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TABLE A-1. SUMMARY OF DATA FOR ELUTION RECOVERY, BREAKTHROUGH TESTS, REPLICATE ANALYSES AND CO-LOCATED SAMPLES

	elution recovery, μg carbonyl per cartridge (a)	breakthrough test, μg carbonyl per cartridge (b)	replicate analyses (c)						co-located cartridges (d)	
			Azusa		Claremont		Long Beach		Concentration, ppb	RSD, percent
			Concentration, ppb	RSD, percent	Concentration, ppb	RSD, percent	Concentration, ppb	RSD, percent		
formaldehyde	0.44 - 2.04	0.48	6.74	6	4.59	1	5.21	3	2.09	14
acetaldehyde	0.70 - 1.07	0.95	2.20	0	1.46	5	7.51	3	1.99	10
acetone	0.40 - 0.62	0.74	0.24	25	0.18	0	0.60	7	1.16	29
propanal	0.15 - 0.30	0.18	0.86	5	0.48	0	1.41	0	0.25	40
crotonaldehyde	0.11 - 0.32	0.11	0.53	8	0.20	15	-	-	0.20	45
2-butanone	0.14 - 0.43	0.30	0.58	0	0.34	0	0.89	0	0.99	24
n-butanal	0.08 - 0.24	0.24	1.06	0	0.51	12	0.97	10	0.58	29
benzaldehyde	0 - 0.27	-	0.22	0	0.17	0	-	-	-	-
cyclohexanone	0.10 - 0.16	0.16	0.22	0	0.20	45	-	-	0.20	40
n-pentanal	0.02 - 0.10	0.10	1.57	2	0.30	3	0.39	0	0.33	24
glyoxal	0.03 - 0.13	0.12	2.98	5	0.83	4	0.49	0	0.30	23
m-tolualdehyde	-	-	0.26	27	-	-	-	-	-	-
n-hexanal	0.04 - 0.15	0.21	1.28	7	0.31	0	0.66	0	0.29	14
methylglyoxal	0.10 - 0.47	0.42	1.96	7	1.23	0	1.13	0	0.78	13
n-heptanal	0.42	0.42	0.76	0	-	-	-	-	0.60	20

(a) No carbonyls were detected in the second elutions. Listed are the ranges of carbonyl concentrations ($\mu\text{g}/\text{cartridge}$) measured in the first elutions. Data are for ambient samples collected in Azusa, Long Beach and Los Angeles.

(b) No carbonyls were detected in the downstream cartridges. Listed are the carbonyl concentrations in the upstream cartridges ($\mu\text{g}/\text{cartridge}$). Data are for four sets of ambient air samples collected in Azusa, 9/12/93, 0930-1330 hours PDT, using two cartridges in series.

(c) Data are for three samples collected in Azusa, Claremont and Long Beach.

(d) Data are for four co-located ambient air samples collected in Azusa, 9/12/93, 0930-1330 hours PDT.

TABLE A-2. CARBONYL CONCENTRATIONS AND CONCENTRATION RATIOS, LONG BEACH

	Sept. 8, 1993				Sept. 9, 1993			
	0-4 (a)	6 - 10	12 - 16	18-22	0-4	6 - 10	12 - 16	18-22
carbonyl concentrations, ppb								
formaldehyde	1.4	2.3	6.2	1.7	1.5	3.2	4.7	2.3
acetaldehyde	1.1	2.2	7.8	1.0	1.5	2.5	7.3	1.2
acetone	1.0	1.3	0.1	0.6	3.7	2.3	0.6	0.5
propanal	0.1	0.3	1.6	0.1	0.2	0.3	1.2	0.1
crotonaldehyde	0.1	0.3	0.3	0.2	0.1	0.3	0.4	0.3
2-butanone	0.6	1.0	0.8	0.4	0.8	1.0	0.8	0.5
n-butanal	0.3	0.2	1.4	0.4	0.3	1.0	1.3	0.2
benzaldehyde	ND (b)	0.1	0.2	ND	0.1	0.2	0.2	ND
cyclohexanone	0.1	0.2	0.2	ND	0.1	0.1	0.1	0.2
n-pentanal	0.3	0.4	0.6	0.4	0.3	0.3	0.4	0.2
glyoxal	0.1	0.1	0.8	0.1	0.1	0.1	0.6	0.1
m-tolualdehyde	ND	ND	ND	ND	ND	ND	ND	ND
n-hexanal	0.1	0.3	0.7	0.2	0.1	0.2	0.6	0.1
methylglyoxal	0.2	0.4	1.0	0.2	0.2	0.2	0.9	0.2
nopinone (c)						0.1	0.1	
n-heptanal (c)						0.1	0.3	
4 acetyl-1-methylcyclohexene (c)						NDB (b)	0.1	
n-octanal (c)						0.1	0.4	
n-nonanal (c)						2.3	0.5	
n-decanal (c)						NDB	0.6	
n-undecanal (c)						NDB	0.3	
n-dodecanal (c)						NDB	0.3	
n-tridecanal (c)						NDB	0.4	
n-tetradecanal (c)						NDB	0.6	
total carbonyls, ppb	5.7	9.4	21.7	5.4	8.9	14.1	22.8	6.0
concentration ratios								
formaldehyde/total carbonyls	0.26	0.29	0.29	0.32	0.16	0.23	0.21	0.39
(formaldehyde + acetaldehyde)/total carbonyls	0.46	0.52	0.65	0.49	0.34	0.40	0.53	0.59
(formaldehyde + acetaldehyde + acetone)/total carbonyls	0.64	0.65	0.65	0.61	0.75	0.57	0.55	0.67
acetaldehyde/formaldehyde	0.78	0.82	1.26	0.52	1.05	0.77	1.55	0.50
acetone/formaldehyde	0.72	0.47	0.02	0.37	2.53	0.72	0.13	0.21

(a) 0-4 means 0000-0400 hours PDT, and so on.

(b) ND = not detected using method A, see detection limits in Table 3.

(c) measured using method B in the two samples collected on Sept. 9, 0600-1000 and 1200-1600 hours PDT.

(d) NDB = not detected using method B.

TABLE A-3. CARBONYL CONCENTRATIONS AND CONCENTRATION RATIOS, LOS ANGELES

	Sept. 8, 1993				Sept. 9, 1993			
	0-4 (a)	6 - 10	12 - 16	18-22	0-4	6 - 10	12 - 16	18-22
carbonyl concentrations, ppb								
formaldehyde	3.4	8.9	6.2	3.7	4.0	10.5	4.0	2.9
acetaldehyde	2.5	6.4	2.5	2.7	2.0	7.5	2.5	2.1
acetone	2.7	0.9	0.6	1.4	2.3	1.6	0.4	0.9
propanal	0.3	1.0	0.8	0.5	0.2	1.3	0.9	0.4
crotonaldehyde	0.3	0.2	0.3	0.3	0.3	0.5	0.4	0.2
2-butanone	1.1	0.6	0.5	0.6	0.7	1.0	0.9	0.5
n-butanal	0.3	0.6	0.9	0.7	0.5	0.8	1.1	0.3
benzaldehyde	0.2	0.3	0.2	0.1	0.1	0.4	0.2	
cyclohexanone	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1
n-pentanal	0.1	0.4	0.3	0.4	0.1	0.5	0.2	0.2
glyoxal	0.1	0.6	2.3	0.5	0.1	0.7	1.3	0.2
m-tolualdehyde	ND (b)	0.2	ND	ND	ND	0.2	ND	ND
n-hexanal	0.1	0.3	0.4	0.2	0.1	0.4	0.4	0.1
methylglyoxal	0.5	1.3	1.8	0.7	0.4	1.8	1.5	0.4
n-heptanal	ND	0.4	0.4	ND	ND	0.6	ND	ND
total carbonyls, ppb	12.36	22.48	17.50	11.85	10.95	27.97	14.01	8.57
concentration ratios								
formaldehyde/total carbonyls	0.32	0.40	0.36	0.31	0.37	0.37	0.29	0.34
(formaldehyde + acetaldehyde)/total carbonyls	0.52	0.68	0.50	0.54	0.55	0.64	0.47	0.59
(formaldehyde + acetaldehyde + acetone)/total carbonyls	0.74	0.72	0.53	0.66	0.76	0.70	0.50	0.70
acetaldehyde/formaldehyde	0.63	0.72	0.40	0.73	0.49	0.72	0.63	0.72
acetone/formaldehyde	0.68	0.10	0.10	0.39	0.56	0.15	0.11	0.32

(a) 0-4 means 0000-0400 hours PDT, and so on.

(b) ND = not detected using method A, see detection limits in Table 3. These samples were not re-analyzed using method B.

TABLE A-4. CARBONYL CONCENTRATIONS AND CONCENTRATION RATIOS, AZUSA

	Sept. 8, 1993				Sept. 9, 1993			
	0-4 (a)	6 - 10	12 - 16	18-22	0-4	6 - 10	12 - 16	18-22
carbonyl concentrations, ppb								
formaldehyde	3.8	8.4	5.3	6.6	5.7	10.6	6.5	4.5
acetaldehyde	4.8	6.6	4.3	7.5	5.0	9.0	2.2	4.2
acetone	3.3	2.2	4.1	4.5	6.4	3.6	0.2	1.5
propanal	0.5	1.2	2.2	1.9	0.8	1.7	0.8	0.9
crotonaldehyde	0.4	0.3	0.3	0.4	0.4	0.4	0.5	0.3
2-butanone	8.4	0.8	1.0	1.6	6.8	2.3	0.6	0.7
n-butanal	0.6	0.7	1.3	1.0	0.8	1.0	1.1	0.7
benzaldehyde	0.3	0.5	0.3	0.2	0.3	0.6	0.2	0.2
cyclohexanone	0.3	0.3	0.3	0.3	0.3	0.6	0.2	0.2
n-pentanal	0.2	0.6	1.3	0.7	0.2	0.6	1.6	0.4
glyoxal	0.2	0.6	2.0	0.7	0.1	0.6	2.9	0.5
m-tolualdehyde	0.5	0.4	0.2	0.3	0.3	0.3	0.2	0.2
n-hexanal	0.4	0.7	1.0	0.8	0.4	1.0	1.2	0.5
methylglyoxal	0.7	1.2	1.6	1.3	0.6	1.5	1.9	0.8
nopinone (b)	0.7	0.2	0.8	ND	ND	NDB (c)	0.2	ND
n-heptanal (b)	0.7	1.1	1.1	1.0	0.8	1.0	0.8	0.7
4 acetyl-1-methylcyclohexene (b)						NDB	0.2	
n-octanal (b)	0.8	ND (d)	ND	1.7	ND	NDB	0.4	ND
n-nonanal (b)						0.5	0.4	
n-decanal (b)						0.4	0.5	
n-undecanal (b)						NDB	0.2	
n-dodecanal (b)						0.3	0.3	
n-tridecanal (b)						NDB	0.3	
total carbonyls, ppb	26.5	25.7	27.1	30.5	28.9	36.0	23.3	16.3
concentration ratios								
formaldehyde/total carbonyls	0.14	0.33	0.20	0.22	0.20	0.29	0.28	0.27
(formaldehyde + acetaldehyde)/total carbonyls	0.33	0.58	0.36	0.46	0.37	0.54	0.37	0.53
(formaldehyde + acetaldehyde + acetone)/total carbonyls	0.45	0.67	0.51	0.61	0.59	0.64	0.38	0.63
acetaldehyde/formaldehyde	1.28	0.79	0.81	1.15	0.87	0.85	0.34	0.95
acetone/formaldehyde	0.88	0.26	0.78	0.68	1.13	0.34	0.03	0.34

(a) 0-4 means 0000-1400 hours PDT, and so on.

(b) measured using method B in the two samples collected on Sept. 9, 0600-10000 and 1200-1600 hours PDT.

(c) NDB = not detected, method B, see detection limits in Table 3.

(d) ND = not detected using method A.

TABLE A-5. CARBONYL CONCENTRATIONS AND CONCENTRATION RATIOS, CLAREMONT

	Sept. 8, 1993				Sept. 9, 1993			
	0-4 (a)	6 - 10	12 - 16	18-22	0-4	6 - 10	12 - 16	18-22
carbonyl concentrations, ppb								
formaldehyde	5.3	6.5	4.6	8.1	4.8	6.0	7.2	7.5
acetaldehyde	4.2	3.7	1.5	5.8	4.0	3.3	2.3	5.6
acetone	0.6	0.0	0.2	1.3	0.3	0.5	0.6	0.7
propanal	0.6	0.7	0.5	1.1	0.6	0.6	0.4	1.1
crotonaldehyde	0.2	0.2	0.2	0.4	0.2	0.1	0.4	0.3
2-butanone	0.6	0.4	0.3	1.1	0.5	0.5	0.5	0.8
n-butanal	0.4	0.7	0.5	0.6	0.7	0.6	0.9	0.9
benzaldehyde	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2
cyclohexanone	0.1	0.2	0.1	0.2	0.1	0.2	0.3	0.2
n-pentanal	0.5	0.2	0.3	0.2	0.2	0.2	0.5	0.2
glyoxal	0.4	0.8	1.3	1.0	0.6	0.7	3.7	0.9
m-tolualdehyde	ND	ND	ND	ND	0.1	0.2	ND	ND
n-hexanal	0.3	0.3	0.3	0.5	0.3	0.3	0.6	0.4
methylglyoxal	1.3	1.3	1.2	1.8	1.3	1.0	2.3	1.7
n-heptanal	0.4	0.6	0.4	0.6	ND	0.4	0.6	ND
n-octanal	ND	ND	ND	ND	1.1	ND	ND	ND
total carbonyls, ppb	15.20	15.86	11.78	23.06	14.96	14.69	20.50	20.7
concentration ratios								
formaldehyde/total carbonyls	0.35	0.41	0.39	0.35	0.32	0.41	0.35	0.37
(formaldehyde + acetaldehyde)/total carbonyls	0.62	0.65	0.52	0.60	0.59	0.63	0.46	0.64
(formaldehyde + acetaldehyde + acetone)/total carbonyls	0.66	0.65	0.54	0.66	0.61	0.66	0.49	0.67
acetaldehyde/formaldehyde	0.80	0.58	0.33	0.72	0.84	0.55	0.32	0.74
acetone/formaldehyde	0.11	0.00	0.04	0.16	0.07	0.09	0.08	0.10

(a) 0-4 means 0000-0400 hours PDT, and so on.

(b) ND = not detected using method A, see detection limits in Table 3. These samples were not re-analyzed using method B.

TABLE A-6. CARBONYL CONCENTRATIONS AND CONCENTRATION RATIOS, SAN NICOLAS ISLAND

	San Nicolas Island			
	Sept. 7, 1993	Sept. 8, 1993		Sept. 9, 1993
	17:50-22:50 (a)	0000-11:06	12:00-23:06	0000-0800
	carbonyl concentrations, ppb			
formaldehyde	0.7	0.7	1.0	0.7
acetaldehyde	0.9	0.7	0.6	0.4
acetone	0.3	0.3	0.2	0.2
propanal	0.1	0.2	0.1	0.1
crotonaldehyde	0.3	0.2	0.3	0.3
2-butanone	0.3	0.1	0.2	0.2
n-butanal	0.3	0.3	0.1	0.1
benzaldehyde	ND	ND	ND	ND
cyclohexanone	ND	0.1	0.1	ND
n-pentanal	0.2	0.2	0.2	0.2
glyoxal	0.1	0.1	0.1	0.1
n-hexanal	0.2	0.2	0.1	ND
methylglyoxal	0.1	0.1	0.1	ND
n-octanal	0.9	0.4	ND	ND
n-nonanal	ND	0.7	ND	ND
total carbonyls, ppb	4.49	4.18	3.09	2.32
	concentration ratios			
formaldehyde/total carbonyls	0.15	0.17	0.33	0.30
(formaldehyde + acetaldehyde)/total carbonyls	0.35	0.34	0.54	0.49
(formaldehyde + acetaldehyde + acetone)/total carbonyls	0.42	0.40	0.62	0.60
acetaldehyde/formaldehyde	1.31	0.98	0.63	0.64
acetone/formaldehyde	0.50	0.40	0.24	0.36

(a) 17:50-22:50 means 1750-2250 hours PDT, and so on.

(b) ND = not detected using method A, see detection limits in Table 3. These samples were not re-analyzed using method B.