

Emissions of Volatile Organic Compounds (VOCs) from an Open-Circuit Dry Cleaning Machine Using a Petroleum-Based Organic Solvent: Implications for Impacts on Air Quality

Hyeonji Lee, Kyunghoon Kim, Yelim Choi, Daekeun Kim

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Table S1. Volatile organic compounds detected in dry cleaning gas and their concentrations during the first 18 minutes of drying operation.

	Compounds	Vapor pressure (mmHg)	Concentration (ppb)				
			0 min	4 min	8 min	12 min	18 min
(1)	1-Butene	1860	5	7	6	19	15
(2)	Butane	1810	38	-*	-	4	-
(3)	Isopentane	688	87	67	99	119	30
(4)	Isoprene	551	2	2	3	3	1
(5)	Pentane	513	19	5	8	28	1
(6)	Methylene chloride	432	52	7	413	10626	17
(7)	Acrolein	264	104	47	66	78	100
(8)	Acetone	249	891	738	1182	10595	489
(9)	2-Methylpentane	208	-	-	-	155	-
(10)	3-Methylpentane	186	-	-	2	357	-
(11)	Tetra hydrofuran	173	6	-	18	230	36
(12)	Hexene	173	-	-	1	2	1
(13)	Hexane	150	145	26	1977	13055	53
(14)	Methylcyclopentane	133	6	-	22	1454	-
(15)	Vinyl Acetate	119	-	16	-	-	-
(16)	Methyl ethyl ketone	98.5	13	12	23	37	15
(17)	Ethyl acetate	98.3	14	-	3	1	-
(18)	Cyclohexane	93.9	24	-	18	1516	-
(19)	Benzene	87.2	7	6	6	30	15
(20)	1,2-Dichloroethane	75.4	6	2	1	1	4
(21)	Heptane	45.9	2	3	-	42	-
(22)	2-Methylheptane	45	88	265	46	2	-
(23)	Methylcyclohexane	41.6	57	92	6	0	-
(24)	MMA	36.7	2	4	3	18	2
(25)	Toluene	23.7	24	23	35	188	27
(26)	MIBK	21.8	4	6	4	4	5
(27)	3-Methylheptane	20.4	67	212	38	-	-
(28)	Tetrachloroethylene	17.8	8	18	9	-	-
(29)	Octane	14.8	353	1212	419	63	27
(30)	Ethylbenzene	7.59	16	-	9	44	22
(31)	m,p-Xylene	6.81	10	-	-	15	6

(32) Styrene	5.05	6	-	-	15	17
(33) Nonane	4.96	1249	3891	4065	2237	983
(34) Decane	1.73	1426	3381	4516	4831	2903
(35) n-Undecane	0.629	945	1202	2128	3363	2054
(36) n-Dodecane	0.236	108	97	238	702	235
Toatl		5785	11342	15362	49834	7055
Concentration						

* below method detection limit

Abbreviation: methyl methacrylate (MMA), methyl isobutyl ketone (MIBK)

Table S2. Composition of VOCs in the organic solvent used in this study. Among compounds mixed in the organic solvent, only 10 compounds recognized as ozone precursors were included in the analysis.

	Compounds	Composition (%)
(1)	n-Undecane	43.11
(2)	Decane	34.42
(3)	n-Dodecane	9.03
(4)	Nonane	7.57
(5)	Octane	0.96
(6)	Ethylbenzene	0.87
(7)	m,p-Xylene	0.84
(8)	Styrene	0.71
(9)	Isopentane	0.66
(10)	o-Xylene	0.56
	Total	98.73*

* Compounds which are not recognized as ozone precursors were not presented in this table.

Note: The composition in this table was not related with VOCs concentrations at exhaust gas during dry cleaning process, because we attained the composition from the organic solvent before the dry cleaning process.

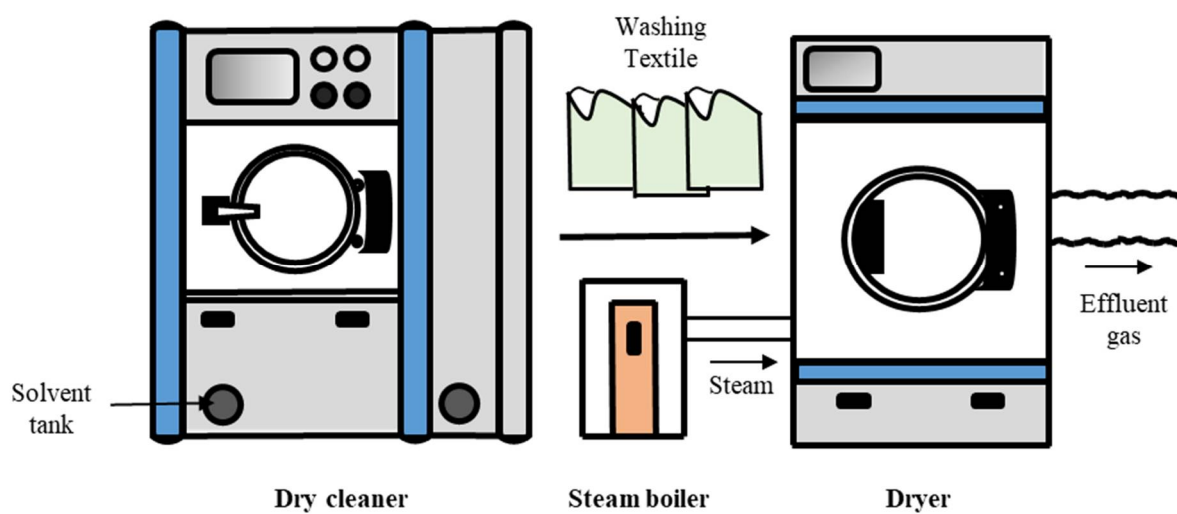


Figure S1. Schematic drawing of dry cleaning process employed in this study. Open-circuit system was used, which means that a dry cleaner and dryer were set separately. Effluent gas, emitted from the dryer during drying process, was sampled from the beginning of drying process to 18 minutes.