Table S1. Measured and Predicted Aerosol Product Yields in the α-Pinene/O_3 System

			Aerosol yield Y_i x 100 (%)						predicted/measured, R_{Y_i}		
			Exp. 6/9/98a		Exp. 6/9/98b		Exp. 6/17/98a		6/9/98a	6/9/98b	6/17/98a
Product	p_L^o (torr)[a]	α[b]	measured[c]	predicted	measured	predicted	measured	predicted			
Norpinonaldehyde	1.74×10^{-1}	0.0208	0.2	0.0001	0.2	0.0001	0.2	0.00005	0.0004	0.0004	0.0002
Pinonaldehyde	4.63×10^{-2}	0.1458	1.0	0.002	0.4	0.002	1.1	0.001	0.002	0.01	0.001
Hydroxy pinonaldehydes	2.29×10^{-4}	0.0762	3.3	0.2	1.4	0.3	2.8	0.2	0.07	0.19	0.06
Norpinonic acid and isomers	8.17×10^{-6}	0.1129	2.6	5.2	5.9	5.5	3.4	4.0	2.01	0.93	1.17
Norpinic acid	7.50×10^{-6}	0.0012	0.1	0.1	0.1	0.1	0.06	0.05	0.61	0.64	0.79
Pinonic acid	2.22×10^{-6}	0.0568	2.3	4.3	2.1	4.4	1.8	3.8	1.87	2.10	2.09
Pinic acid	2.10×10^{-6}	0.0661	2.5	5.2	5.3	5.3	3.9	4.6	2.08	1.00	1.19
Hydroxy pinonic acid	2.03×10^{-6}	0.0397	3.1	3.1	1.9	3.1	3.1	2.7	0.99	1.65	0.88
X (total unidentified mass)[d]	1.00×10^{-12}	0.0167	2.6	2.6	1.2	1.2	1.2	1.2	1.00	1.00	1.00
Total Yield, Y x 100%			17.6	20.6	18.6	19.9	15.9	16.5	R_Y = 1.17	1.07	1.04
M_o (μg m^{-3})			54.2	63.4	65.1	70.0	38.8	40.3			

[a] Predicted by UNIFAC vapor pressure method at 308 K.

[b] Arithmetic average of measured α values calculated for the three experiments.

[c] Measured values are from Yu *et al*. [*34*].

[d] Product X represents the total amount of unidentified aerosol mass, including two products identified only as A_{13} and A_{14} by Yu *et al*. [*34*]. Product X was assumed to consist of a compound with 2 CH3, 2 CH2, 2 CH, 1 C, 1 CH3CO, and 1 COOH UNIFAC functional groups, MW_X = 184 g mol^{-1}. An alpha value for product X was calculated individually for each experiment. The vapor pressure of X is such that essentially all the available mass will partition into the aerosol phase.

Table S2. Measured and Predicted Aerosol Product Yields in the β-Pinene/O_3 System

			Aerosol yield Y_i x 100 (%)				predicted/measured, R_{Y_i}	
			6/11/98b		6/17/98b		6/11/98b	6/17/98b
Product	p_L^o (torr)[a]	α[b]	measured[c]	predicted	measured	predicted		
Hydroxy pina ketones	1.09×10^{-1}	0.0923	0.74	0.0005	1.3	0.0001	0.001	0.00005
Norpinonic acid and isomers	8.17×10^{-6}	0.1400	1.7	4.9	2.7	1.0	2.88	0.36
Norpinic acid	7.50×10^{-6}	0.0039	0.17	0.15	0.12	0.03	0.89	0.26
Hydroxy norpinonic acid	6.93×10^{-6}	0.0129	0.14	0.48	0.33	0.09	3.40	0.27
Pinonic acid	2.22×10^{-6}	0.0085	0.14	0.56	0.25	0.18	4.00	0.72
Pinic acid	2.10×10^{-6}	0.0431	1.2	3.0	1.6	1.0	2.49	0.65
Hydroxy pinonic acid	2.03×10^{-6}	0.0054	0.25	0.37	0.2	0.1	1.47	0.59
X (total unidentified mass)[d]	1.00×10^{-12}	0.0099	0.15	0.15	1.8	1.8	1.00	1.00
Total Yield, Y x 100%			4.5	9.6	8.3	4.3	R_Y = 2.13	0.52
M_o (μg m^{-3})			18.9	40.4	11.2	5.7		

[a] Predicted by UNIFAC vapor pressure method at 308 K.

[b] Arithmetic average of measured α values calculated for the two experiments.

[c] Measured values are from Yu *et. al.* [*34*].

[d] Product X represents the total amount of unidentified aerosol mass, including the product identified as 3-Oxo-pina-ketone by Yu *et al*. [*34*]. Product X was assumed to consist of a compound with 2 CH3, 2 CH2, 2 CH, 1 C, 1 CH3CO, and 1 COOH UNIFAC functional groups, MW_X = 184 g mol^{-1}. An alpha value for product X was calculated individually for each experiment. The vapor pressure of X is such that essentially all the available mass will partition into the aerosol phase.

Table S3. Measured and Predicted Aerosol Product Yields in the Sabinene/O_3 System

Product	p_L^o (torr)[a]	α[b]	Aerosol yield Y_i x 100 (%) 6/15/98a measured[c]	Aerosol yield Y_i x 100 (%) 6/15/98a predicted	predicted/measured, R_{Y_i} 6/15/98a
2-(2-isopropyl)-2-formyl-cyclopropyl-methanoic acid	1.75×10^{-1}	0.0030	0.13	0.000002	0.00002
Hydroxy sabina ketones	2.93×10^{-2}	0.4729	0.53	0.0005	0.0009
Sabina ketone	9.49×10^{-3}	0.0793	0.43	0.004	0.01
Norsabinonic acid and isomers	8.17×10^{-6}	0.0588	1.4	0.8	0.55
Norsabinic acid	7.50×10^{-6}	0.0032	0.09	0.04	0.49
Sabinic acid	2.10×10^{-6}	0.0164	0.53	0.60	1.13
Pinic acid	2.10×10^{-6}	0.0191	0.39	0.70	1.79
S_{10} (exact structure unknown)	2.03×10^{-6}	0.0021	0.03	0.08	2.73
X (total unidentified mass)[d]	1.00×10^{-12}	0.0001	0.01	0.01	1.00
Total Yield, Y x 100%			3.5	2.2	R_Y = 0.63
M_o (μg m^{-3})			17.6	11.1	

[a] Predicted by UNIFAC vapor pressure method at 308 K.

[b] Measured α values for the single experiment.

[c] Measured values are from Yu *et. al.* [*34*].

[d] Product X represents the total amount of unidentified aerosol mass, including the product identified as 3-Oxo-sabina-ketone by Yu *et. al*. [*34*]. Product X was assumed to consist of a compound with 2 CH3, 2 CH2, 2 CH, 1 C, 1 CH3CO, and 1 COOH UNIFAC functional groups, MW_X = 184 g mol^{-1}. The vapor pressure of X is such that essentially all the available mass will partition into the aerosol phase.

Table S4. Measured and Predicted Aerosol Product Yields in the Δ^3-Carene/O_3 System

			Aerosol yield Y_i x 100 (%)			predicted/measured, R_{Y_i}
			Exp. 6/15/98b			6/15/98b
Product	p_L^o (torr)[a]	α[b]	measured[c]	predicted		
C_5 (exact structure unknown)	>10	0.0261	0.25	0.000000		0.000000
Caronaldehyde	2.97×10^{1}	0.1050	0.83	0.000001		0.000002
Hydroxy caronaldehydes	5.38×10^{-2}	0.0433	0.25	0.0004		0.002
Nor-3-caronic acid and isomers	5.55×10^{-3}	0.0288	0.68	0.002		0.004
C_4 (exact structure unknown)	4.77×10^{-3}	0.0061	0.54	0.0001		0.0003
3-Caronic acid	1.46×10^{-3}	0.0568	2.1	0.02		0.01
3-Caric acid	2.10×10^{-6}	0.026	1.8	1.8		1.01
Pinic acid	2.10×10^{-6}	0.0164	0.46	1.15		2.51
Hydroxy 3-caronic acid	2.03×10^{-6}	0.0162	1.0	1.1		1.11
X (total unidentified mass)[d]	1.00×10^{-12}	0.0514	5.1	5.1		1.00
Total Yield, Y x 100%			13.0	9.3	R_Y =	0.72
M_o (μg m^{-3})			63.3	44.9		

[a] Predicted by UNIFAC vapor pressure method at 308 K.

[b] Measured α values for the single experiment.

[c] Measured values are from Yu *et. al*. [*34*].

[d] Product X represents the total amount of unidentified aerosol mass. Product X was assumed to consist of a compound with 3 CH3, 1 CH2, 2 CH, 1 C, 1 CH2CO, and 1 COOH UNIFAC functional groups, MW_X = 184 g mol^{-1}. The vapor pressure of X is such that essentially all the available mass will partition into the aerosol phase.

Table S5a. Measured and Predicted Aerosol Product Yields in the Cyclohexene/O_3 System

			Aerosol yield Y_i x 100 (%)					predicted/measured, R_{Y_i}	
			Exp. 5/13/99a		Exp. 5/13/99b			5/13/99a	5/13/99b
Product	p_L^o (torr)[a]	α[b]	measured[c]	predicted	measured	predicted			
2-hydroxy-pentanoic acid	1.52×10^{-3}	0.0158	0.1	0.01	0.1	0.01		0.04	0.08
4-hydroxy-butyraldehyde	1.24×10^{-3}	0.0303	0.3	0.01	0.2	0.01		0.04	0.07
oxalic acid	2.03×10^{-4}	0.0703	1.3	0.1	1.3	0.1		0.11	0.11
malonic acid	1.59×10^{-4}	0.0969	0.6	0.32	0.64	0.34		0.55	0.54
1,4-butanedial	1.54×10^{-4}	0.0061	0.1	0.02	0.03	0.02		0.33	0.55
4-oxo-butanoic acid	1.45×10^{-4}	0.0963	0.4	0.4	0.3	0.4		0.86	1.15
succinic acid	9.64×10^{-5}	0.0096	0.2	0.1	0.2	0.1		0.35	0.34
glutaraldehyde	7.82×10^{-5}	0.0060	0.03	0.03	0.01	0.03		1.04	2.05
5-oxo-pentanoic acid	7.49×10^{-5}	0.0688	0.49	0.5	0.56	0.5		0.97	0.89
glutaric acid	5.09×10^{-5}	0.1064	0.7	1.1	0.2	1.1		1.61	5.60
adipaldehyde	3.62×10^{-5}	0.0262	0.02	0.2	0.01	0.2		11.83	41.18
6-oxo-hexanoic acid	3.53×10^{-5}	0.0714	0.56	0.86	0.48	0.90		1.53	1.88
adipic acid	2.47×10^{-5}	0.0406	0.8	0.7	0.1	0.7		0.84	5.12
2-hydroxy-glutaric acid	1.40×10^{-7}	0.0331	2.0	3.2	1.2	3.2		1.65	2.69
2-hydroxy-adipic acid	7.76×10^{-8}	0.0187	2.1	1.8	1.7	1.8		0.87	1.07
X (total unidentified mass)[d]	1.00×10^{-12}	0.0505	0.3	0.3	5.7	5.7		1.00	1.00
Total Yield, Y x 100%			9.9	9.7	12.8	15.3	R_Y =	0.97	1.19
M_o ($\mu g\ m^{-3}$)			43.4	42.1	36.4	43.6			

[a] Predicted by UNIFAC vapor pressure method at 298 K.

[b] Arithmetic average of measured α values calculated for five of six experiments. Experiment 5/17/99b was neglected in computing the average. Four of six experiments were used in calculating the average α value for product X (see below)[d].

[c] Measured values are from Kalberer *et al. [35]*.

[d] Product X represents the total amount of unidentified aerosol mass. Product X was assumed to consist of a compound with 2 CH2 and 2 COOH UNIFAC functional groups, MW_X = 118 g mol^{-1}. An alpha value for product X was calculated individually for each experiment. The vapor pressure of X was set such that essentially all the available mass would partition into the aerosol phase.

Table S5b. Measured and Predicted Aerosol Product Yields in the Cyclohexene/O_3 System

			Aerosol yield Y_i x 100 (%)				predicted/measured, R_{Y_i}	
			Exp. 5/17/99a		Exp. 5/17/99b		5/17/99a	5/17/99b
Product	p_L^o (torr)[a]	α[b]	measured[c]	predicted	measured	predicted		
2-hydroxy-pentanoic acid	1.52×10^{-3}	0.0158	0.2	0.02	0.03	0.01	0.09	0.37
4-hydroxy-butyraldehyde	1.24×10^{-3}	0.0303	0.5	0.1	0.4	0.03	0.11	0.06
oxalic acid	2.03×10^{-4}	0.0703	0.8	0.5	0.9	0.2	0.62	0.27
malonic acid	1.59×10^{-4}	0.0969	0.8	1.1	0.3	0.6	1.36	2.24
1,4-butanedial	1.54×10^{-4}	0.0061	0.1	0.1	0.01	0.03	0.68	3.06
4-oxo-butanoic acid	1.45×10^{-4}	0.0963	0.8	1.3	0.2	0.7	1.79	4.30
succinic acid	9.64×10^{-5}	0.0096	0.2	0.2	0.1	0.1	1.08	1.06
glutaraldehyde	7.82×10^{-5}	0.0060	0.1	0.1	0.01	0.05	1.94	3.74
5-oxo-pentanoic acid	7.49×10^{-5}	0.0688	0.2	1.6	0.2	0.8	6.42	4.52
glutaric acid	5.09×10^{-5}	0.1064	2.8	3.3	0.2	1.9	1.18	10.54
adipaldehyde	3.62×10^{-5}	0.0262	0.1	0.7	0.003	0.4	11.67	140.88
6-oxo-hexanoic acid	3.53×10^{-5}	0.0714	0.7	2.6	0.2	1.5	3.73	9.36
adipic acid	2.47×10^{-5}	0.0406	3.6	1.9	0.2	1.2	0.53	7.45
2-hydroxy-glutaric acid	1.40×10^{-7}	0.0331	2.0	3.3	0.4	3.3	1.63	8.46
2-hydroxy-adipic acid	7.76×10^{-8}	0.0187	0.4	1.9	1.3	1.9	4.87	1.44
X (total unidentified mass)[d]	1.00×10^{-12}	0.0505	7.3	7.3	6.8	6.8	1.00	1.00
Total Yield, Y x 100%			20.5	26.0	11.1	19.4	R_Y = 1.27	1.75
M_o ($\mu g\ m^{-3}$)			126	159	43.4	76.3		

[a] Predicted by UNIFAC vapor pressure method at 298 K.

[b] Arithmetic average of measured α values calculated for five of six experiments. Experiment 5/17/99b was neglected in computing the average. Four of six experiments were used in calculating the average α value for product X (see below)[d].

[c] Measured values are from Kalberer *et al. [35]*.

[d] Product X represents the total amount of unidentified aerosol mass. Product X was assumed to consist of a compound with 2 CH2 and 2 COOH UNIFAC functional groups, MW_X = 118 g mol^{-1}. An alpha value for product X was calculated individually for each experiment. The vapor pressure of X was set such that essentially all the available mass would partition into the aerosol phase.

Table S5c. Measured and Predicted Aerosol Product Yields in the Cyclohexene/O_3 System

			Aerosol yield Y_i x 100 (%)				predicted/measured, R_{Y_i}	
			Exp. 5/19/99a		Exp. 5/19/99b		5/19/99a	5/19/99b
Product	p_L° (torr)[a]	α[b]	measured[c]	predicted	measured	predicted		
2-hydroxy-pentanoic acid	1.52×10^{-3}	0.0158	0.1	0.001	0.4	0.01	0.02	0.01
4-hydroxy-butyraldehyde	1.24×10^{-3}	0.0303	1.7	0.002	0.5	0.01	0.001	0.03
oxalic acid	2.03×10^{-4}	0.0703	2.2	0.03	0.5	0.1	0.01	0.26
malonic acid	1.59×10^{-4}	0.0969	1.1	0.1	0.3	0.3	0.06	0.97
1,4-butanedial	1.54×10^{-4}	0.0061	0.1	0.003	0.1	0.02	0.05	0.18
4-oxo-butanoic acid	1.45×10^{-4}	0.0963	0.4	0.1	0.2	0.4	0.18	1.74
succinic acid	9.64×10^{-5}	0.0096	0.2	0.01	0.1	0.1	0.05	0.63
glutaraldehyde	7.82×10^{-5}	0.0060	0.2	0.01	0.03	0.03	0.03	1.08
5-oxo-pentanoic acid	7.49×10^{-5}	0.0688	0.3	0.1	0.5	0.5	0.31	0.96
glutaric acid	5.09×10^{-5}	0.1064	0.2	0.2	0.6	1.1	0.94	1.88
6-oxo-hexanoic acid	3.62×10^{-5}	0.0714	0.03	0.04	0.03	0.2	1.20	7.00
adipaldehyde	3.53×10^{-5}	0.0262	0.22	0.16	0.42	0.9	0.72	2.11
adipic acid	2.47×10^{-5}	0.0406	0.2	0.1	0.6	0.7	0.67	1.19
2-hydroxy-glutaric acid	1.40×10^{-7}	0.0331	0.9	2.9	7.0	3.2	3.18	0.46
2-hydroxy-adipic acid	7.76×10^{-8}	0.0187	1.4	1.7	1.3	1.8	1.20	1.45
X (total unidentified mass)[d]	1.00×10^{-12}	0.0505	0	0	0	0	1.00	1.00
Total Yield, Y x 100%			6.6	5.5	7.9	9.5	R_Y = 0.83	1.19
M_o ($\mu g\ m^{-3}$)			9.8	8.1	36.4	43.3		

[a] Predicted by UNIFAC vapor pressure method at 298 K.

[b] Arithmetic average of measured α values calculated for five of six experiments. Experiment 5/17/99b was neglected in computing the average. Four of six experiments were used in calculating the average α value for product X (see below)[d].

[c] Measured values are from Kalberer *et al. [35]*.

[d] Product X represents the total amount of unidentified aerosol mass. Product X was assumed to consist of a compound with 2 CH2 and 2 COOH UNIFAC functional groups, MW_X = 118 g mol^{-1}. An alpha value for product X was calculated individually for each experiment; alpha = 0 for the 5/19/99 experiments in which all of the aerosol mass was identified. The vapor pressure of X was set that essentially all the available mass would partition into the aerosol phase.