 0.10	0.19	0.19	n.d.	n.d.	n.d.	0.65
methylvinylketone	70.09	1	19	0.05 ± 0.02	1.36 ± 0.67	0.05 ± 0.02	0.05 ± 0.06	0.00	0.00	n.d.	n.d.	n.d.	1.07

MW = molecular weight (g mol^{-1}); ER = emission ratio in units of ppbv per ppmv CO equivalent to mmol per mol CO, k_{OH} = second-order reaction rate coefficients of VOC+ OH reaction ($\times 10^{12}$ cm^3 molecule^{-1} s^{-1}) obtained from Manion et al., (2015); SOAP = secondary organic aerosol potential values reported in Derwent et al (2010b). [a] denotes species whose SOAP values were estimated from the analogous species and [b] k_{OH} values were estimated from the analogous species. n.d. = no data

Table S2: VOC species groups based on GEIA method and mean POCP values suggested for each family (Huang et al., 2017)

Class	VOCs families	VOC species integrated in this study	Mean POCP
VOC1	Alkanols (alcohols)	n.d.	34.92
VOC2	Ethane	n.d.	12.3
VOC3	Propane	n.d.	22.12
VOC4	Butanes	n.d.	36.54
VOC5	Pentanes	pentane	39.5
VOC6	Hexanes and higher alkanes	2-methylpentane, 3-methylpentane, hexane, 2,2-dimethylpentane, 2,4-dimethylpentane, 2,2,3-trimethylbutane, 3,3-dimethylpentane, cyclohexane, 2-methylhexane, 2,3-dimethylpentane, iso-octane, heptane, octane, nonane, decane, undecane, dodecane, tridecane, tetradecane, pentadecane, hexadecane	44.15
VOC7	Ethene (ethylene)	n.d.	100
VOC8	Propene	n.d.	97.89
VOC9	Ethyne (acetylene)	n.d.	8.5
VOC10	Isoprenes	isoprene	109.2
VOC11	Monoterpenes	α-pinene, β-pinene, camphene, 3-carene, α-terpinene, limonene, α-ocimene, γ-terpinene, terpinolene, myrcene	109.2
VOC12	Other alk(adi)enes/alkynes (olefines)	n.d.	95.29
VOC13	Benzene (benzol)	benzene	21.8
VOC14	Methylbenzene (toluene)	toluene	63.7
VOC15	Dimethylbenzenes (xylenes)	m+p-xylene, o-xylene, ethylbenzene,	107.41
VOC16	Trimethylbenzenes	1,2,4-trimethylbenzene, 1,2,3-trimethylbenzene and 1,3,5-trimethylbenzene	129.86
VOC17	Other aromatics	iso-propylbenzene, styrene	77.78
VOC18	Esters	n.d.	20.68
VOC19	Ethers (alkoxy alkanes)	n.d.	12.44
VOC20	Chlorinated hydrocarbons	n.d.	23.72
VOC21	Methanal (formaldehyde)	n.d.	51.9
VOC22	Other alkanals (aldehydes)	benzaldehyde, heptanal, hexanal, octanal, nonanal, decanal, undecanal, camphor, borneol	64.1
VOC23	Alkanones (ketones)	methylvinylketone, methylethylketone	24.54
VOC24	Acids (alkanoic)	n.d.	12.44
VOC25	Other NMVOC (HCFCs, nitriles, etc.)	n.d.	12.44

POCP= photochemical ozone creation potentials (POCPs) reported on Derwent et al (2001, 2010). n.d. = no data

Table S3. Measurement and sampling site details during the Abidjan ambient campaign

			POSITION GPS		Sampling dates							
SITE CODE	TUBE CODE	Sampling site	LONGITUDE	LATITUDE	09/02/2016	11/02/2016	14/02/2016	16/02/2016	18/02/2016	21/02/2016	VOLUME	Activities
AT	AT1	AT ADJAME	04°01'095W	05°21'252N	16:29	12:06	08:57	11:42	19:23	07:23	6X600mL	Near transport emissions; regular traffic jams, old public transport vehicles
	AT2				16:31	12:08	08:59	11:44	19:26	07:26	6X600mL	
AD	AD1	AD AKOUEDO	03°56'16,57"W	05°21'12,65"N	11:46	11:40	08:00	18:20	15:32	09:42	6X600mL	Landfill waste burning. Uncontrolled landfill, continuous waste burning
	AD2				11:53	11:44	08:03	18:24	15:36	09:44	6X600mL	
FAC	FAC1	CAMPUS COCODY	3°59'27,61"W	5°20'42"N	15:23	08:58	06:54	13:50	17:32	05:15	6X600mL	Residential University residence
	FAC2				15:26	09:00	06:56	13:53	17:35	05:18	6X600mL	
BIN	BIN1	CNRI BINGERVILLE	03°54'7,81W	05°21'30,09"N	12:50	10:40	08:06	12:58	14:00	06:24	6X600mL	Urban Background Far from traffic, near to Ebrié Lagoon
	BIN2				12:53	10:42	08:08	13:01	14:03	06:26	6X600mL	
CRE	CRE1	CRE TREICHVILLE	4°0'10,26"W	5°18'41,18"N	18:42	10:30	10:25	08:35	14:12	12:23	6X600mL	Green urban area. Near to Ebrié Lagoon; windy
	CRE2				18:48	10:34	10:28	08:37	14:16	12:27	6X600mL	
ABO	ABO1	ABOBO MAIRIE	04°4'50,61"W	05°21'8"N	17:14	07:30	13:57	10:35	09:45	08:45	6X600mL	Townhall, near to the big market of Abobo. Old communal taxis and minibuses in a crowded crossroad
	ABO2				17:16	07:32	13:59	10:38	09:48	08:48	6X600mL	
ZI YOP	ZI1	ZI YOP	04°4'52,57"W	05°22'12,32"N	18:13	14:07	12:11	09:40	06:22	15:32	6X600mL	Industrial site heavy-duty vehicles and traffic jams. Domestic fires + traffic
	ZI2				18:15	14:09	12:14	09:43	06:25	15:35	6X600mL	
PL	KSI1	PLATEAU	04°1'26,52W	05°19'33,97"N	16:14	07:30	10:45	15:03	18:31	12:38	6X600mL	City center, crossroad with traffic jams; Light-duty vehicles, near the train station
	KSI2				16:17	07:34	10:48	15:07	18:35	12:44	6X600mL	
KSI	PL1	KOUMASSI	3°57'20,66"W	5°17'52,25"	17:33	09:26	09:30	14:23	07:20	11:20	6X600mL	Residential site mainly influenced by domestic activities, fire-wood, and charcoal; old vehicles. Traffic/administrative
	PL2				17:30	09:30	09:33	14:27	07:24	11:24	6X600mL	

Table S4. Measurement and emission source details performed in Abidjan

Emission source code	Description	Sorbent tube	Sampling time	Date	Hour	Total volume (mL)
FW	Fuelwood burning	Carbopack	15	20/07/2015	10:53:00	1500
CHM	Charcoal Making	Carbopack	15	21/07/2015	10:39:00	1500
CH	Charcoal burning	Carbopack	15	22/07/2015	16:37:00	1500
TW-2T	Two-wheel two-stroke	Carbopack	15	25/07/2015	11:20:00	1500
TW-4T	Two-wheel four-stroke	Carbopack	15	25/07/2015	12:21:00	1500
TW-4T	Two-wheel four-stroke	Carbopack	15	25/07/2015	13:02:00	1500
TW-4T	Two-wheel four-stroke	Carbopack	15	25/07/2015	13:42:00	1500
CH	Charcoal burning	Carbopack	15	26/07/2015	17:40:00	1500
HDDV	Heavy-duty diesel vehicles	Carbopack	15	27/07/2015	11:41:00	1500
HDDV	Heavy-duty diesel vehicles	Carbopack	15	27/07/2015	11:05:00	1500
HDDV	Heavy-duty diesel vehicles	Carbopack	15	27/07/2015	15:35:00	1500
TW-2T	Two-wheel two-stroke	Carbopack	15	28/07/2015	09:43:00	1500
TW-2T	Two-wheel two-stroke	Carbopack	15	28/07/2015	10:36:00	1500
FW	Fuelwood burning	Tenax	15	20/07/2015	11:17:00	1500
FW	Fuelwood burning	Tenax	15	20/07/2015	17:09:00	1500
CHM	Charcoal making	Tenax	15	21/07/2015	11:05:00	1500
CH	Charcoal burning	Tenax	15	22/07/2015	16:04:00	1500
TW-2T	Two-wheel two-stroke	Tenax	15	25/07/2015	10:52:00	1500
TW-4T	Two-wheel four-stroke	Tenax	15	25/07/2015	11:50:00	1500
TW-4T	Two-wheel four-stroke	Tenax	15	25/07/2015	12:42:00	1500
TW-4T	Two-wheel four-stroke	Tenax	15	25/07/2015	13:23:00	1500
CH	Charcoal burning	Tenax	15	26/07/2015	16:53:00	1500
HDDV	Heavy-duty diesel vehicles	Tenax	15	27/07/2015	11:15:00	1500
HDDV	Heavy-duty diesel vehicles	Tenax	15	27/07/2015	10:56:00	1500
HDDV	Heavy-duty diesel vehicles	Tenax	15	27/07/2015	15:45:00	1500
TW-2T	Two-wheel two-stroke	Tenax	15	28/07/2015	09:30:00	1500
TW-2T	Two-wheel two-stroke	Tenax	15	28/07/2015	08:39:00	1500
LDDV	Light-duty diesel vehicles	Tenax	15	16/08/2015	15:10:00	1500
LDDV	Light-duty diesel vehicles	Tenax	15	16/08/2015	15:20:00	1500
LDGV	Light-duty gasoline vehicles	Tenax	15	16/08/2015	14:44:00	1500
LDGV	Light-duty gasoline vehicles	Tenax	15	16/08/2015	14:34:00	1500
WB	waste burning	Tenax	15	15/08/2015	10:02:00	1500
WB	waste burning	Tenax	15	15/08/2015	10:15:00	1500
WB	waste burning	Tenax	15	15/08/2015	10:38:00	1500
WB	waste burning	Tenax	15	15/08/2015	10:52:00	1500
WB	waste burning	Tenax	15	15/08/2015	11:10:00	1500

References

Derwent, R. G., Jenkin, M. E., Saunders, S. M. and Pilling, M. J.: Characterization of the reactivities of volatile organic compounds using a master chemical mechanism, J. Air Waste Manag. Assoc., 51(5), 699–707, doi:10.1080/10473289.2001.10464297, 2001.

Derwent, R. G., Jenkin, M. E., Pilling, M. J., Carter, W. P. L. and Kaduwela, A.: Reactivity scales as comparative tools for chemical mechanisms., J. Air Waste Manag. Assoc., 60(8), 914–924, doi:10.3155/1047-3289.60.8.914, 2010a.

Derwent, R. G., Jenkin, M. E., Utembe, S. R., Shallcross, D. E., Murrells, T. P. and Passant, N. R.: Secondary organic aerosol formation from a large number of reactive man-made organic compounds, Sci. Total Environ., 408(16), 3374–3381, doi:10.1016/j.scitotenv.2010.04.013, 2010b.

Huang, G., Brook, R., Crippa, M., Janssens-Maenhout, G., Schieberle, C., Dore, C., Guizzardi, D., Muntean, M., Schaaf, E. and Friedrich, R.: Speciation of anthropogenic emissions of non-methane volatile organic compounds: A global gridded data set for 1970-2012, Atmos. Chem. Phys., 17(12), 7683–7701, doi:10.5194/acp-17-7683-2017, 2017.

Manion, J. A., Huie, R. E., Levin, R. D., Jr., D. R. B., Orkin, V. L., Tsang, W., McGivern, W. S., Hudgens, J. W., Knyazev, V. D., Atkinson, D. B., Chai, E., Tereza, A. M., Lin, C.-Y., Allison, T. C., Mallard, W. G., Westley, F., Herron, J. T., R. F. Hampson, A. and Frizzell, D. H.: NIST Chemical Kinetics Database, Gaithersburg, Maryland. [online] Available from: http://kinetics.nist.gov/ (Accessed 18 April 2018), 2015.