

Supporting information

Mixture of Hydrogen and Methane under planetary interior conditions

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Table 1: DC Electrical conductivity data table of a dense hydrogen-methane mixture as a function of pressure along five isotherms.

Temperature [K]	Pressure [GPa]	ρ [g/cm ³]	σ_0 [MS/m]
1000	73.329	1.32	7.245e-13
1000	183.56	1.85	9.438e-11
1000	555.88	2.90	0.18403
1000	820.58	3.43	0.89112
1000	978.44	3.70	1.3114
3000	18.340	0.74	1.55e-05
3000	83.345	1.32	0.001652
3000	181.253	1.85	0.44612
3000	360.770	2.42	0.96726
3000	571.341	2.90	1.41040
3000	857.916	3.43	1.89140
3000	1023.22	3.70	2.08960
4000	20.029	0.74	0.0020762
4000	79.360	1.32	0.22072
4000	187.621	1.85	0.70642
4000	373.578	2.42	1.1537
4000	588.299	2.90	1.5101
4000	878.583	3.43	2.0087
4000	1045.93	3.70	2.1885
6000	21.818	0.74	0.0937
6000	87.634	1.32	0.48127
6000	139.541	1.85	0.8759
6000	400.853	2.42	1.3064
6000	622.585	2.90	1.6207
6000	919.991	3.43	1.9678
6000	1090.9	3.70	2.1701
8000	26.165	0.74	0.173
8000	99.789	1.32	0.5657
8000	225.617	1.85	0.9328
8000	427.99	2.42	1.3204
8000	655.760	2.90	1.6239
8000	959.95	3.43	1.9382
8000	1134.19	3.70	2.1547
16000	51.0504	0.74	0.2536
16000	151.645	1.32	0.6311
16000	302.54	1.85	0.9636
16000	532.03	2.42	1.3016
16000	782.378	2.90	1.6067
16000	1112.14	3.43	1.8874
16000	1297.24	3.70	2.0104

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Table 2: Electrical conductivity data along the P-T profile of Uranus¹ as a function of radius of the planet.

Pressure [GPa]	Temperature [K]	r/R_p	σ_0 [MS/m]
17.157	2445.52	0.783	1.123e-06
39.40	3000	0.7117	0.007115
78.90	3646.30	0.6587	0.1473
126.78	4176.87	0.6057	0.4967
194.26	4758.55	0.5377	0.7894
279.60	5285.71	0.4577	1.1097
400.853	6000	0.3447	1.338
499.44	6231.78	0.2467	1.4953
773.66	6523.89	0.0432	1.8446

References:

1. N. Nettelmann, R Helled, J. Fortney and R. Redmer, Planet. Space Sci., 2013, 77, 143-151.