Supplementary material
Dynamics of the isotope exchange reaction of D with H_3^+, H_2D^+, and D_2H^+

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TABLE SI. Vibrationally adiabatic energy curve of the $H + H_3^+ \rightarrow H_3^+ + H$ reaction path (see Fig.2). The quantities s and E_{VA} are expressed in the units of $a_0\ u^{1/2}$ and meV, respectively.

s	E_{VA}	s	E_{VA}
-35.86585	0.0000000	0.03012	96.1450958
-25.68839	-0.0565730	0.09033	93.4722137
-16.20538	-0.3765016	0.15055	88.1021881
-14.39211	-0.5791615	0.21077	80.0669403
-12.60662	-0.9278474	0.27099	69.3151703
-10.84891	-1.4112476	0.33121	55.9483910
-9.11897	-2.7128890	0.39143	40.0626602
-7.41682	-5.2284098	0.45166	21.8674870
-5.75021	-11.9844589	0.51188	1.5873907
-5.44904	-14.4222813	0.57210	-20.3536968
-5.14787	-17.7229767	0.63232	-43.5685463
-4.84678	-22.1711769	0.69254	-67.4737549
-4.54568	-27.6510868	0.75277	-91.3724289
-4.24459	-34.9007530	0.81299	-114.4776077
-3.94350	-44.5565948	0.87321	-135.9278107
-3.64242	-56.4754562	0.93343	-154.8179626
-3.34135	-72.2898941	0.99365	-170.5589294
-3.04030	-93.5165634	1.05387	-183.1901703
-2.73928	-119.6272202	1.11409	-193.5239716
-2.43833	-150.0937805	1.17431	-202.4735260
-2.13752	-182.5179901	1.23453	-210.3686371
-1.83710	-211.8334808	1.29475	-217.0305328
-1.76000	-218.0021515	1.35498	-222.2850494
-1.66000	-224.4001160	1.41520	-226.0685120
-1.56000	-228.0001678	1.47542	-228.3886566
-1.47542	-228.3886566	1.56000	-228.0001678
-1.41520	-226.0685120	1.66000	-224.4001160
-1.35498	-222.2850494	1.76000	-218.8795471
-1.29475	-217.0305328	1.83710	-211.8334808
-1.23453	-210.3686371	2.13752	-182.5179901
-1.17431	-202.4735260	2.43833	-150.0937805
-1.11409	-193.5239716	2.73928	-119.6272202
-1.05387	-183.1901703	3.04030	-93.5165634
-0.99365	-170.5589294	3.34135	-72.2898941
-0.93343	-154.8179626	3.64242	-56.4754562
-0.87321	-135.9278107	3.94350	-44.5565948
-0.81299	-114.4776077	4.24459	-34.9007530
-0.75277	-91.3724289	4.54568	-27.6510868
-0.69254	-67.4737549	4.84678	-22.1711769
-0.63232	-43.5685463	5.14787	-17.7229767
-0.57210	-20.3536968	5.44904	-14.4222813
-0.51188	1.5873907	5.75021	-11.9844589
-0.45166	21.8674870	7.41682	-5.2284098
-0.39143	40.0626602	9.11897	-2.7128890
-0.33121	55.9483910	10.84891	-1.4112476
-0.27099	69.3151703	12.60662	-0.9278474
-0.21077	80.0669403	14.39211	-0.5791615
-0.15055	88.1021881	16.20538	-0.3765016
-0.09033	93.4722137	25.68839	-0.0565730
-0.03012	96.1450958	35.86585	0.0000000
0.00000	96.5319214		

TABLE SII. Same as Table SI but for $D + H_3^+ \rightarrow DH_2^+ + H$.

s	E_{VA}	s	E_{VA}
-47.32367	0.0000000	0.03155	66.8143463
-33.39217	-0.0565730	0.09463	63.0885620
-20.70567	-0.3765016	0.15772	56.8930779
-18.31777	-0.5791615	0.22081	48.2542839
-15.97967	-0.9278474	0.28390	37.1876831
-13.69137	-1.5711873	0.34699	23.7942410
-11.45287	-2.8728285	0.41008	8.1748991
-9.26417	-5.7342863	0.47317	-9.5527811
-7.12525	-13.4262524	0.53626	-29.1689243
-6.75966	-15.6215439	0.59935	-50.4422417
-6.39546	-18.4825649	0.66244	-73.0706863
-6.03276	-22.1474113	0.72553	-96.7089462
-5.67141	-27.1268425	0.78862	-120.8702164
-5.31131	-33.6200447	0.85171	-145.1250916
-4.95238	-42.1206360	0.91480	-168.7238770
-4.59446	-53.2136612	0.97790	-191.0105591
-4.23735	-67.1230927	1.04099	-211.0822144
-3.88074	-85.4595032	1.10408	-228.0634766
-3.52416	-108.4179153	1.16717	-241.3859100
-3.16698	-136.3181915	1.23025	-251.1539764
-2.80830	-167.5932465	1.29334	-258.6216125
-2.44687	-199.0659332	1.35643	-264.9825439
-2.08117	-224.6227112	1.41952	-270.5758362
-1.85000	-235.6115875	1.48261	-275.0276184
-1.79378	-237.3014526	1.54570	-278.1297302
-1.75000	-238.2101898	1.60879	-279.8611755
-1.73496	-238.4401245	1.67186	-280.3001099
-1.67190	-238.9021301	1.70000	-279.9001160
-1.65000	-238.9200592	1.75000	-278.7009583
-1.60880	-238.6623230	1.85000	-275.3358459
-1.54571	-236.9806671	1.95000	-268.8105469
-1.48262	-233.6303864	2.07587	-258.6296387
-1.41952	-228.6479797	2.23053	-245.1251678
-1.35643	-222.0881348	2.38519	-230.0556335
-1.29334	-214.0365601	2.69377	-198.5758514
-1.23025	-204.7071381	3.00005	-169.1238861
-1.16716	-194.2976990	3.30572	-143.4208984
-1.10407	-183.0267334	3.61035	-122.6000366
-1.04098	-170.6575317	3.91524	-106.8504868
-0.97789	-156.5141449	4.22011	-94.7127228
-0.91480	-140.0485229	4.52573	-86.2287521
-0.85171	-121.2054596	4.83188	-80.2438736
-0.78862	-100.5748749	5.13903	-76.4158630
-0.72553	-78.8552856	5.44701	-73.6812134
-0.66244	-56.8679314	5.75631	-72.0785522
-0.59935	-35.3418274	6.06678	-70.7270660
-0.53626	-14.9585886	6.50000	-68.8088608
-0.47317	3.8425677	7.00000	-67.0182571
-0.41008	20.5873756	7.79252	-64.3342896
-0.34699	35.0436935	9.54725	-61.8228302
-0.28390	46.9478645	11.33100	-60.5211868
-0.22081	56.2272110	13.14375	-59.8778458
-0.15772	62.8033943	14.98552	-59.5291634
-0.09463	66.7359848	16.85631	-59.3264999
-0.03155	68.0336914	26.64540	-59.0065727
0.00000	67.7681046	37.15979	-58.9500008

TABLE SIII. Same as Table SI but for $D + DH_2^+ \rightarrow D_2H^+ + H$.

s	E_{VA}	s	E_{VA}
-42.38665	0.0000000	-0.03496	80.8608475
-31.48346	-0.0565725	0.00000	80.7589951
-20.58027	-0.3764968	0.03496	79.8727951
-18.39963	-0.5791400	0.10485	76.2109604
-16.21900	-0.9278267	0.17475	69.8772430
-14.03836	-1.5711855	0.24466	60.8651047
-11.85772	-2.8728149	0.31456	49.2629776
-9.67708	-5.0895333	0.38446	35.1906090
-7.89425	-8.8123856	0.45437	18.7364311
-7.50000	-10.5813522	0.52427	0.0914611
-7.10575	-12.8728590	0.59417	-20.5638866
-6.71160	-15.6435223	0.66408	-42.8938179
-6.31745	-19.5211449	0.73398	-66.6496429
-5.92330	-24.6997452	0.80388	-91.3926773
-5.52916	-31.4756527	0.87379	-116.6048508
-5.13502	-40.5569077	0.94369	-141.6360626
-4.74088	-52.4983521	1.01360	-165.6601715
-4.34676	-68.1337433	1.08350	-187.7337799
-3.95266	-88.2571106	1.15340	-206.8334503
-3.55859	-113.4439697	1.22330	-222.1385040
-3.16461	-142.4172058	1.29320	-233.6739502
-2.77080	-173.9323120	1.36310	-242.6074524
-2.37740	-203.8367157	1.43300	-250.4105835
-2.20000	-215.9140930	1.50291	-257.3963013
-2.05000	-224.7957458	1.57281	-263.3564148
-1.98784	-226.9596252	1.64271	-268.0721436
-1.95000	-227.7880859	1.71261	-271.5274353
-1.90000	-228.3153992	1.78250	-273.4924622
-1.85245	-228.2176971	1.82000	-274.1028442
-1.78254	-227.0132599	1.85235	-274.4142761
-1.71263	-224.5461426	1.92000	-274.2001648
-1.64273	-220.8217468	2.02128	-271.7119141
-1.57282	-215.8774719	2.33138	-254.5836639
-1.50292	-209.2424774	2.64249	-225.4792938
-1.43301	-201.2472229	2.95389	-193.5735168
-1.36311	-191.9123535	3.26540	-163.5522003
-1.29320	-181.2740631	3.57697	-138.0577545
-1.22330	-169.3228302	3.88858	-118.0481415
-1.15340	-155.8520966	4.20019	-102.7041779
-1.08350	-140.5568542	4.51182	-90.9469528
-1.01359	-123.3551788	4.82345	-82.9262009
-0.94369	-104.3964539	5.13509	-78.3214951
-0.87379	-84.0850677	5.44672	-75.0201645
-0.80388	-63.0691643	5.75828	-71.9304504
-0.73398	-41.9302597	6.07000	-68.7075729
-0.66408	-21.3184605	6.38172	-66.5656128
-0.59417	-1.6963269	8.07864	-59.6425858
-0.52427	16.4161186	9.79085	-57.2510490
-0.45436	32.6855278	11.50306	-56.3201218
-0.38446	46.8447113	13.21527	-55.6767807
-0.31456	58.6751328	14.92748	-55.3280945
-0.24466	68.0614319	16.63969	-55.1254349
-0.17475	74.9132538	25.20074	-54.8055077
-0.10485	79.1985092	33.76179	-54.7489357

TABLE SIV. Same as Table SI but for $D + H_2D^+ \rightarrow HD_2^+ + H$.

s	E_{VA}	s	E_{VA}
-42.35043	0.0000000	-0.03506	83.9837112
-31.45998	-0.0565725	0.00000	83.5438766
-20.56953	-0.3764968	0.03506	82.3447647
-18.39144	-0.5791400	0.10516	78.0880890
-16.21335	-0.9278267	0.17526	71.4022522
-14.03526	-1.5711855	0.24536	62.3574600
-11.85717	-2.8728149	0.31547	51.1166992
-9.67908	-4.1881680	0.38557	37.7635307
-7.50000	-8.8123703	0.45567	22.3537178
-7.24230	-9.8522711	0.52578	5.1226583
-6.98464	-11.3459578	0.59588	-13.8137445
-6.72698	-12.7250223	0.66599	-34.2516747
-6.46931	-14.4943066	0.73609	-55.8645935
-6.21164	-16.9659176	0.80620	-78.4212036
-5.95396	-20.0086956	0.87630	-101.5451660
-5.69629	-23.7529812	0.94641	-124.8092728
-5.43862	-28.3514347	1.01652	-147.7648010
-5.18095	-33.9460945	1.08662	-169.8933716
-4.92328	-41.4202232	1.15673	-190.5949707
-4.66562	-49.8932419	1.22683	-209.1977692
-4.40799	-60.0689316	1.29694	-225.1292267
-4.15040	-72.1773224	1.36704	-237.9912415
-3.89287	-86.3084869	1.43714	-247.8466492
-3.63537	-101.8736420	1.50724	-255.5292358
-3.37783	-118.3912811	1.57735	-260.9247131
-3.12022	-136.2296600	1.64745	-265.2263184
-2.86258	-156.6487885	1.71756	-268.4484253
-2.60493	-179.2078247	1.72000	-268.5309143
-2.34731	-201.6862030	1.78766	-270.6163330
-2.20000	-214.2029572	1.82000	-271.7942810
-2.10000	-221.1600952	1.85774	-272.3194885
-2.00000	-226.0598755	1.92774	-272.1004639
-1.92789	-228.0296173	1.98000	-270.8790894
-1.85778	-228.5464935	2.02000	-269.3063354
-1.78767	-227.6117554	2.04137	-268.4228516
-1.71756	-225.1975708	2.12000	-264.0183411
-1.64746	-221.3209686	2.35046	-249.0012054
-1.57735	-216.0415039	2.66073	-223.4972382
-1.50724	-209.4644470	2.97131	-192.9459686
-1.43713	-201.1487122	3.28204	-164.2100677
-1.36703	-191.5442200	3.59280	-139.7973938
-1.29692	-180.6558533	3.90362	-120.2969284
-1.22682	-168.6119537	4.21442	-105.0883484
-1.15671	-155.5511627	4.52523	-93.2349777
-1.08661	-141.6279907	4.83603	-84.4049911
-1.01651	-127.1011734	5.14680	-77.8214645
-0.94641	-109.4506226	5.45761	-73.0537567
-0.87630	-89.6540680	5.76810	-70.1739731
-0.80620	-68.1864548	6.07904	-67.5582428
-0.73609	-45.9188385	6.38998	-65.6707764
-0.66599	-23.7943459	8.09691	-59.9810638
-0.59588	-2.5740817	9.81531	-57.5895271
-0.52578	17.1073608	11.53372	-56.0299988
-0.45567	34.7335472	13.25213	-55.3866577
-0.38557	49.9460716	14.97054	-55.0379715
-0.31547	62.5011330	16.68895	-54.8353119
-0.24536	72.2174988	25.28099	-54.5153847
-0.17526	79.0268784	33.87303	-54.4588089
-0.10516	82.9235535		

TABLE SV. Same as Table SI but for $D + D_2H^+ \rightarrow D_3^+ + H$.

s	E_{VA}	s	E_{VA}
-43.95350	0.0000000	-0.18492	85.1430054
-32.67100	-0.0565725	-0.11095	89.0603638
-21.38850	-0.3764968	-0.03699	90.2786179
-19.13200	-0.5791400	0.00000	89.9832840
-16.87550	-0.9278267	0.03699	88.9066238
-14.61900	-1.5711855	0.11095	84.8366013
-12.36250	-2.5021024	0.18492	78.1763458
-10.10600	-4.2737174	0.25889	68.9465179
-7.85011	-10.1377611	0.33286	57.2899780
-7.57661	-11.4713459	0.40683	43.2448235
-7.30312	-13.0262585	0.48080	26.9811211
-7.02964	-14.8302689	0.55477	8.6354733
-6.75615	-17.1478615	0.62874	-11.5572777
-6.48267	-20.0436974	0.70271	-33.4246254
-6.20918	-23.5591373	0.77668	-56.6634178
-5.93570	-27.8397617	0.85065	-80.9166565
-5.66221	-33.0795860	0.92462	-105.8022919
-5.38873	-39.4133072	0.99859	-130.7790833
-5.11524	-47.0161705	1.07257	-155.2385864
-4.84176	-56.1542969	1.14654	-178.4822693
-4.56827	-66.9966736	1.22051	-199.6500244
-4.29479	-79.7299728	1.29448	-217.9755249
-4.02131	-94.4279327	1.36845	-232.9123993
-3.74783	-111.1324615	1.44242	-244.6382751
-3.47435	-129.6862640	1.51638	-252.6097870
-3.20087	-149.7203827	1.59035	-259.2119141
-2.92741	-170.4764099	1.66432	-264.5480957
-2.65396	-191.9180908	1.73829	-268.6884155
-2.38057	-211.3572540	1.81226	-271.6927490
-2.18000	-222.2600708	1.88621	-273.6157532
-2.08000	-225.9813995	1.92000	-274.2967834
-2.03419	-226.5010071	1.96014	-274.5028992
-1.98000	-226.1182556	2.03395	-274.3896179
-1.96022	-225.6701355	2.14555	-271.5680847
-1.88624	-223.7729187	2.22000	-268.4553833
-1.81227	-220.5331268	2.45788	-252.2112885
-1.73830	-216.0005188	2.77033	-224.3792877
-1.66432	-210.1614990	3.08280	-194.7022858
-1.59035	-202.9485779	3.39527	-166.9880829
-1.51638	-194.4126434	3.70774	-143.0946198
-1.44241	-184.5800629	4.02021	-123.6339645
-1.36844	-173.5017700	4.33268	-108.4832840
-1.29447	-161.2618256	4.64515	-97.0747147
-1.22050	-147.7366638	4.95762	-88.5586243
-1.14653	-132.5919037	5.27010	-81.7823181
-1.07256	-115.5300903	5.58257	-76.9281769
-0.99859	-96.5670166	5.89504	-73.1707458
-0.92462	-76.1288223	6.20611	-70.2776642
-0.85065	-54.7931862	6.51741	-68.2863541
-0.77668	-33.2248955	8.26647	-62.7942657
-0.70271	-12.1129427	10.01553	-60.7746811
-0.62874	7.9407635	11.76459	-59.8201942
-0.55477	26.4374332	13.51365	-59.1768570
-0.48080	43.0385513	15.26271	-58.8281708
-0.40683	57.3762321	17.01177	-58.6255112
-0.33286	69.2491150	25.75707	-58.3055801
-0.25889	78.5360870	34.50237	-58.2490082

TABLE SVI. $D + H_2D^+ \rightarrow D_2H^+ + H$ experimental merged-beams rate coefficients, $\langle \sigma v_r \rangle$, with corresponding one-standard-deviation statistical uncertainties, $\Delta\langle \sigma v_r \rangle$, as a function of the relative translational energy, E_r, with the one-standard-deviation width of the collision-energy spread, ΔE_r, vs. applied floating cell voltages, U_f.

U_f	E_r	ΔE_r	$\langle \sigma v_r \rangle$	$\Delta\langle \sigma v_r \rangle$
(kV)	(eV)		(10^{-10} cm^3 s^{-1})	
-0.720	9.428	0.148	0.489	0.071
-0.640	7.424	0.130	0.955	0.090
-0.560	5.668	0.114	1.521	0.110
-0.480	4.154	0.097	2.650	0.144
-0.400	2.880	0.080	3.719	0.158
-0.360	2.328	0.072	4.050	0.159
-0.320	1.841	0.064	4.424	0.118
-0.280	1.409	0.056	3.972	0.157
-0.240	1.038	0.048	4.084	0.114
-0.200	0.722	0.040	3.551	0.155
-0.180	0.586	0.036	3.366	0.114
-0.160	0.466	0.032	2.981	0.074
-0.140	0.358	0.028	2.895	0.105
-0.120	0.265	0.024	2.533	0.078
-0.100	0.186	0.020	2.571	0.098
-0.080	0.122	0.016	2.547	0.067
-0.060	0.070	0.012	2.764	0.103
-0.040	0.033	0.008	3.072	0.086
-0.020	0.011	0.004	3.238	0.109
0.000	0.003	0.001	3.618	0.079
0.020	0.007	0.003	3.099	0.108
0.040	0.026	0.007	2.901	0.082
0.060	0.059	0.011	2.818	0.107
0.080	0.106	0.015	2.705	0.070
0.100	0.166	0.019	2.783	0.104
0.120	0.240	0.023	2.667	0.081
0.140	0.327	0.026	2.910	0.105
0.160	0.430	0.030	3.014	0.073
0.180	0.543	0.034	3.330	0.116
0.200	0.671	0.038	3.615	0.092
0.240	0.970	0.045	3.935	0.113
0.280	1.318	0.053	4.221	0.161
0.320	1.724	0.060	4.328	0.119
0.360	2.178	0.068	4.007	0.160
0.400	2.690	0.075	3.877	0.117
0.480	3.867	0.090	3.275	0.153
0.560	5.248	0.104	2.287	0.130
0.640	6.833	0.119	1.183	0.096
0.720	8.621	0.133	0.734	0.085
0.800	10.607	0.147	0.280	0.060

TABLE SVII. Same as Table SVI but for $D + D_2H^+ \rightarrow D_3^+ + H$.

U_f	E_r	ΔE_r	$\langle \sigma v_r \rangle$	$\Delta\langle \sigma v_r \rangle$
(kV)	(eV)		(10^{-10} cm^3 s^{-1})	
-0.720	12.248	0.185	0.020	0.068
-0.640	9.639	0.164	0.142	0.072
-0.560	7.354	0.142	0.636	0.087
-0.480	5.387	0.121	0.913	0.095
-0.400	3.734	0.100	1.822	0.117
-0.360	3.025	0.090	1.930	0.124
-0.320	2.391	0.080	1.937	0.088
-0.280	1.834	0.070	2.104	0.132
-0.240	1.350	0.060	2.028	0.089
-0.200	0.943	0.050	1.982	0.126
-0.180	0.764	0.045	1.659	0.119
-0.160	0.608	0.040	1.640	0.066
-0.140	0.467	0.035	1.430	0.110
-0.120	0.348	0.030	1.311	0.076
-0.100	0.244	0.025	1.145	0.101
-0.080	0.161	0.020	1.179	0.059
-0.060	0.094	0.015	1.228	0.101
-0.040	0.047	0.011	1.283	0.077
-0.020	0.015	0.006	1.632	0.115
0.000	0.005	0.001	1.435	0.065
0.020	0.009	0.004	1.044	0.103
0.040	0.034	0.009	1.448	0.081
0.060	0.074	0.013	1.109	0.102
0.080	0.134	0.018	1.037	0.057
0.100	0.209	0.023	1.274	0.102
0.120	0.304	0.028	1.234	0.074
0.140	0.414	0.032	1.222	0.105
0.160	0.545	0.037	1.499	0.067
0.180	0.689	0.042	1.614	0.118
0.200	0.854	0.046	1.800	0.087
0.240	1.234	0.056	1.972	0.091
0.280	1.681	0.065	2.131	0.136
0.320	2.195	0.074	2.126	0.092
0.360	2.778	0.083	1.768	0.123
0.400	3.426	0.092	1.687	0.087
0.480	4.922	0.110	1.209	0.100
0.560	6.681	0.128	0.601	0.079
0.640	8.698	0.145	0.375	0.071
0.720	10.969	0.162	0.050	0.053
0.800	13.491	0.179	0.090	0.051

TABLE SVIII. List of experimentally derived thermal rate coefficient for $D + H_3^+ \rightarrow H_2D^+ + H$, for our semi-empirical model without tunneling, $k_{mod}(T)$, and with tunneling, $k_{tun}(T)$.

T	$k_{mod}(T)$	$k_{tun}(T)$ [a]
(K)	(cm^3 s^{-1})	
10		2.976[-13]
11		3.270[-13]
12		3.553[-13]
13		3.829[-13]
14		4.089[-13]
15	1.789[-33]	4.341[-13]
16	6.063[-32]	4.573[-13]
17	1.259[-30]	4.791[-13]
18	1.794[-29]	5.013[-13]
19	1.894[-28]	5.213[-13]
20	1.562[-27]	5.403[-13]
25	4.915[-24]	6.331[-13]
30	1.063[-21]	7.175[-13]
40	9.292[-19]	9.006[-13]
50	5.866[-17]	1.125[-12]
60	9.193[-16]	1.410[-12]
70	6.642[-15]	1.781[-12]
80	2.938[-14]	2.257[-12]
90	9.121[-14]	2.865[-12]
100	2.235[-13]	3.625[-12]
110	4.634[-13]	4.555[-12]
120	8.488[-13]	5.670[-12]
130	1.414[-12]	6.977[-12]
140	2.187[-12]	8.481[-12]
150	3.189[-12]	1.018[-11]
160	4.432[-12]	1.208[-11]
170	5.925[-12]	1.416[-11]
180	7.661[-12]	1.642[-11]
190	9.642[-12]	1.886[-11]
200	1.185[-11]	2.146[-11]
250	2.593[-11]	3.651[-11]
300	4.368[-11]	5.410[-11]
400	8.440[-11]	9.309[-11]
500	1.275[-10]	1.342[-10]
600	1.717[-10]	1.766[-10]
700	2.166[-10]	2.201[-10]
800	2.612[-10]	2.638[-10]
900	3.045[-10]	3.063[-10]
1000	3.453[-10]	3.465[-10]
1100	3.828[-10]	3.836[-10]
1200	4.192[-10]	4.192[-10]
1300	4.519[-10]	4.519[-10]
1400	4.819[-10]	4.819[-10]
1500	5.097[-10]	5.097[-10]
1600	5.356[-10]	5.356[-10]
1700	5.597[-10]	5.597[-10]
1800	5.823[-10]	5.823[-10]
1900	6.035[-10]	6.035[-10]
2000	6.235[-10]	6.235[-10]
2500	7.085[-10]	7.085[-10]
3000	7.752[-10]	7.752[-10]
4000	8.731[-10]	8.731[-10]

[a] X[Y] corresponds to $X \times 10^Y$.

TABLE SIX. Same as Table SVIII but for $D + H_2D^+ \rightarrow D_2H^+ + H$.

T (K)	$k_{mod}(T)$ ($cm^3\ s^{-1}$)	$k_{tun}(T)$ ($cm^3\ s^{-1}$)
10		4.168[-14]
11		4.672[-14]
12		5.283[-14]
13		6.000[-14]
14		6.812[-14]
15		7.710[-14]
16		8.676[-14]
17	2.587[-33]	9.677[-14]
18	5.525[-32]	1.071[-13]
19	8.888[-31]	1.172[-13]
20	1.073[-29]	1.274[-13]
25	1.283[-25]	1.744[-13]
30	6.219[-23]	2.142[-13]
40	1.250[-19]	2.912[-13]
50	1.152[-17]	3.817[-13]
60	2.307[-16]	4.979[-13]
70	1.936[-15]	6.499[-13]
80	9.446[-15]	8.483[-13]
90	3.216[-14]	1.107[-12]
100	8.520[-14]	1.440[-12]
110	1.882[-13]	1.860[-12]
120	3.629[-13]	2.380[-12]
130	6.310[-13]	3.010[-12]
140	1.011[-12]	3.755[-12]
150	1.520[-12]	4.622[-12]
160	2.167[-12]	5.611[-12]
170	2.961[-12]	6.724[-12]
180	3.904[-12]	7.957[-12]
190	4.996[-12]	9.309[-12]
200	6.234[-12]	1.077[-11]
250	1.440[-11]	1.960[-11]
300	2.511[-11]	3.035[-11]
400	5.064[-11]	5.511[-11]
500	7.851[-11]	8.194[-11]
600	1.072[-10]	1.097[-10]
700	1.358[-10]	1.376[-10]
800	1.637[-10]	1.649[-10]
900	1.903[-10]	1.911[-10]
1000	2.152[-10]	2.157[-10]
1100	2.412[-10]	2.412[-10]
1200	2.639[-10]	2.639[-10]
1300	2.847[-10]	2.847[-10]
1400	3.039[-10]	3.039[-10]
1500	3.217[-10]	3.217[-10]
1600	3.383[-10]	3.383[-10]
1700	3.538[-10]	3.538[-10]
1800	3.683[-10]	3.683[-10]
1900	3.819[-10]	3.819[-10]
2000	3.947[-10]	3.947[-10]
2500	4.493[-10]	4.493[-10]
3000	4.922[-10]	4.922[-10]
4000	5.553[-10]	5.553[-10]

TABLE SX. Same as Table SVIII but for $D + D_2H^+ \rightarrow D_3^+ + H$.

T (K)	$k_{mod}(T)$ ($cm^3\ s^{-1}$)	$k_{tun}(T)$ ($cm^3\ s^{-1}$)
10		7.648[-15]
11		8.414[-15]
12		9.281[-15]
13		1.025[-14]
14		1.131[-14]
15		1.246[-14]
16		1.370[-14]
17		1.500[-14]
18	1.417[-34]	1.635[-14]
19	2.921[-33]	1.771[-14]
20	4.434[-32]	1.912[-14]
25	1.326[-27]	2.651[-14]
30	1.230[-24]	3.412[-14]
40	5.913[-21]	5.081[-14]
50	9.114[-19]	7.073[-14]
60	2.546[-17]	9.619[-14]
70	2.697[-16]	1.301[-13]
80	1.563[-15]	1.761[-13]
90	6.079[-15]	2.396[-13]
100	1.790[-14]	3.258[-13]
110	4.310[-14]	4.410[-13]
120	8.931[-14]	5.910[-13]
130	1.649[-13]	7.815[-13]
140	2.784[-13]	1.017[-12]
150	4.375[-13]	1.303[-12]
160	6.489[-13]	1.640[-12]
170	9.175[-13]	2.032[-12]
180	1.247[-12]	2.480[-12]
190	1.640[-12]	2.982[-12]
200	2.098[-12]	3.540[-12]
250	5.315[-12]	7.103[-12]
300	9.848[-12]	1.174[-11]
400	2.134[-11]	2.303[-11]
500	3.427[-11]	3.558[-11]
600	4.757[-11]	4.850[-11]
700	6.083[-11]	6.146[-11]
800	7.394[-11]	7.432[-11]
900	8.685[-11]	8.704[-11]
1000	1.006[-10]	1.006[-10]
1100	1.128[-10]	1.128[-10]
1200	1.239[-10]	1.239[-10]
1300	1.341[-10]	1.342[-10]
1400	1.436[-10]	1.436[-10]
1500	1.524[-10]	1.524[-10]
1600	1.605[-10]	1.605[-10]
1700	1.682[-10]	1.682[-10]
1800	1.753[-10]	1.753[-10]
1900	1.820[-10]	1.820[-10]
2000	1.883[-10]	1.883[-10]
2500	2.151[-10]	2.151[-10]
3000	2.362[-10]	2.362[-10]
4000	2.672[-10]	2.672[-10]