

**PAPS Table 1.**  $6^1\Sigma^+(v, J) \leftarrow 2(A)^1\Sigma^+(v', J')$  transitions identified in this experiment, and comparison between the experimentally measured energies of the  $6^1\Sigma^+$  state ro-vibrational levels (referenced to the bottom of the ground state well) and the energies obtained from the molecular state constants obtained in this work.

$6^1\Sigma^+(v,J)$	$2(A)^1\Sigma^+(v',J')$	Transition frequency ( $\text{cm}^{-1}$ )	$E(6^1\Sigma^+(v,J))$ ( $\text{cm}^{-1}$ ) (measured value)	$E(6^1\Sigma^+(v,J))$ ( $\text{cm}^{-1}$ ) (calculated value)	$E(\text{meas.})-E(\text{calc.})$ ( $\text{cm}^{-1}$ )
(13,29)	(16,30)	13208.7633	26682.2445	26681.6369	+0.6076
(13,31)	(16,30)	13215.7979	26689.2791	26688.6994	+0.5797
(13,69)	(16,70)	13191.5035	26907.5869	26908.2659	-0.6790
(13,71)	(16,70)	13207.3259	26923.4093	26924.1989	-0.7896
(14,18)	(16,19)	13279.7011	26719.7156	26719.4994	+0.2162
(14,20)	(16,19)	13284.1661	26724.1806	26723.9759	+0.2047
(14,29)	(16,30)	13276.4524	26749.9336	26749.7578	+0.1758
(14,31)	(16,30)	13283.3974	26756.8786	26756.7345	+0.1441
(14,42)	(16,43)	13271.4392	26803.1699	26803.1412	+0.0287
(14,44)	(16,43)	13281.3041	26813.0348	26813.0289	+0.0059
(14,69)	(16,70)	13256.7873	26972.8707	26973.3697	-0.4990
(14,71)	(16,70)	13272.4353	26988.5187	26989.0697	-0.5510
(15,11)	(16,10)	13351.0491	26774.5819	26774.6049	-0.0230
(15,15)	(16,14)	13351.0598	26780.7043	26780.7375	-0.0332
(15,18)	(16,19)	13346.4679	26786.4824	26786.5252	-0.0428
(15,20)	(16,19)	13350.8942	26790.9087	26790.9481	-0.0394
(15,25)	(16,26)	13344.3060	26803.9358	26803.9759	-0.0401
(15,27)	(16,26)	13350.3017	26809.9315	26809.9728	-0.0413
(15,29)	(16,30)	13342.8853	26816.3665	26816.4173	-0.0508
(15,31)	(16,30)	13349.7745	26823.2557	26823.3081	-0.0524
(15,38)	(16,39)	13339.1852	26850.8538	26850.9238	-0.0700
(15,40)	(16,39)	13348.0659	26859.7345	26859.8077	-0.0732
(15,42)	(16,43)	13337.3173	26869.0480	26869.1306	-0.0826
(15,44)	(16,43)	13347.0750	26878.8057	26878.8908	-0.0851
(15,46)	(16,47)	13335.3063	26888.9945	26889.0866	-0.0921
(15,48)	(16,47)	13345.9321	26899.6203	26899.7163	-0.0960
(15,50)	(16,51)	13333.1566	26910.6775	26910.7780	-0.1005
(15,52)	(16,51)	13344.6424	26922.1633	26922.2698	-0.1065
(15,55)	(16,56)	13330.2423	26940.1868	26940.3096	-0.1228
(15,57)	(16,56)	13342.7965	26952.7410	26952.8677	-0.1267
(15,69)	(16,70)	13320.7464	27036.8298	27037.0121	-0.1823
(15,71)	(16,70)	13336.2114	27052.2948	27052.4791	-0.1843
(15,92)	(19,93)	13085.7373	27238.4340	27238.7774	-0.3434
(15,93)	(19,94)	13084.8553	27248.3588	27248.7022	-0.3434

(15,94)	(19,93)	13105.6614	27258.3581	27258.7195	-0.3614
(15,95)	(19,94)	13104.9605	27268.4640	27268.8288	-0.3648
(15,97)	(19,98)	13081.1205	27288.8520	27289.3217	-0.4697
(15,99)	(19,98)	13101.9459	27309.6774	27310.1772	-0.4998
(16,18)	(16,19)	13411.9733	26851.9878	26852.0896	-0.1018
(16,20)	(16,19)	13416.3459	26856.3604	26856.4590	-0.0986
(16,29)	(16,30)	13408.0652	26881.5464	26881.6154	-0.0690
(16,31)	(16,30)	13414.8667	26888.3479	26888.4204	-0.0725
(16,42)	(16,43)	13401.8805	26933.6112	26933.6585	-0.0473
(16,44)	(16,43)	13411.5253	26943.2560	26943.2912	-0.0352
(16,69)	(16,70)	13383.2866	27099.3700	27099.1932	+0.1768
(16,71)	(16,70)	13398.5533	27114.6367	27114.4271	+0.2096
(16,92)	(19,93)	13145.5380	27298.2334	27297.6849	+0.5485
(16,94)	(19,93)	13165.1745	27317.8699	27317.2751	+0.5948
(17,9)	(16,10)	13478.6594	26902.1922	26902.2298	-0.0376
(17,13)	(16,14)	13477.6414	26907.2980	26907.3307	-0.0327
(17,17)	(16,18)	13476.4710	26914.1734	26914.1997	-0.0263
(17,18)	(16,19)	13476.1396	26916.1541	26916.1926	-0.0385
(17,20)	(16,19)	13480.4639	26920.4784	26920.5084	-0.0300
(17,21)	(16,22)	13475.1099	26922.8051	26922.8311	-0.0260
(17,25)	(16,26)	13473.5759	26933.2057	26933.2181	-0.0124
(17,29)	(16,30)	13471.8747	26945.3559	26945.3521	+0.0038
(17,31)	(16,30)	13478.6027	26952.0839	26952.0713	+0.0126
(17,33)	(16,34)	13469.9815	26959.2422	26959.2234	+0.0188
(17,38)	(16,39)	13467.3648	26979.0334	26978.9883	+0.0451
(17,42)	(16,43)	13465.0604	26996.7911	26996.7251	+0.0660
(17,44)	(16,43)	13474.5814	27006.3121	27006.2302	+0.0819
(17,46)	(16,47)	13462.5776	27016.2658	27016.1574	+0.1084
(17,50)	(16,51)	13459.8634	27037.3843	27037.2692	+0.1151
(17,69)	(16,70)	13444.3010	27160.3844	27159.9128	+0.4716
(17,71)	(16,70)	13459.3565	27175.4399	27174.9138	+0.5261
(18,18)	(16,19)	13538.8953	26978.9098	26978.8342	+0.0756
(18,20)	(16,19)	13543.1590	26983.1735	26983.0965	+0.0770
(18,25)	(16,26)	13536.1151	26995.7438	26995.6471	+0.0967
(18,26)	(16,27)	13535.6632	26998.5799	26998.4809	+0.0990
(18,27)	(16,26)	13541.8940	27001.5227	27001.4224	+0.1003
(18,28)	(16,27)	13541.6566	27004.5733	27004.4713	+0.1020
(18,29)	(16,30)	13534.2527	27007.7339	27007.6274	+0.1065
(18,30)	(16,31)	13533.7330	27010.9826	27010.8906	+0.0920
(18,31)	(16,30)	13540.8812	27014.3624	27014.2607	+0.1017
(18,32)	(16,31)	13540.5889	27017.8385	27017.7376	+0.1009
(18,33)	(16,34)	13532.1571	27021.4178	27021.3209	+0.0969
(18,34)	(16,35)	13531.6161	27025.1198	27025.0106	+0.1092
(18,35)	(16,34)	13539.6536	27028.9143	27028.8064	+0.1079

(18,36)	(16,35)	13539.3161	27032.8198	27032.7081	+0.1117
(18,42)	(16,43)	13526.7481	27058.4788	27058.3303	+0.1485
(18,44)	(16,43)	13536.1436	27067.8743	27067.7079	+0.1664
(18,69)	(16,70)	13503.6738	27219.7572	27219.1711	+0.5861
(18,71)	(16,70)	13518.4994	27234.5828	27233.9390	+0.6438
(18,92)	(19,93)	13259.7194	27412.4161	27411.1157	+1.3004
(18,94)	(19,93)	13278.6771	27431.3738	27430.0022	+1.3716
(19,9)	(16,10)	13602.9880	27026.5208	27026.3954	+0.1254
(19,13)	(16,14)	13601.8366	27031.4932	27031.3713	+0.1219
(19,17)	(16,18)	13600.4818	27038.1842	27038.0709	+0.1133
(19,18)	(16,19)	13600.0211	27040.0356	27040.0145	+0.0211
(19,20)	(16,19)	13604.3056	27044.3201	27044.2231	+0.0970
(19,21)	(16,22)	13598.8954	27046.5906	27046.4880	+0.1026
(19,25)	(16,26)	13597.0877	27056.7175	27056.6147	+0.1028
(19,29)	(16,30)	13595.0505	27068.5317	27068.4414	+0.0903
(19,31)	(16,30)	13601.6087	27075.0899	27074.9889	+0.1010
(19,33)	(16,34)	13592.7883	27082.0490	27081.9571	+0.0919
(19,38)	(16,39)	13589.6336	27101.3022	27101.2072	+0.0950
(19,42)	(16,43)	13586.8387	27118.5694	27118.4741	+0.0953
(19,44)	(16,43)	13596.0955	27127.8262	27127.7242	+0.1020
(19,46)	(16,47)	13583.8040	27137.4922	27137.3826	+0.1096
(19,50)	(16,51)	13580.5225	27158.0434	27157.9148	+0.1286
(19,69)	(16,70)	13561.2157	27277.2991	27276.9680	+0.3311
(19,71)	(16,70)	13575.7790	27291.8624	27291.5029	+0.3595
(19,79)	(18,80)	13403.6217	27353.7812	27353.2926	+0.4886
(19,81)	(18,80)	13420.0090	27370.1685	27369.6334	+0.5351
(19,84)	(18,85)	13396.7432	27395.3798	27394.7984	+0.5814
(19,86)	(18,85)	13413.9892	27412.6258	27412.0049	+0.6209
(19,88)	(19,89)	13319.7177	27430.1957	27429.5501	+0.6456
(19,90)	(19,89)	13337.6288	27448.1068	27447.4296	+0.6772
(19,92)	(19,93)	13313.6373	27466.3340	27465.6390	+0.6950
(19,94)	(19,93)	13332.1858	27484.8825	27484.1737	+0.7088
(20,9)	(16,10)	13662.7586	27086.2914	27086.2861	+0.0053
(20,13)	(16,14)	13661.5317	27091.1883	27091.1995	-0.0112
(20,18)	(16,19)	13659.6796	27099.6941	27099.7333	-0.0392
(20,20)	(16,19)	13663.8193	27103.8338	27103.8884	-0.0546
(20,21)	(16,22)	13658.3748	27106.0700	27106.1244	-0.0544
(20,22)	(16,23)	13657.8910	27108.3885	27108.4658	-0.0773
(20,23)	(16,22)	13663.1430	27110.8382	27110.9124	-0.0742
(20,24)	(16,23)	13662.8751	27113.3726	27113.4642	-0.0916
(20,25)	(16,26)	13656.4072	27116.0359	27116.1209	-0.0850
(20,26)	(16,27)	13655.8655	27118.7822	27118.8824	-0.1002
(20,27)	(16,26)	13662.0086	27121.6373	27121.7485	-0.1112
(20,28)	(16,27)	13661.6814	27124.5981	27124.7191	-0.1210

(20,29)	(16,30)	13654.1973	27127.6785	27127.7940	-0.1155
(20,31)	(16,30)	13660.6399	27134.1211	27134.2556	-0.1345
(20,33)	(16,34)	13651.7056	27140.9663	27141.1318	-0.1655
(20,38)	(16,39)	13648.2379	27159.9065	27160.1246	-0.2181
(20,42)	(16,43)	13645.1687	27176.8770	27177.1565	-0.2795
(20,46)	(16,47)	13641.8215	27195.5097	27195.8032	-0.2935
(20,50)	(16,51)	13638.1916	27215.7125	27216.0456	-0.3331
(20,55)	(16,56)	13633.2484	27243.1929	27243.5610	-0.3681
(20,57)	(16,56)	13644.9155	27254.8600	27255.2464	-0.3864
(20,69)	(16,70)	13616.7306	27332.8091	27333.3035	-0.4944
(20,71)	(16,70)	13631.0201	27347.0986	27347.6054	-0.5068
(20,92)	(19,93)	13365.0171	27517.7138	27518.7010	-0.9872
(20,94)	(19,93)	13383.0981	27535.7948	27536.8837	-1.0889

**PAPS Table 2.** Absolute predissociation linewidths for different  $6^1\Sigma^+(v, J)$  levels. The predissociation rates can be obtained from  $\Gamma_{\text{pred}}(\text{s}^{-1}) = 2\pi\Delta\nu_{\text{pred}}$ .

<b>v</b>	<b>J</b>	<b><math>\Delta\nu_{\text{pred}}</math> (MHz)</b>
15	11	0
	15	0
	25	2.2
	27	38.7
	38	38.7
	40	38.7
	46	58.9
	48	58.9
	50	58.9
	52	58.9
	55	71.1
	57	71.1
	69	170.2
	71	190.5
	76	241.1
79	285.6	
92	484.0	
94	524.5	
17	9	91.3
	13	99.4
	17	111.5
	21	119.6
	25	99.4
	29	99.4
	33	99.4
	38	89.3
	42	79.1
	46	79.1
	50	79.1
	69	79.1
71	79.1	
18	18	259.2
	25	686.4
	26	807.4
	27	1071.1
	28	1243.1
	29	1496.2
	30	1484.0
	31	1435.4
	32	1131.8
	33	767.4
	34	646.0
	35	433.4
36	342.3	
42	61.2	

18	69	58.9
	71	79.1
	92	220.8
	94	273.5
19	9	79.1
	13	79.1
	17	79.1
	21	69.0
	25	63.0
	29	58.6
	33	38.4
	38	38.4
	42	38.4
	46	38.4
	50	38.4
	69	38.6
	71	79.1
	79	79.1
	81	79.1
	84	111.5
	86	119.6
88	119.6	
90	160.1	
92	281.6	
94	220.8	
20	9	78.8
	18	99.0
	20	99.4
	21	99.0
	22	79.1
	23	78.2
	24	71.1
	25	75.2
	26	69.0
	28	58.9
	29	63.0
	31	58.9
	33	58.6
	38	38.4
	42	38.4
	46	58.6
	50	119.2
55	117.2	
57	117.2	
69	79.1	
71	79.1	
92	160.1	
94	200.6	