

Supplementary Information

**INFRARED SPECTRA OF PRODUCTS OF THE REACTION OF H ATOMS WITH O₂
TRAPPED IN SOLID NEON. HO₂, HO₂⁺, HOHOH⁻, AND H₂O(HO)**

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Table S1. Behavior of absorptions^a (cm⁻¹) which appear on codeposition at 4.3 K of Ne:O₂ samples with various mole ratios with a Ne:H₂ = 80:1 sample that has been passed through a microwave discharge.

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
504.5w,br,C+	504.7w,br,C+	505.0C+	504.5C+		
522.9w,br,C+	522.4w,br,C+	523.4C+	523.4C+		(H ₂ O) ₂
544.0vw,br,C+	544.1w,br,C+	541.7C+	541.7C+		
699.7wm,C-	699.7wm,C-	699.7w,C-			O ₃
702.7wm,br,A+C-	702.8m,br,A+C-	702.9m,br,A+C-	702.7m,br,A+C-	702.5m,br,B+C-	HOHOH ⁻
732.0w		732.3vw		731.9wm	
793.7wm,A+B-	757.0vw,br,A+C-	756.2vw,br,A+C-	756.7A+C-	756.8B+C-	HOHO ⁻
795.0m,A-	793.6wm,A+B-	793.7vw,A+B-	793.7vw,A'+B-		
796.3ms,A-	795.0m,A'-	795.0wm,A-	795.0w,A'-		O ₃ ⁻
800.7w,br,C-	796.3ms,A'-	796.3m,A-	796.4wm,A-	796.5w,B-	O ₃ ⁻
	801.4wm,br,B-	801.5wm,br,B-	801.5wm,br,B-	801.3wm,br,C-	O ₃ ⁻
	904.4w,A-	904.3w,br,A-	904.3w,br,A-	904.4w,br,B-	
954.5w,br,C-			913.2vw	913.2wm	
965.5m,C-	953.9w,br,C-	953.9w,br,C-			
	965.5m,C-	965.6wm,B-	965.4w,B-		

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
967.6wm,A-	967.7wm,A-	967.8w,A-			O ₄ ⁻
972.1wm,A-	972.1w,A-	972.3w,A-			O ₄ ⁻
973.3ms,A-	973.2sh,A-	973.3sh,A-			O ₄ ⁻
974.2m,C-	974.2m,B-	974.3wm,C-	974.2w,B-		O ₄ ⁻
976.8m,C-	976.8wm,A''+C-	976.8wm,C-	976.9w,B-		O ₄ ⁻
	979.7w,sh,C-	979.9vw,sh,C-			O ₄ ⁻
1026.6w,br,C-	1026.5wm,A-	1026.6wm,br,A-	1026.5wm,br,A'-	1026.4wm,br,B-	HO ₂ ⁺
1038.6s,C-	1038.7s,C-	1038.7ms,C-	1038.7wm,C-	1038.7wm,C-	O ₃
1039.7vs,C-	1039.9vs,C-	1039.9s,C-	1039.9m,C-	1039.9m,C-	O ₃
1045.1m,B-	1045.2m,B-	1045.2wm,B-	1045.3wm,B-		O ₃
1097.8m	1097.9m,C-	1097.9m,C-	1097.8m	1097.9m	HO ₂
1100.3vs,A+C-	1100.2vs,C-	1100.2vs,C-	1100.3vs,C-	1100.2s	HO ₂
1105.5ms,C-	1105.4s,A+C-	1105.4s,A+C-	1105.5msC-	1105.4m	HO ₂
1118.7vw,C-	1118.4w,C-				
1164.5vs,A-	1164.5vs,A-	1164.5s,A-	1164.5wm,A'-	1164.5w,B-	t-O ₄ ⁺
1177.2w,br,C-	1177.2w,A-				
1202.3C+	1201.9C+	1202.5C+			

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
1266.9vw,C+	1267.0w,C+	1267.0w,A+	1266.8wm,A+	1266.9wm,B+	H ₂ O ₂
1271.9C+	1272.1w,C+	1271.9vw,A+	1272.0w,A+	1271.9w,B+	H ₂ O ₂
1318.5wm,A-	1318.4wm,A'-	1318.5w,A-	1318.4vw,A-		cyc-O ₄ ⁺
1320.3ms,A-	1320.3ms,A'-	1320.3wm,A-	1320.3w,A-		cyc-O ₄ ⁺
1325.4C+	1323.1B+	1323.2vw,B+	1323.1B+		
1391.6m	1391.7s	1391.6s,A+C-	1391.6ms,C-	1391.6ms	HO ₂
1393.7wm,C-	1393.7ms,C-	1393.7m,A+C-	1393.7m,C-	1393.6m	HO ₂
1394.9wm	1394.8m,C-	1394.9m,A+C-	1394.8m,C-	1394.8m	HO ₂
1397.8vs,C-	1397.9vs,C-	1397.9vs,C-	1397.9vs,C-	1397.8vs	HO ₂
1399.8m,C-	1399.9s,C-	1399.8s,C-	1399.8ms,A+C-	1399.8m,B+	HO ₂
1401.7w,C-	1401.7sh,C-				HO ₂
1429.6vw,B-					
1489.6vw,C-	1489.9vw,br,B-		1442.4w,A'+A-		
1500.3vw,br,C-	1500.4vw,br,C-	1500.2w,br,C-	1499.9vw,br,C-		
			1564.5wm		

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
1596.4vs	1596.3vs	1596.2vs	1596.2vs	1596.1vs	H ₂ O···H ₂
1598.8m,C+	1598.7sh,C+	1598.7s,C+	1598.7s,C+	1598.7ms,C+	H ₂ O(HO)
1607.5wm,br,C+	1607.4wm,br,C+	1607.5wm,br,C+	1607.7wm,br,C+	1607.7w,br,C+	H ₂ O
1613.8w	1613.8wm	1613.8wm,sh	1613.8wm,sh		
1615.5wm,br,C+	1615.8wm,br,C+	1615.7s,br,C+	1615.5ms,br,C+	1615.4ms,br,C+	H ₂ O
1631.2m,br,C+	1631.3m,br,C+	1631.2s,br,C+	1630.9s,br,C+	1630.6s,br,C+	H ₂ O
1643.8w,br,C+	1643.7vw,br,B+	1644.1wm,C+	1644.0wm,br,B+	1643.9wm,br,B+	
1705.3C+	1705.3C+	1705.3C+	1705.5B+		
2107.7vw,C-	2107.7vw,C-	1737.5vw,A+	1737.5vw,A+		O ₃
2110.0wm,C-	2110.0w,C-	2107.6vw,B-			O ₃
		2110.0w,B-		2192.0w	
2481.4vw,C-	2481.4w,C-	2481.5w,C-	2194.5w,A-		HO ₂ (v ₂ + v ₃)
2769.3w,C-	2769.4wm,C-	2769.4wm,C-	2481.5w,C-		
2808.5wm,A-	2808.6wm,A'-	2808.5vw,A-	2681.2w,A+		
			2769.4w,A+C-	2769.3vw	HO ₂ (2v ₂)

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
2948.6w,br,A-	2948.9wm,br,A'-				cyc-O ₄ ⁺
		3182.5w,A-	3182.6wm,A'-	3182.6w,B-	H ₂ O ⁺
			3191.5w,br,C+	3192.0vw,br	
		3209.6w,br,A-	3209.8w,br,A-	3209.6vw,br,B-	H ₂ O ⁺
		3216.3w,br,A-	3216.4w,br,A-	3216.4w,br,B-	H ₂ O ⁺
		3237.2C-			HO ₂ (3V ₃)
3254.5vw,br,A-					cyc-O ₄ ⁺
	3343.5br,C+				
3365.1w,br,C+	3365.0C+	3365.0C+	3365.2C+		(H ₂ O) ₅
3381.7w,br,C+	3382.0wm,br,C+	3382.0wm,br,C+	3382.1wm,br,C+	3381vw,br,C+	(H ₂ O) ₄
3409.4C+	3409.4C+	3409.4C+	3409.6C+		
3412.2wm	3412.3wm,C-	3412.1wm,C-	3412.2wm,A+C-	3412.0wm	HO ₂
3413.7sh,C-	3413.8sh,C-	3413.7sh,C-	3413.6wm,A+C-	3413.6wm,B+	HO ₂
3415.2ms	3415.2s,C-	3415.1s,C-	3415.1vs,C-	3415.1ms,B+C-	HO ₂
3419.7wm,C-	3419.8wm,C-	3419.7wm,C-	3419.6w,C-		HO ₂
3424.2wm,C-	3424.3wm,C-	3424.1wm,C-	3424.1wm,C-	3424.1wm	HO ₂
3427.0m,C-	3427.1ms,C-	3427.2ms,C-	3427.1ms,C-	3427.0m	HO ₂

Ne:O ₂ = 200:l	Ne:O ₂ = 400:l ^b	Ne:O ₂ = 800:l	Ne:O ₂ = 1600:l ^c	Ne:O ₂ = 3200:l ^d	Assignment
3472.4ms,C+	3472.1s,C+	3472.1vs,C+	3472.4vs,C+	3472.4vs,C+	H ₂ O(HO)
3498.8w,A-	3498.8wm,A-	3499.0m,A-	3498.6m,A-	3498.6wm,B-	
3523vbr,w,C+	3525wm,vbr,C+	3522wm,br,C+	3522wm,br,C+	3522w,vbr,C+	(H ₂ O) ₃
	3566.2C+	3527wm,br,C+	3527wm,br,C+		(H ₂ O) ₃
3569.5vw	3569.4w,C-	3566.7C+			
3576.6w	3576.6wm	3576.7wm	3576.6m	3576.6wm	OH
3586.1sh	3586.2sh			3586.1sh,C+	(H ₂ O) ₂ ···H ₂
3587.3m,br,C+	3587.1s,C+	3587.0s,C+	3587.1s,C+	3587.1s,br,C+	(H ₂ O) ₂ ···H ₂
3590.4sh	3590.5sh	3590.4sh	3590.4sh,C+	3590.4sh,C+	(H ₂ O) ₂
		3610.2C+	3610.2C+		
3662.6w,sh,C+		3662.6w,sh,C+	3662.5sh,C+		H ₂ O(HO)
	3663.0wm,C+		3662.9wm,C+	3663.0w,C+	H ₂ O···H ₂
3663.7w	3663.7w,C+	3663.9wm,C+	3663.9wm,A+	3663.8wm	H ₂ O
	3676.4w,A-	3676.6wm,A-	3676.6w,A-	3676.6vw,br,B-	
3697.1C+	3697.0vw,A+	3697.0w,B+	3697.0C+	3697.2vw,B+	H ₂ O
3718.1C+	3718.6C+				

Ne:O ₂ = 200:l	Ne:O ₂ = 400:l ^b	Ne:O ₂ = 800:l	Ne:O ₂ = 1600:l ^c	Ne:O ₂ = 3200:l ^d	Assignment
3723.3C+	3723.5w,C+	3723.5w,sh,C+	3723.4w,sh,C+	3723.5w,br,C+	
3728.5w,br,C+	3728.8wm,br,C+	3728.4wm,sh,C+	3728.6w,sh,C+	3728.4w,br,C+	H ₂ O(HO)
3731.0w,br,C+	3731.0wm,br,C+	3731.0wm,C+	3731.2wm,C+	3731.1w,br,C+	
3733.5sh	3733.5sh,C+	3733.7sh,C+	3733.5sh,C+	3733.5sh,C+	(H ₂ O) ₂
3742.7w,br	3742.6wm,br	3742.7wm,br			
3748.8C+	3749.7C+	3750.0sh,C+			(H ₂ O) ₂
3761.0C+	3761.3wm,C+	3761.2sh,C+	3761.wm,br,C+		(H ₂ O) ₂
3762.7w,C+	3762.7wm,C+	3762.6wm,C+	3762sh,C+		(H ₂ O) ₂
3773.9s,C+	3773.9s,C+	3773.8s,C+	3773.8s,A+	3773.9m,B+	H ₂ O⋯H ₂
3776.2C+			3776.4sh,C+	3776.3sh,C+	
			3780.2sh,C+	3780.0sh,C+	
3783.2s,C+	3782.6ms,C+	3782.8ms,A+	3783.0ms,A+	3783.3m,B+	H ₂ O
3789.1C+	3789.4C+	3789.3sh,A+	3789.3C+	3789.2wm,br,C+	
3804.1w,br,A ⁻	3804.1wm,br,A ^{''-}	3803.8wm,br,A ⁻	3803.6wm,br,A ^{'-}	3803.4w,br,B ⁻	H ₂ O
4150.0vw,C ⁻	4149.8vw,C ⁻				
4151.3w,C ⁻	4151.4wm,C ⁻	4151.4wm,C ⁻	4151.4wm,C ⁻		HO ₂ ⋯H ₂
4156.9w,C ⁺	4156.9wm,C ⁺	4156.9m,C ⁺	4157.0m,A ⁺	4157.0m,B ⁺	H ₂ O⋯H ₂

Ne:O ₂ = 200:1	Ne:O ₂ = 400:1 ^b	Ne:O ₂ = 800:1	Ne:O ₂ = 1600:1 ^c	Ne:O ₂ = 3200:1 ^d	Assignment
4510.8wm,C-	4510.8wm,C-	4510.8wm,C-	4510.7wm,C-	4510.7w,C+	HO ₂ (v ₁ + v ₃)
4787.7w,C-	4787.7w,C-	4787.8w,C-			HO ₂ (v ₁ + v ₂)
		6129.5C-			HO ₂ (v ₁ + 2v ₂)
		6614.1C-			HO ₂ (2v ₁)

^a A''-Hg-arc irradiation, $\lambda > 490$ nm.

A'-Hg-arc irradiation, $\lambda > 420$ nm.

A-Hg-arc irradiation, $\lambda > 345$ nm.

B-Hg-arc irradiation, $\lambda > 280$ nm.

C-unfiltered Hg-arc irradiation.

^b Photolyses A'' and A' included.

^c Photolysis A' included.

^d Photolyses B and C only.

Table S2. Behavior of absorptions^a (cm⁻¹) which appear on codeposition at 4.3 K of a Ne:O₂ = 800 sample with a Ne:H₂-d_n = 80:1 sample that has been passed through a microwave discharge.

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
		473.0wm,br,A+B-	DODOD ⁻
505.0C+			
523.4C+			(H ₂ O) ₂
541.7C+			
	683.5w,br,C-		
	691.5w,br,C-		
699.7w,C-		699.7w,C-	
702.9m,br,A+C-	703.2vw,C-		HOHOH ⁻
732.3vw			
756.2vw,br,A+C-			HOHO ⁻
793.7vw,A+B-			
795.0wm,A-	795.0w,C-	795.1w,A-	O ₃ ⁻
796.3m,A-	796.4wm,B-	796.4wm,A-	O ₃ ⁻
801.5wm,br,B-			O ₃ ⁻
		806.5vw,C-	DO ₂ ⁺
904.3w,br,A-			
		946.4sh,C+	
		948.9wm,C+	
		951.6wm,br,C+	
953.9w,br,C-			
		962.3C+	
965.6wm,B-			
967.8w,A-			O ₄ ⁻

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
972.3w,A-			O ₄ ⁻
973.3sh,A-			O ₄ ⁻
974.3wm,C-			O ₄ ⁻
976.8wm,C-			O ₄ ⁻
979.9vw,sh,C-			O ₄ ⁻
		996.1wm	
		1018.5wm,B-	DO ₂
	1021.0m	1021.1m	DO ₂
	1023.3m,B+	1023.4wm	DO ₂
1026.6wm,br,A-			HO ₂ ⁺
	1027.3vs,C-	1027.3vs,C-	DO ₂
	1028.7m,B+	1028.7s,C-	DO ₂
	1037.9B+C-		
1038.7ms,C-	1038.7wm,B+C-	1038.7wm,C-	O ₃
1039.9s,C-	1039.9m,C-	1039.9m,C-	O ₃
1045.2wm,B-	1045.1vw,B+C-	1045.2w,br,B-	O ₃
		1088.3wm,br	
		1090.1wm,br,C-	
1097.9m,C-	1098.0w,B+C-		HO ₂
1100.2vs,C-	1101.1m		HO ₂
1105.4s,A+C-	1106.2wm,B+C-		HO ₂
	1124.6wm,B+C-	1124.6m,C-	DO ₂
		1129.4wm,C-	DO ₂
1164.5s,A-	1164.5wm,B-	1164.4wm,A-	<i>t</i> -O ₄ ⁺
	1178.9s	1179.0vs	D ₂ O
	1181.1m,C+	1181.1ms,C+	D ₂ O(DO)

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
		1181.5sh	D ₂ O···DOD
		1185.0C+	
	1191.4wm,C+	1191.3s,C+	D ₂ O
	1199.4wm,B+	1199.4s,C+	D ₂ O
1202.5C+			
		1213.5w,br,C+	
1267.0w,A+			H ₂ O ₂
1271.9vw,A+			H ₂ O ₂
1318.5w,A-			<i>cyc</i> -O ₄ ⁺
1320.3wm,A-	1320.3vw,C-		<i>cyc</i> -O ₄ ⁺
1323.2vw,B+			
1391.6s,A+C-	1391.7wm		HO ₂
1393.7m,A+C-			HO ₂
1394.9m,A+C-			HO ₂
1397.9vs,C-			HO ₂
1399.8s,C-	1399.8m		HO ₂
		1404.2sh	HDO
	1404.6s	1404.6vs	HDO
	1407.4sh,C+		HDO(HO)
	1414.6wm,B+	1414.5wm,C+	HDO···D ₂
	1419.0m,B+	1419.2m,C+	HDO
	1421.3w,sh,B+	1421.1w,C+	
	1433.3ms,B+	1433.3wm,br,C+	HDO
1500.2w,br,C-			
		1546.8wm	
	1546.7w		

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
	1548.0w		
		1548.1wm	
1596.2vs	1596.2s	1596.3vs	H ₂ O⋯H ₂ H ₂ O⋯D ₂
1598.7s,C+	1598.7sh,B+		H ₂ O(HO)
		1599.6wm,br,A+	
1607.5wm,br,C+			H ₂ O
1613.8wm,sh			
1615.7s,br,C+	1615.6wm,br,C+	1615.4w,br,C+	H ₂ O
		1627.2w,sh,C+	
1631.2s.br,C+	1630.8m,br,B+	1630.8m,br,C+	H ₂ O
1644.1wm,C+	1644.1C+		
1705.3C+			
1737.5vw,A+			
	2038.3w	2038.3wm,C-	DO ₂ (2ν ₂)
2107.6vw,B-			O ₃
2110.0w,B-			O ₃
		2326.6wm,A-	
		2330.2wm,br,A-	
		2361.4C+	
		2472vw,A-	
		2476.0w,br,C+	
2481.5w,C-			HO ₂ (ν ₂ + ν ₃)
		2491.8m,br,C+	(D ₂ O) ₄
		2516.2w,br,C+	(D ₂ O) _{n>3}
	2518.5w,br,B+		

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
	2527.0w,B+C-	2527.0w,sh,A+C-	DO ₂
	2527.9w,sh,B+C-	2527.9m,sh,A+C-	DO ₂
	2529.2ms	2529.2vs,C-	DO ₂
	2530.3wm,B+		
	2531.3wm,B+		
		2534.5m,C-	DO ₂
	2536.1B+		
	2537.0m	2536.9m,C-	DO ₂
		2547.2C+	(D ₂ O) _{n>4}
		2555.6sh,C+	D ₂ O(DO)
		2556.4sh,C+	D ₂ O(DO)
	2557.5ms,B+	2557.5vs,C+	D ₂ O(DO)
		2558.4sh,C+	D ₂ O(DO)
		2583m,br,C+	(D ₂ O) ₃
		2619.3w,sh,C+	
		2621.3wm,sh,C+	
	2623.2w,br,B+	2623.2ms,C+	(D ₂ O) ₂
	2625.8w,B+	2625.7m,C+	(D ₂ O) ₂
	2635.8wm	2635.8m,C-	OD
		2637.1w	
	2643.3w,B+		
	2646.0w,br,B+	2646.2	
	2647.7vw,B+		
	2648.3w,B+		
		2670.0w,br,C+	
		2672.7m,C+	(D ₂ O) ₂

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
		2674.3m	
	2675.4wm,B+	2675.4ms,C+	
		2676.8m,C-	
		2693.2vw,br,C+	
		2696.1w,C+	
	2736.2wm,br,B+	2735.8w,br,C+	
	2741.7m,br,B+	2742.2w,A+	HDO
		2759.9s,br,C+	(D ₂ O) ₂
	2760.5wm,br,B+	2760.7sh,C+	(D ₂ O) ₂
	2762.6w,sh	2762.4sh,C+	(D ₂ O) ₂
2769.4wm,C-			HO ₂ (2v ₂)
		2780.9m,br,C+	
	2789.9B+	2790.2sh,C+	
	2796.0wm,br,B+	2795.9s,br,C+	D ₂ O⋯D ₂
	2801.4C+	2801.0s,br,C+	D ₂ O
2808.5vw,A-			<i>t</i> -O ₄ ⁺
		2979.2wm,C-	DO ₂ (3v ₂)
	2989.8w,B+	2989.7ms	D ₂ O⋯D ₂
3182.5w,A-			H ₂ O ⁺
3209.6w,br,A-			H ₂ O ⁺
3216.3w,br,A-			H ₂ O ⁺
3237.2C-			HO ₂ (3v ₃)
3365.0C+			(H ₂ O) ₅
3382.0wm,br,C+			(H ₂ O) ₄
3409.4C+			
3412.1wm,C-			HO ₂

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
3413.7sh,C-			HO ₂
3415.1s,C-			HO ₂
3419.7wm,C-			HO ₂
3424.1wm,C-			HO ₂
3427.2ms,C-			HO ₂
3472.1vs,C+	3472.2m,B+	3472.4w,C+	H ₂ O(HO)
3499.0m,A-			
3522wm,br,C+			(H ₂ O) ₃
3527wm,br,C+			(H ₂ O) ₃
		3543.0wm,C-	
3566.7C+			
3576.7wm	3576.5wm		OH
3587.0s,C+			(H ₂ O) ₂ ⋯H ₂
3590.4sh			(H ₂ O) ₂
3610.2C+			
		3653.2C-	DO ₂ (v ₁ + v ₃)
3662.6w,sh,C+			H ₂ O(HO)
3663.9wm,C+			H ₂ O⋯H ₂
3676.6wm,A-			
3697.0w,B+			H ₂ O
		3718.7wm	HDO
	3722.1m,br,B+	3722.2wm,A+	HDO
	3728.1m,br,B+	3728.2wm,A+	HDO
3723.5w,sh,C+			
3728.4wm,sh,C+			H ₂ O(HO)
3731.0wm,C+			

Ne:H ₂ = 80	Ne:HD = 80 ^b	Ne:D ₂ = 80	Assignment
3733.7sh,C+			(H ₂ O) ₂
	3739.5B+		
3742.7wm,br			
3750.0sh,C+			(H ₂ O) ₂
3761.2sh,C+			(H ₂ O) ₂
3762.6wm,C+			(H ₂ O) ₂
3773.8s,C+	3773.9wm,br,B+	3774.0wm	H ₂ O...H ₂
3782.8ms,A+	3782.9wm,br,B+	3782.8m,A+	H ₂ O
3789.3sh,A+			
3803.8wm,br,A-			H ₂ O
		3964.5w,A+	
		3970.0w,A+	
4151.4wm,C-			HO ₂ ...H ₂
4156.9m,C+	4156.7wm,B+		H ₂ O...H ₂
4510.8wm,C-			HO ₂ (ν ₁ + ν ₃)
4787.8w,C-			HO ₂ (ν ₁ + ν ₂)
		4959.6C-	DO ₂ (2ν ₁)
6129.5C-			HO ₂ (ν ₁ + 2ν ₂)
6614.1C-			HO ₂ (2ν ₁)

^a A''-Hg-arc irradiation, λ > 490 nm.

A'-Hg-arc irradiation, λ > 420 nm.

A-Hg-arc irradiation, λ > 345 nm.

B-Hg-arc irradiation, λ > 280 nm.

C-unfiltered Hg-arc irradiation.

^b One-third of typical sample deposit; photolyses B and C only.

FIGURE CAPTIONS

Figure S1

Behavior of the absorptions between 3710 and 3750 cm^{-1} on ultraviolet irradiation of the same deposit as that shown in Figure 1.

- (a) 9.90 mmol Ne:O₂ = 1600:1 codeposited at 4.3 K over a period of 184 min with 9.95 mmol Ne:H₂ = 80:1 that had been passed through a microwave discharge.
- (b) 25 min mercury-arc irradiation through a 420-nm cutoff filter, with little change, then 25 min irradiation through a 345-nm cutoff filter.
- (c) 25 min mercury-arc irradiation through a 280-nm cutoff filter.
- (d) 1 min unfiltered mercury-arc irradiation.
- (e) 10 min additional unfiltered mercury-arc irradiation.

Figure S2

Behavior of the absorptions between 1590 and 1605 cm^{-1} on ultraviolet irradiation of the same deposit as that shown in Figures 1 and 4 and Figure S1.

Figure S3

Changes in the absorption pattern between 1170 and 1210 cm^{-1} on ultraviolet irradiation of the same highly deuterium-enriched sample as that shown in Figures 3 and 5.

- (a) 10.2 mmol Ne:O₂ = 800:1 codeposited at 4.3 K over a period of 189 min with 10.0 mmol Ne:D₂ = 80:1 that had been passed through a microwave discharge.
- (b) 20 min mercury-arc irradiation through a 345-nm cutoff filter.
- (c) 20 min mercury-arc irradiation through a 280-nm cutoff filter.
- (d) 45 sec unfiltered mercury-arc irradiation.

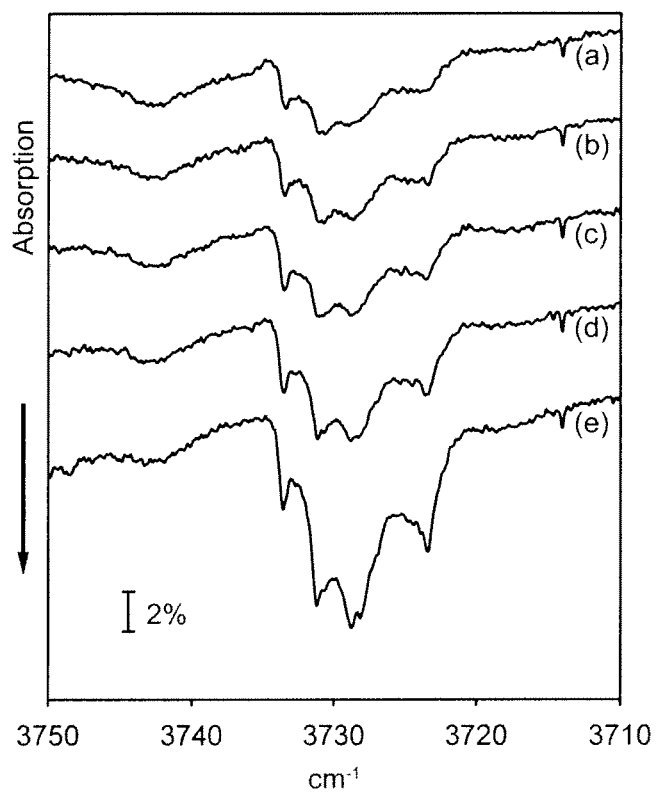


Figure S1

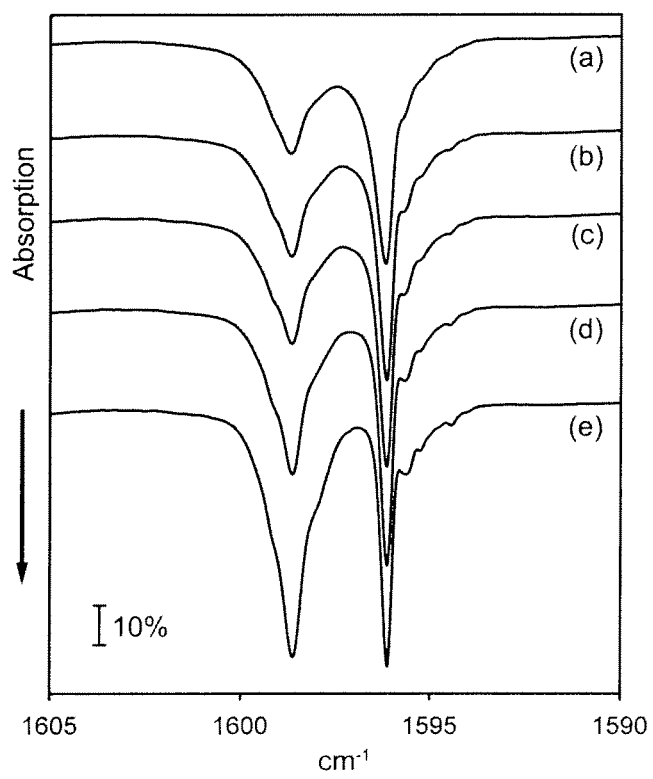


Figure S2

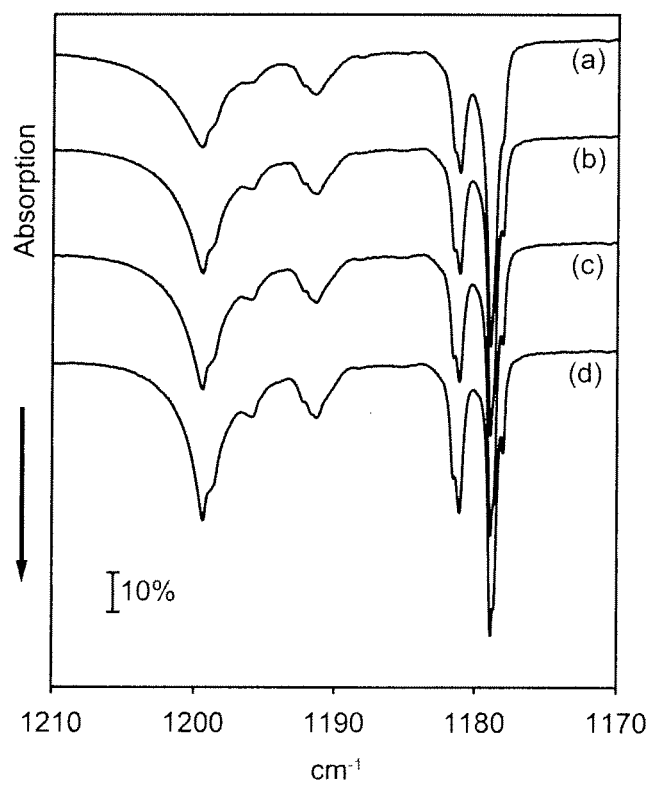


Figure S3