**Supplemental Information : **Secondary Organic Aerosol Production from Modern Diesel Engine Emissions, Shar Samy and Barbara Zielinska

Table S1. Composition of VOC mixtures

Compound	**Density g/ml**	**Mixture #1**	**Added to chamber 10 µl**	**Concentrations in chamber (µg/m³)**	**Mixture #2**	**Added to chamber 100 µl**	**Concentrations in chamber (µg/m³)**
Benzene	0.88	None	None	None	75 µl	5.94 µl	26
o-Xylene	0.87	None	None	None	175 µl	13.86 µl	60
p-Cymene	0.86	50 µl	2.63 µl	11	250 µl	19.80 µl	85
1,2 - Diethylbenzene	0.86	50µl	2.63 µl	11	250 µl	19.80 µl	85
1,2,4-Trimethylbenzene	0.88	40 µl	2.11 µl	9.0	200 µl	15.84 µl	70
iso-Butylbenzene	0.85	50 µl	2.63 µl	11	250 µl	19.80 µl	84
Naphthalene	solid	1.9 mg	1.9 mg	9.5	37.3 mg	2.95 mg	15
1,2,4,5-Tetramethylbenzene	solid	1.6 mg	1.6 mg	8.0	25.2 mg	2.0 mg	10

Mixture #1 was added only to exposure D-2 (06/01/06; DE+ NO_3+VOC). Mixture #2 was added to exposures L-1b (06/02/06; DE+sun+VOC) and L-2b (06/07/06; DE+sun+OH+VOC)

Table S2. List of POC analyzed in this study

Alkanoic acids	*Alkanedioic acids*	*Aromatic acids*
Full Compound Name	**Full Compound Name**	**Full Compound Name**
hexanoic acid (c6*)	oxalic acid (d-c2)	phenylacetic acid
heptanoic acid (c7)	malonic acid (d-c3)	o-toluic
octanoic acid (c8)	me-malonic (d-c3)	m-toluic
nonanoic acid (c9)	maleic acid (d-c4)	p-toluic
decanoic acid (c10)	succinic acid (d-c4)	2,6-dimethylbenzoic acid
undecanoic acid (c11)	me-succinic acid (d-c5)	2,5-dimethylbenzoic acid
myristoleic acid (c14)	glutaric acid (d-c5)	2,4-dimethylbenzoic acid
myristic acid (c14)	2-methylglutaric (d-c6)	3,5-dimethylbenzoic acid
pentadecanoic acid (c15)	3-methylglutaric acid (d-c6)	3,4-dimethylbenzoic acid
palmitic acid (c16)	hexanedioic (adipic) acid (d-c6)	2,3-dimethoxybenzoic acid
isostearic acid (c18)	3-methyladipic acid (d-c7)	2,6-dimethoxybenzoic acid
oleic acid (c18)	heptanedioic (pimelic) acid (d-c7)	2,5-dimethoxybenzoic acid
elaidic acid (c18)	suberic acid (d-c8)	phthalic acid
stearic acid (c18)	azelaic acid (d-c9)	isophthalic acid
nonadecanoic acid (c19)	sebacic acid (d-c10)	
eicosanoic acid (c20)	undecanedioic acid (d-c11)	
heneicosanoic acid (c21)	dodecanedioic acid (d-c12)	
docosanoic acid (c22)	traumatic acid (d-c12)	
tricosanoic acid (c23)	1,11-undecanedicarboxylic acid (d-c13)	
tetracosanoic acid (c24)	1,12-dodecanedicarboxylic acid (d-c14)	

*c# = carbon number, d = di-acid

The significant difference between the 2005 and 2006 L-3 experiments (Table S3) may be due to several factors, including: engine age or total engine lifetime operation, differences in the initial in-chamber toluene mixing ratios (639 +/- 32 for 2005; 524 +/- 6 for 2006), total DE aging time of the individual experiments (~5 hrs. for 2005; ~4 hrs. for 2006), and difference in the initial DPM mass concentrations (10.1 +/- 1.4 $\mu g/m^{-3}$ for 2005; 36.8 +/- 5.5 $\mu g/m^{-3}$). In addition, as the engine becomes older changes in the engine components (e.g. valves, seals, internal surfaces) may result in corollary changes in the emissions. For more detail on compositional and toxicity changes produced from further diesel engine use, see Zielinska et al. (2009).

Table S3. 2005 SOA % production values, pre-sampling mass has been corrected for wall-loss.

Date	Experiment	Post-injection Time (GMT)	Post-injection mass (μgm^{-3})	Pre-Sampling Time (GMT)	Pre-sampling mass (μgm^{-3})	Mass Difference (μgm^{-3})	%SOA of Final Mass
05/16/05	D-3, Diesel in Dark with ozone	9:15	11.5	15:30	11	-0.5	0.0
05/17/05	D-3, Diesel in Dark with ozone	10:18	12.9	15:18	12.8	-0.1	0.0
05/12/05	L-1, Diesel in Light	10:23	11.7	15:18	11.8	0.1	0.8
05/11/05	L-1, Diesel in Light	10:31	9.8	15:16	10.4	0.6	5.8
05/13/05	L-2, Diesel in Light with HCHO	9:17	8.2	15:32	9.8	1.6	16.3
05/18/05	L-2, Diesel in Light with HCHO	9:13	13.8	15:38	16.6	2.8	16.9
05/19/05	L-3, Diesel in Light with toluene	8:15	9.1	13:35	70.5	61.4	87.1
05/20/05	L-3, Diesel in Light with toluene	8:57	11.1	13:52	75.2	64.1	85.2

Table S4. Chamber conditions for 2006 experiments.

Name	Date	Run Description	Post-Injection DPM ($\mu g/m^3$)	NO_x (ppb)	HCHO Max, Mean, Median (ppb)	Ozone Max. (ppb)
D-1	05/31/06	DE in dark	29	36	ND [A]	ND
D-2	06/01/06	DE+N_2O_5 in dark	28	333	3	442
L-1a	06/08/06	DE+Sun	44	77	ND	22
L-1b	06/02/06	DE+Sun+VOC	49	82	30	188
L-2a	06/05/06	DE+Sun+OH	40	27	252,37,13	147
L-2b	06/07/06	DE+Sun+OH+VOC	29	58	263,58,32	251
L-3a	06/06/06	DE+Toluene	32	25	37,13,10	112
L-3b	06/09/06	DE+Toluene	40	98	20,10,10	185

[A] ND, not detected

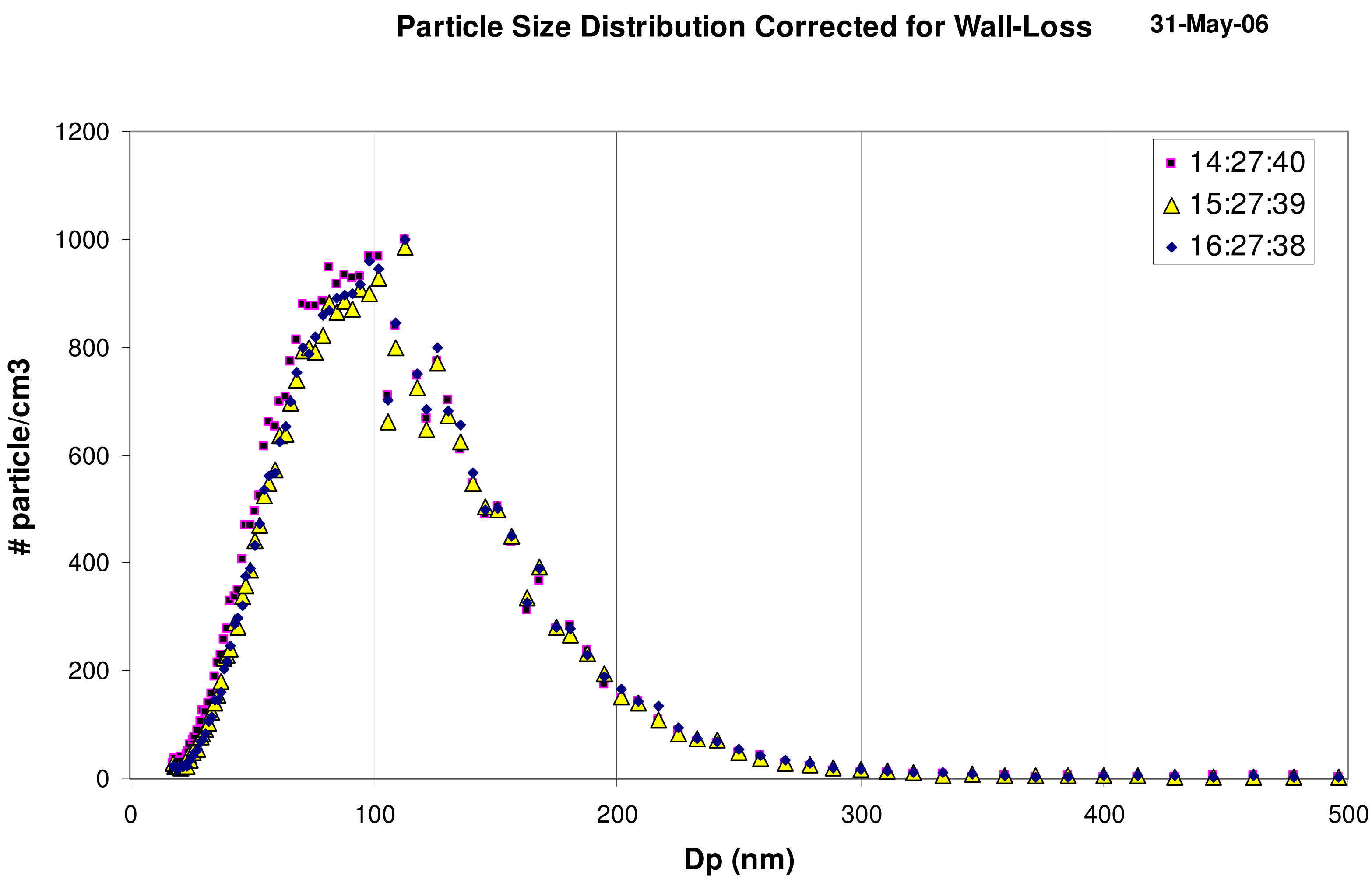

Figure S1. Corrected particle profile for diesel in dark aging experiment at 0,1,and 2 hours.

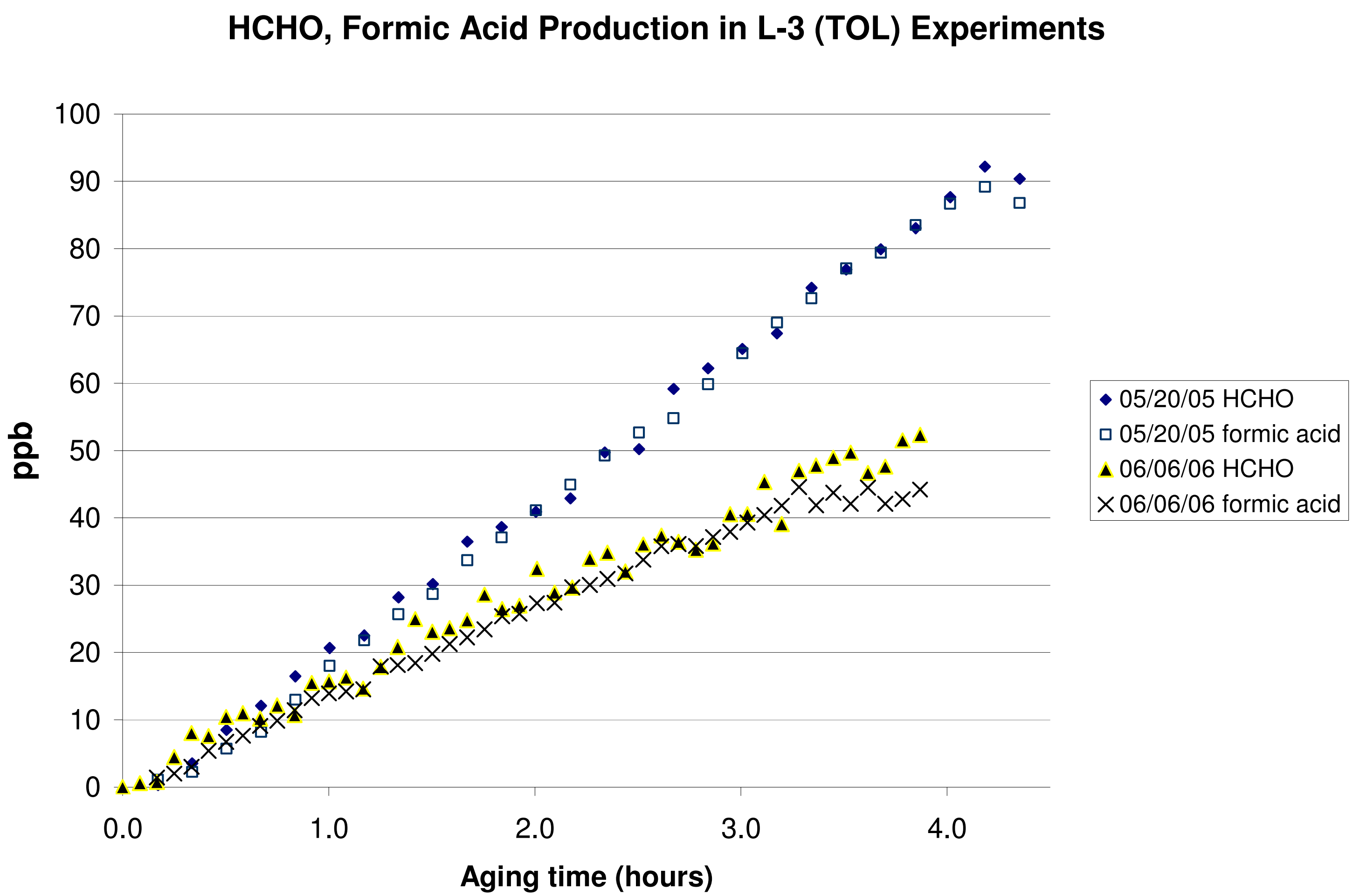

Figure S2. HCHO and formic acid production measured by FTIR and corrected for loss for L-3a (06/06/06) and L-3d (05/20/05)..