

Supporting Information

Hydration Promoted by a Methylene Group: A Volumetric Study on Alkynes in Water

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Table of Contents	Page number
Table S1. Densities of 1-pentyne aqueous solutions at various molarities	S1 - S2
Table S2. Densities of 1-hexyne aqueous solutions at various molarities	S3 - S4
Table S3. Densities of 1-heptyne aqueous solutions at various molarities	S5 - S6
Table S4. Densities of 2-pentyne aqueous solutions at various molarities	S7
Table S5. Densities of 2-hexyne aqueous solutions at various molarities	S8 - S9
Table S6. Densities of 2-heptyne aqueous solutions at various molarities	S10 - S11
Table S7. Densities of 3-hexyne aqueous solutions at various molarities	S12 - S13
Table S8. Density of 3-heptyne aqueous solutions at various molarities	S14 - S15

Table S1. Densities (ρ) of 1-pentyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{1\text{-pentyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{1\text{-pentyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{1\text{-pentyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.018624	0.996816	-0.000228
0.007463	0.996947	-0.000097	0.018673	0.996846	-0.000198
0.007559	0.996949	-0.000095	0.018680	0.996818	-0.000226
0.008804	0.996930	-0.000114	0.018710	0.996827	-0.000217
0.010320	0.996906	-0.000138	0.018776	0.996821	-0.000223
0.010410	0.996907	-0.000137	0.018849	0.996820	-0.000224
0.011400	0.996890	-0.000154	0.019133	0.996840	-0.000204
0.012180	0.996892	-0.000152	0.019194	0.996843	-0.000201
0.012240	0.996891	-0.000153	0.019409	0.996835	-0.000209
0.013370	0.996875	-0.000169	0.019645	0.996803	-0.000241
0.013820	0.996867	-0.000177	0.019693	0.996790	-0.000254
0.014030	0.996873	-0.000171	0.019775	0.996835	-0.000209
0.014910	0.996841	-0.000203	0.019780	0.996802	-0.000242
0.015220	0.996856	-0.000188	0.020012	0.996792	-0.000252
0.016070	0.996811	-0.000233	0.020030	0.996808	-0.000236
0.016070	0.996870	-0.000174	0.020091	0.996822	-0.000222
0.016359	0.996847	-0.000197	0.020326	0.996779	-0.000265
0.016710	0.996829	-0.000215	0.020365	0.996771	-0.000273
0.017823	0.996801	-0.000243	0.020461	0.996811	-0.000233
0.018007	0.996832	-0.000212	0.020605	0.996822	-0.000222
0.018112	0.996819	-0.000225	0.020611	0.996808	-0.000236
0.018450	0.996828	-0.000216	0.020654	0.996775	-0.000269
0.018454	0.996814	-0.000230	0.020664	0.996783	-0.000261
0.018490	0.996847	-0.000197	0.020712	0.996793	-0.000251
0.018612	0.996821	-0.000223	0.020760	0.996803	-0.000241

Table S1. Continued

$m_{1\text{-pentyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.020773	0.996777	-0.000267
0.020850	0.996779	-0.000265
0.021044	0.996774	-0.000270
0.021064	0.996788	-0.000256
0.021196	0.996781	-0.000263
0.021387	0.996796	-0.000248
0.021774	0.996780	-0.000264
0.021776	0.996779	-0.000265
0.021807	0.996782	-0.000262
0.021924	0.996803	-0.000241
0.022105	0.996786	-0.000258
0.022260	0.996781	-0.000263
0.022315	0.996759	-0.000285
0.022366	0.996772	-0.000272
0.022756	0.996766	-0.000278

Table S2. Densities (ρ) of 1-hexyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{1\text{-hexyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{1\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{1\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.003055	0.997002	-0.000042
0.001879	0.997024	-0.000020	0.003106	0.997005	-0.000039
0.001919	0.997017	-0.000027	0.003135	0.997004	-0.000040
0.001928	0.997022	-0.000022	0.003180	0.997003	-0.000041
0.002071	0.997022	-0.000022	0.003180	0.997002	-0.000042
0.002081	0.997019	-0.000025	0.003249	0.997014	-0.000030
0.002103	0.997014	-0.000030	0.003250	0.997012	-0.000032
0.002112	0.997019	-0.000025	0.003260	0.997003	-0.000041
0.002147	0.997023	-0.000021	0.003298	0.997009	-0.000035
0.002190	0.997016	-0.000028	0.003354	0.996999	-0.000045
0.002206	0.997014	-0.000030	0.003383	0.997006	-0.000038
0.002307	0.997012	-0.000032	0.003388	0.997013	-0.000031
0.002406	0.997010	-0.000034	0.003393	0.997011	-0.000033
0.002488	0.997013	-0.000031	0.003402	0.997002	-0.000042
0.002499	0.997008	-0.000036	0.003433	0.997003	-0.000041
0.002589	0.997014	-0.000030	0.003532	0.996999	-0.000045
0.002679	0.997006	-0.000038	0.003536	0.996999	-0.000045
0.002700	0.997016	-0.000028	0.003569	0.997003	-0.000041
0.002808	0.997011	-0.000033	0.003583	0.997014	-0.000030
0.002878	0.997006	-0.000038	0.003593	0.996995	-0.000049
0.002902	0.997006	-0.000038	0.003611	0.997001	-0.000043
0.002907	0.997005	-0.000039	0.003625	0.997002	-0.000042
0.002948	0.997004	-0.000040	0.003627	0.997006	-0.000038
0.003026	0.997005	-0.000039	0.003666	0.997001	-0.000043
0.003041	0.997010	-0.000034	0.003690	0.997006	-0.000038

Table S2. Continued

$m_{1\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.003705	0.997001	-0.000043
0.003715	0.997011	-0.000033
0.003716	0.997007	-0.000037
0.003720	0.997012	-0.000032
0.003752	0.997007	-0.000037
0.003765	0.997003	-0.000041
0.003788	0.997000	-0.000044
0.003847	0.997001	-0.000043
0.003869	0.997001	-0.000043
0.003927	0.997006	-0.000038
0.003936	0.996991	-0.000053
0.003943	0.996990	-0.000054
0.003944	0.997009	-0.000035
0.003959	0.996996	-0.000048
0.003967	0.996993	-0.000051
0.004052	0.997007	-0.000037
0.004114	0.997003	-0.000041
0.004125	0.996997	-0.000047
0.004146	0.997001	-0.000043
0.004166	0.996999	-0.000045
0.004218	0.997000	-0.000044
0.004247	0.997008	-0.000036
0.004285	0.997004	-0.000040
0.004339	0.996992	-0.000052

Table S3: Densities (ρ) of 1-heptyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{1\text{-heptyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{1\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{1\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.000673	0.997041	-0.000003
0.000179	0.997040	-0.000004	0.000677	0.997038	-0.000006
0.000187	0.997041	-0.000003	0.000680	0.997041	-0.000003
0.000238	0.997039	-0.000005	0.000681	0.997041	-0.000003
0.000283	0.997037	-0.000007	0.000688	0.997035	-0.000009
0.000321	0.997041	-0.000003	0.000691	0.997034	-0.000010
0.000327	0.997041	-0.000003	0.000692	0.997035	-0.000009
0.000371	0.997037	-0.000007	0.000694	0.997033	-0.000011
0.000390	0.997041	-0.000003	0.000698	0.997037	-0.000007
0.000420	0.997041	-0.000003	0.000698	0.997041	-0.000003
0.000463	0.997039	-0.000005	0.000699	0.997036	-0.000008
0.000486	0.997041	-0.000003	0.000700	0.997041	-0.000003
0.000488	0.997035	-0.000009	0.000728	0.997035	-0.000009
0.000501	0.997036	-0.000008	0.000728	0.997035	-0.000009
0.000540	0.997032	-0.000012	0.000742	0.997035	-0.000009
0.000579	0.997036	-0.000008	0.000743	0.997037	-0.000007
0.000584	0.997036	-0.000008	0.000750	0.997036	-0.000008
0.000607	0.997037	-0.000007	0.000750	0.997035	-0.000009
0.000633	0.997033	-0.000011	0.000757	0.997034	-0.000010
0.000638	0.997041	-0.000003	0.000762	0.997039	-0.000005
0.000639	0.997033	-0.000011	0.000765	0.997037	-0.000007
0.000642	0.997040	-0.000004	0.000767	0.997037	-0.000007
0.000650	0.997035	-0.000009	0.000775	0.997033	-0.000011
0.000651	0.997030	-0.000014	0.000775	0.997036	-0.000008
0.000659	0.997036	-0.000008	0.000785	0.997031	-0.000013

Table S3. Continued

$m_{1\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000787	0.997030	-0.000014
0.000788	0.997031	-0.000013
0.000807	0.997033	-0.000011
0.000825	0.997037	-0.000007
0.000827	0.997030	-0.000014
0.000830	0.997037	-0.000007
0.000838	0.997036	-0.000008
0.000840	0.997032	-0.000012
0.000841	0.997029	-0.000015
0.000858	0.997036	-0.000008
0.000860	0.997031	-0.000013

Table S4: Densities (ρ) of 2-pentyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{2\text{-pentyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{2\text{-pentyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{2\text{-pentyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.014871	0.996851	-0.000193
0.004100	0.996992	-0.000052	0.014863	0.996845	-0.000199
0.004769	0.996979	-0.000065	0.014200	0.996842	-0.000202
0.005245	0.996973	-0.000071	0.014086	0.996837	-0.000207
0.005104	0.996966	-0.000078	0.014903	0.996833	-0.000211
0.005860	0.996955	-0.000089	0.013004	0.996833	-0.000211
0.006496	0.996954	-0.000090	0.015318	0.996827	-0.000217
0.006949	0.996951	-0.000093	0.016220	0.996820	-0.000224
0.006644	0.996948	-0.000096	0.015207	0.996817	-0.000227
0.008343	0.996930	-0.000114	0.016659	0.996809	-0.000235
0.009262	0.996922	-0.000122	0.017399	0.996788	-0.000256
0.008069	0.996917	-0.000127	0.016834	0.996780	-0.000264
0.010104	0.996908	-0.000136	0.017946	0.996770	-0.000274
0.009500	0.996904	-0.000140	0.019679	0.996764	-0.000280
0.010171	0.996902	-0.000142	0.018345	0.996757	-0.000287
0.010336	0.996894	-0.000150	0.018678	0.996756	-0.000288
0.010136	0.996890	-0.000154	0.019285	0.996733	-0.000311
0.012574	0.996885	-0.000159	0.020770	0.996729	-0.000315
0.011979	0.996883	-0.000161	0.020478	0.996725	-0.000319
0.011979	0.996878	-0.000166	0.020570	0.996719	-0.000325
0.012846	0.996867	-0.000177	0.023719	0.996689	-0.000355
0.011353	0.996865	-0.000179	0.022896	0.996682	-0.000362
0.012420	0.996860	-0.000184	0.027577	0.996618	-0.000426
0.013404	0.996859	-0.000185			
0.012854	0.996854	-0.000190			

Table S5: Densities (ρ) of 2-hexyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{2\text{-hexyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{2\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{2\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.004223	0.996988	-0.000056
0.002755	0.997013	-0.000031	0.004244	0.997001	-0.000043
0.003164	0.997012	-0.000032	0.004254	0.996993	-0.000051
0.003343	0.997001	-0.000043	0.004360	0.997004	-0.000040
0.003354	0.997003	-0.000041	0.004387	0.996987	-0.000057
0.003377	0.997012	-0.000032	0.004440	0.997001	-0.000043
0.003414	0.997000	-0.000044	0.004441	0.996989	-0.000055
0.003453	0.997003	-0.000041	0.004451	0.996992	-0.000052
0.003457	0.997003	-0.000041	0.004471	0.996986	-0.000058
0.003469	0.997006	-0.000038	0.004614	0.997001	-0.000043
0.003490	0.996998	-0.000046	0.004660	0.996998	-0.000046
0.003519	0.997004	-0.000040	0.004738	0.996984	-0.000060
0.003591	0.997006	-0.000038	0.004820	0.996995	-0.000049
0.003770	0.996993	-0.000051	0.004895	0.996994	-0.000050
0.003814	0.997012	-0.000032	0.004901	0.996987	-0.000057
0.003880	0.997003	-0.000041	0.004970	0.997000	-0.000044
0.003892	0.996993	-0.000051	0.005297	0.996988	-0.000056
0.003930	0.996992	-0.000052	0.005322	0.996998	-0.000046
0.003951	0.996993	-0.000051	0.005360	0.996983	-0.000061
0.003978	0.996993	-0.000051	0.005590	0.996985	-0.000059
0.004022	0.996994	-0.000050	0.005598	0.997003	-0.000041
0.004086	0.997001	-0.000043	0.005768	0.996986	-0.000058
0.004160	0.997012	-0.000032	0.005829	0.996987	-0.000057
0.004192	0.996995	-0.000049	0.006004	0.996979	-0.000065
0.004204	0.997000	-0.000044	0.006096	0.996997	-0.000047

Table S5. Continued

$m_{2\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.006107	0.996992	-0.000052
0.006959	0.996967	-0.000077
0.006961	0.996983	-0.000061
0.006979	0.996978	-0.000066
0.006995	0.996968	-0.000076
0.007180	0.996984	-0.000060
0.007286	0.996981	-0.000063
0.008070	0.996959	-0.000085
0.008197	0.996964	-0.000080

Table S6: Densities (ρ) of 2-heptyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{2\text{-heptyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{2\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{2\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.001625	0.997036	-0.000008
0.000081	0.997043	-0.000001	0.001674	0.997031	-0.000013
0.000247	0.997044	0.000000	0.001894	0.997026	-0.000018
0.000293	0.997039	-0.000005	0.001943	0.997032	-0.000012
0.000339	0.997044	0.000000	0.001958	0.997035	-0.000009
0.000408	0.997039	-0.000005	0.001981	0.997035	-0.000009
0.000465	0.997036	-0.000008	0.002030	0.997025	-0.000019
0.000539	0.997040	-0.000004	0.002101	0.997026	-0.000018
0.000589	0.997039	-0.000005	0.002126	0.997023	-0.000021
0.000604	0.997036	-0.000008	0.002225	0.997025	-0.000019
0.000685	0.997042	-0.000002	0.002253	0.997028	-0.000016
0.000689	0.997041	-0.000003	0.002281	0.997033	-0.000011
0.000697	0.997041	-0.000003	0.002341	0.997030	-0.000014
0.000744	0.997037	-0.000007	0.002372	0.997032	-0.000012
0.000841	0.997036	-0.000008	0.002421	0.997032	-0.000012
0.000883	0.997031	-0.000013	0.002546	0.997034	-0.000010
0.000887	0.997038	-0.000006	0.002550	0.997026	-0.000018
0.000968	0.997035	-0.000009	0.002625	0.997026	-0.000018
0.001002	0.997038	-0.000006	0.002655	0.997017	-0.000027
0.001132	0.997042	-0.000002	0.002790	0.997033	-0.000011
0.001164	0.997036	-0.000008	0.002860	0.997018	-0.000026
0.001230	0.997039	-0.000005	0.002861	0.997033	-0.000011
0.001423	0.997028	-0.000016	0.002929	0.997031	-0.000013
0.001449	0.997031	-0.000013	0.003101	0.997026	-0.000018
0.001553	0.997032	-0.000012	0.003152	0.997031	-0.000013

Table S6. Continued

$m_{2\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.003331	0.997019	-0.000025
0.003441	0.997020	-0.000024
0.003446	0.997026	-0.000018
0.003638	0.997022	-0.000022

Table S7: Densities (ρ) of 3-hexyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{3\text{-hexyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{3\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{3\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.004432	0.996986	-0.000058
0.001980	0.997004	-0.000040	0.004655	0.996997	-0.000047
0.002343	0.997001	-0.000043	0.004660	0.996988	-0.000056
0.002640	0.997009	-0.000035	0.004740	0.996979	-0.000065
0.002640	0.997002	-0.000042	0.004749	0.997004	-0.000040
0.003055	0.997004	-0.000040	0.005131	0.996980	-0.000064
0.003058	0.997009	-0.000035	0.005232	0.997007	-0.000037
0.003129	0.997004	-0.000040	0.005276	0.996993	-0.000051
0.003279	0.996992	-0.000052	0.005399	0.996982	-0.000062
0.003285	0.996980	-0.000064	0.005495	0.996992	-0.000052
0.003449	0.997001	-0.000043	0.005546	0.996962	-0.000082
0.003612	0.997001	-0.000043	0.005593	0.996985	-0.000059
0.003621	0.997010	-0.000034	0.005859	0.996982	-0.000062
0.003648	0.997005	-0.000039	0.006114	0.996973	-0.000071
0.003764	0.997004	-0.000040	0.006192	0.996992	-0.000052
0.003880	0.996997	-0.000047	0.006267	0.996980	-0.000064
0.003999	0.996992	-0.000052	0.006308	0.997002	-0.000042
0.004024	0.996984	-0.000060	0.006561	0.996985	-0.000059
0.004155	0.997001	-0.000043	0.006753	0.996980	-0.000064
0.004159	0.996993	-0.000051	0.006816	0.996991	-0.000053
0.004259	0.996992	-0.000052	0.006954	0.996968	-0.000076
0.004275	0.996977	-0.000067	0.007057	0.996968	-0.000076
0.004285	0.996991	-0.000053	0.007149	0.996969	-0.000075
0.004302	0.997002	-0.000042	0.007297	0.996967	-0.000077
0.004353	0.997006	-0.000038	0.007533	0.996963	-0.000081

Table S7. Continued

$m_{3\text{-hexyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.007555	0.996962	-0.000082
0.007662	0.996982	-0.000062
0.008440	0.996958	-0.000086
0.008736	0.996939	-0.000105
0.009286	0.996968	-0.000076
0.009340	0.996962	-0.000082

Table S8: Densities (ρ) of 3-heptyne aqueous solutions, and their difference from that of bulk water at various molarities ($m_{3\text{-heptyne}}$) under 25.000 ± 0.003 °C and atmospheric pressure.

$m_{3\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³	$m_{3\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.000000	0.997044	0.000000	0.001403	0.997037	-0.000007
0.000551	0.997041	-0.000003	0.001442	0.997041	-0.000003
0.000625	0.997042	-0.000002	0.001451	0.997034	-0.000010
0.000641	0.997043	-0.000001	0.001523	0.997032	-0.000012
0.000675	0.997043	-0.000001	0.001676	0.997037	-0.000007
0.000689	0.997036	-0.000008	0.001711	0.997024	-0.000020
0.000732	0.997035	-0.000009	0.001735	0.997028	-0.000016
0.000771	0.997044	0.000000	0.001739	0.997026	-0.000018
0.000788	0.997036	-0.000008	0.001779	0.997025	-0.000019
0.000818	0.997033	-0.000011	0.001808	0.997024	-0.000020
0.000886	0.997035	-0.000009	0.001891	0.997025	-0.000019
0.000897	0.997038	-0.000006	0.001962	0.997022	-0.000022
0.000948	0.997033	-0.000011	0.002038	0.997026	-0.000018
0.000986	0.997036	-0.000008	0.002160	0.997031	-0.000013
0.000991	0.997033	-0.000011	0.002179	0.997027	-0.000017
0.001012	0.997037	-0.000007	0.002192	0.997020	-0.000024
0.001151	0.997032	-0.000012	0.002226	0.997029	-0.000015
0.001152	0.997037	-0.000007	0.002260	0.997019	-0.000025
0.001158	0.997031	-0.000013	0.002460	0.997024	-0.000020
0.001186	0.997038	-0.000006	0.002614	0.997022	-0.000022
0.001203	0.997037	-0.000007	0.002626	0.997031	-0.000013
0.001251	0.997042	-0.000002	0.002628	0.997026	-0.000018
0.001253	0.997037	-0.000007	0.002649	0.997015	-0.000029
0.001340	0.997030	-0.000014	0.002811	0.997029	-0.000015
0.001394	0.997037	-0.000007	0.002825	0.997025	-0.000019

Table S8. Continued

$m_{3\text{-heptyne}}$ /mol kg ⁻¹	ρ /g cm ⁻³	$\Delta\rho$ /g cm ⁻³
0.002905	0.997018	-0.000026
0.002909	0.997026	-0.000018
0.002910	0.997017	-0.000027
0.003090	0.997022	-0.000022
0.003231	0.997015	-0.000029
0.003453	0.997016	-0.000028
0.003470	0.997019	-0.000025
0.003507	0.997024	-0.000020
0.003873	0.997011	-0.000033
0.003900	0.997017	-0.000027
0.004546	0.997005	-0.000039