An Experimental and Detailed Kinetics Modeling Study of Norbornadiene in Hydrogen and Methane Mixtures: Ignition Delay Time and Spectroscopic CO Measurements

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Supplementary Material

1/ Ignition delay times for 100% H_2 oxidation (Mixture 1), ϕ = 1.0, T = 1014 – 1459 K, P = 0.93 – 7.51 atm

T5 (K)	P5 (atm)	OH* IDTs (μs)
1014	1.87	974
1052	1.76	578
1098	1.20	578
1125	1.74	353
1127	1.12	520
1127	1.12	466
1164	1.10	418
1167	1.06	398
1201	1.66	233
1218	1.00	293
1258	0.97	260
1266	0.99	237
1283	1.55	147
1309	1.00	199
1316	1.05	191
1317	0.93	161
1337	1.54	112
1459	1.00	108
1080	7.51	837
1093	7.47	389
1095	7.08	327
1107	7.08	184
1139	7.17	154
1140	6.95	143

2/ Ignition delay times for 98/2% H_2/NBD oxidation (Mixture 3), ϕ = 1.0, T = 1151 – 1404 K, P = 0.96 – 7.08 atm

T5 (K)	P5 (atm)	OH* IDTs (μs)
1169	1.02	3109
1194	1.12	1740
1208	1.02	1758
1220	1.24	1374
1220	0.99	1332
1258	1.00	723
1290	0.96	501
1309	1.17	365
1336	1.07	301
1375	1.00	220
1404	0.98	145
1151	7.08	1941
1163	6.82	1437
1165	6.58	1472
1173	6.61	1121
1194	6.57	790
1199	6.77	754
1214	6.32	662
1217	6.66	579
1225	6.46	381
1228	6.33	583
1233	6.68	469
1252	6.55	256
1259	6.44	217
1265	6.33	266
1305	6.34	154

3/ Ignition delay times for 100% CH_4 (Mixture 2), ϕ = 0.99, T = 1846 – 2227 K, P = 0.93 – 1.05 atm

T5 (K)	P5 (atm)	OH* IDTs (μs)
1846	1.04	1045
1901	1.05	820
1961	1.05	532
2017	1.04	348
2023	0.97	320
2093	1.00	179
2118	1.00	156
2134	0.96	167
2227	0.93	102

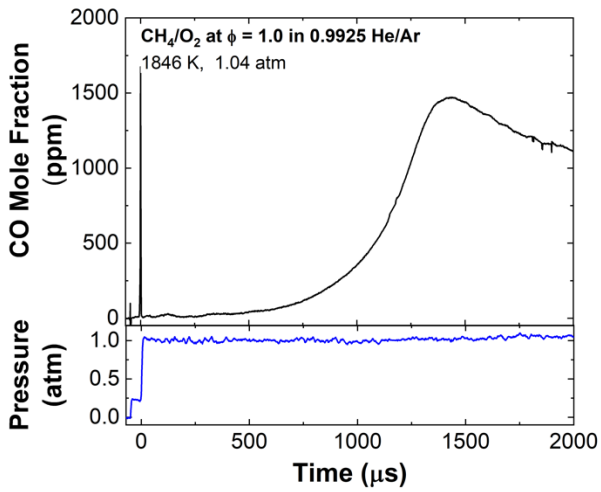
4/ Ignition delay times for 99/1% CH_4/NBD oxidation (Mixture 4), ϕ = 1.01, T = 1838 – 2107 K, P = 0.95 – 1.05 atm

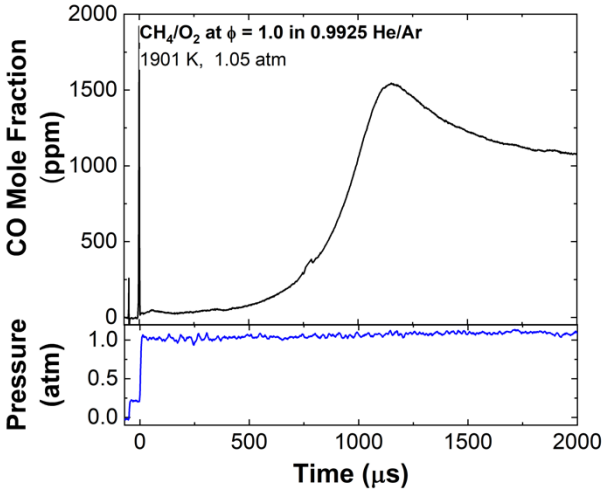
T5 (K)	P5 (atm)	OH* IDTs (μs)
1838	1.03	926
1848	0.99	777
1879	1.03	710
1908	1.04	497
1933	1.04	498
1936	1.03	461
1943	1.05	501
1971	1.03	356
2006	1.00	273
2054	0.95	194
2061	0.98	203
2107	0.95	150

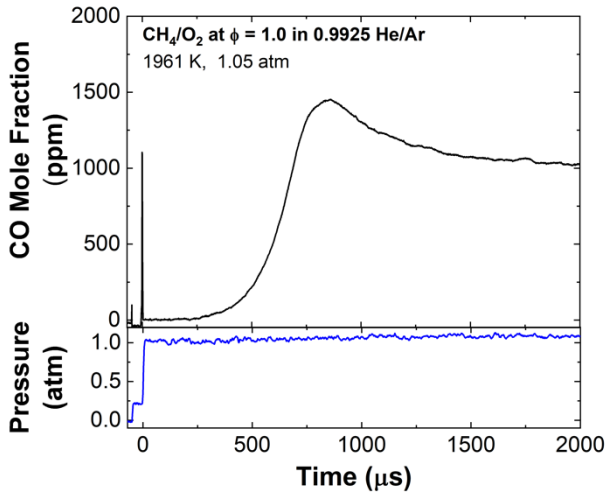
5/ Ignition delay times for 98/2% CH_4/NBD oxidation (Mixture 5), ϕ = 1.0, T = 1778 – 2091 K, P = 0.97 – 1.08 atm

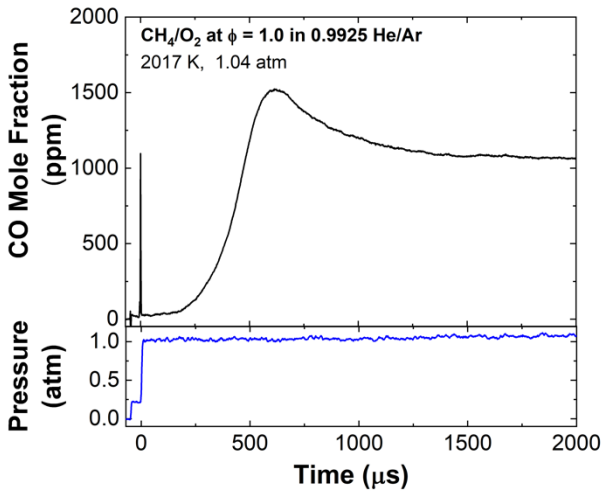
T5 (K)	P5 (atm)	OH* IDTs (μs)
1778	1.03	1161
1815	1.06	806
1842	1.06	718
1879	1.07	560
1935	1.03	379
1944	1.06	361
1979	1.01	276
2002	0.97	250
2033	1.08	220
2091	0.97	160

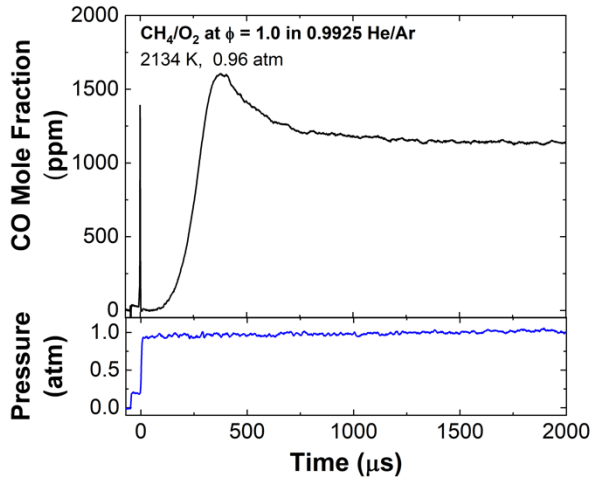
6/ CO time-history profiles: methane oxidation, ϕ = 0.99, T = 1846 – 2316 K, P = 0.90 – 1.05 atm

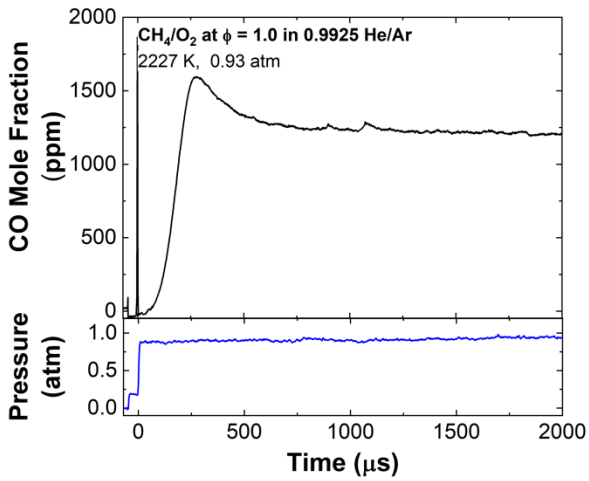












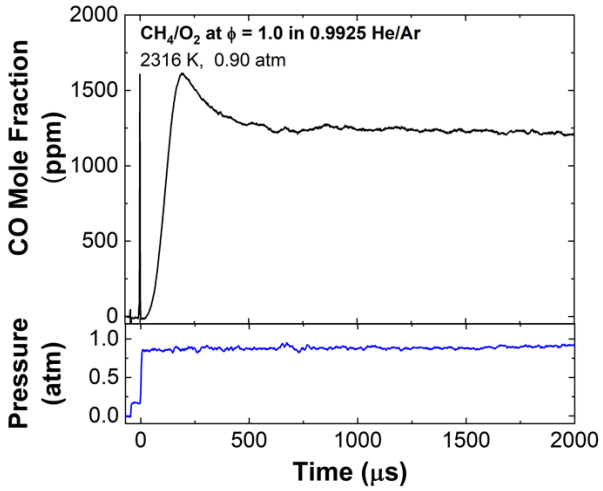
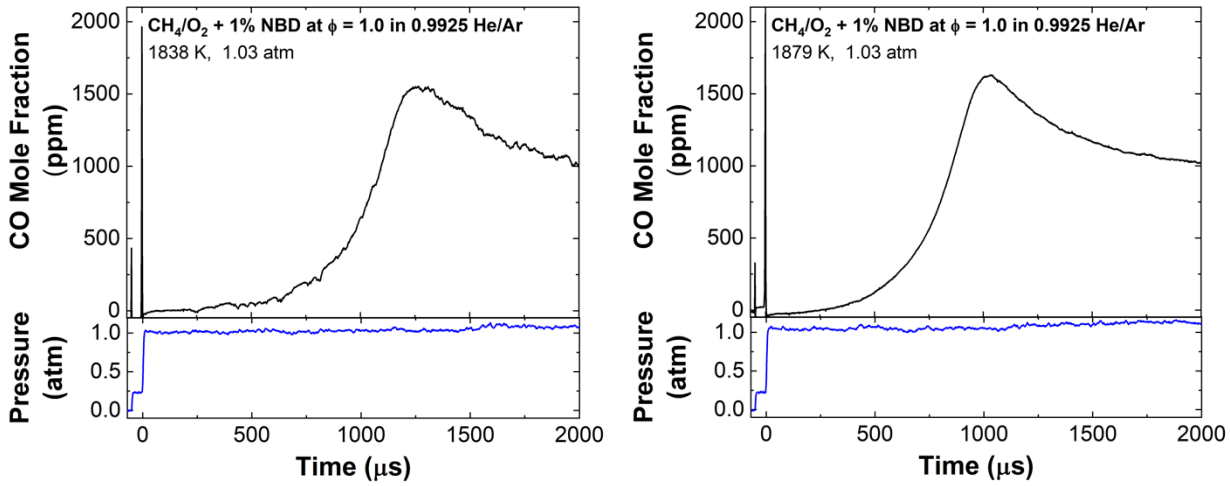


Figure S1. Experimental CO time-history profiles for the oxidation of CH_4 at ϕ = 0.99 in 99.25% He/Ar.

7/ CO time-history profiles: methane oxidation + 1% NBD, ϕ = 1.01, T = 1838 – 2174 K, P = 0.95 – 1.03 atm



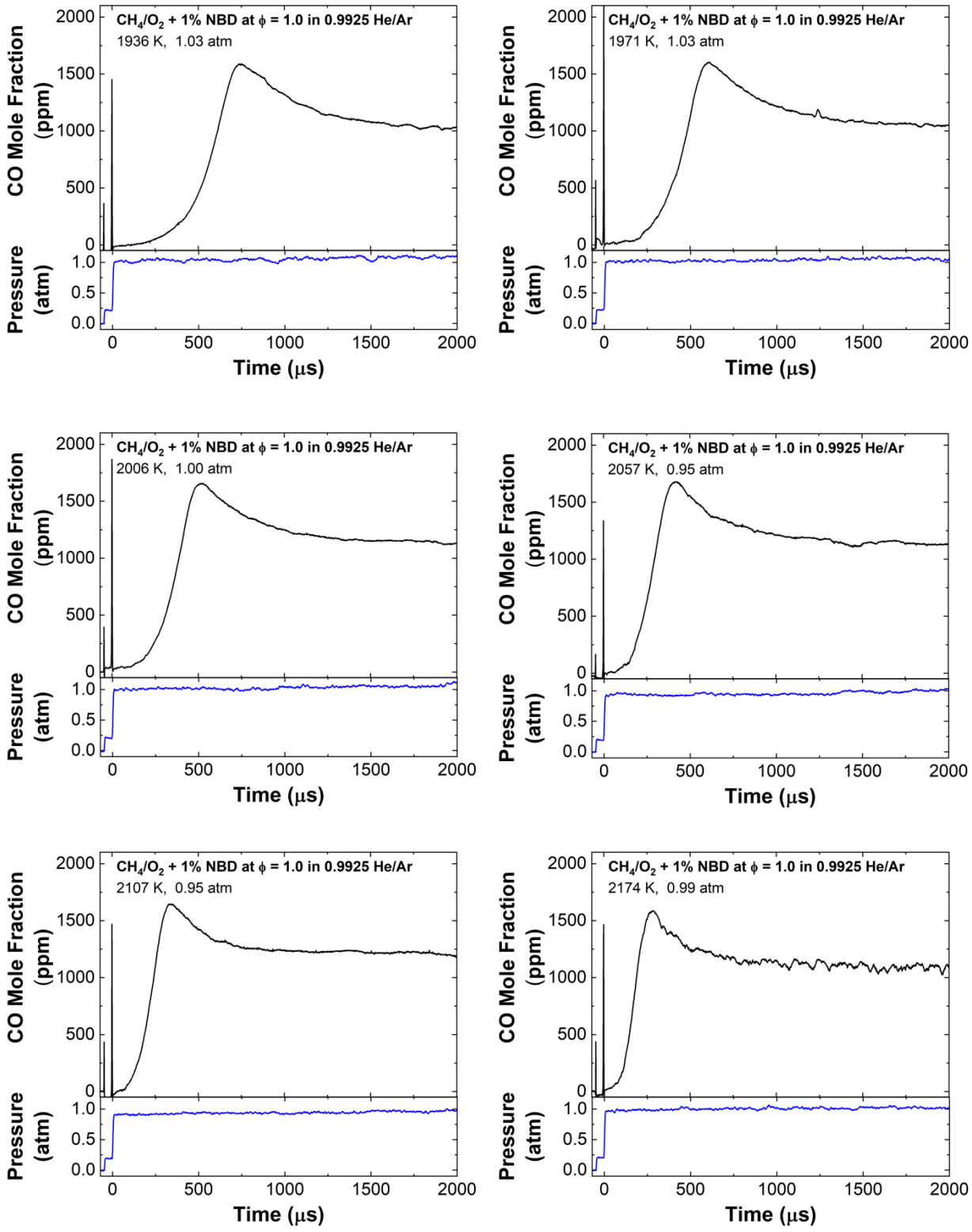
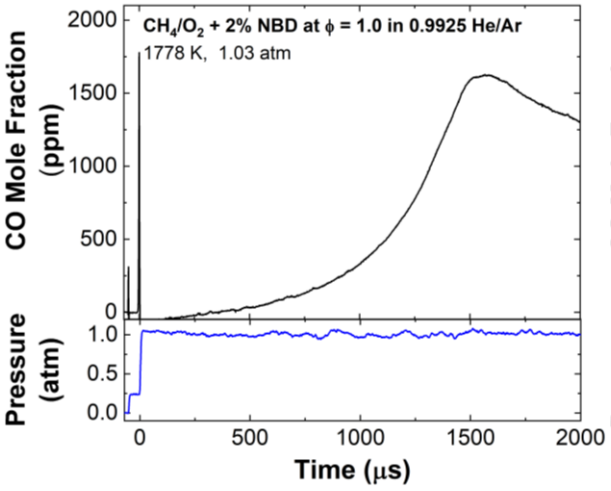
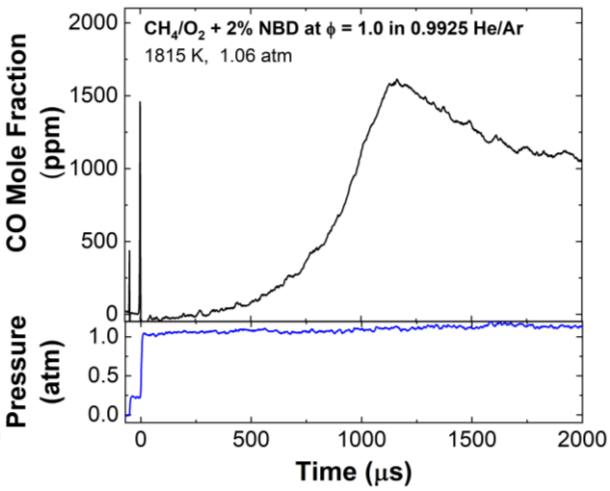
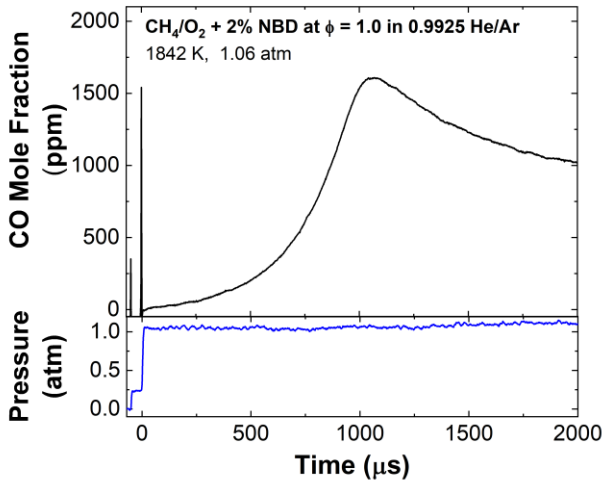


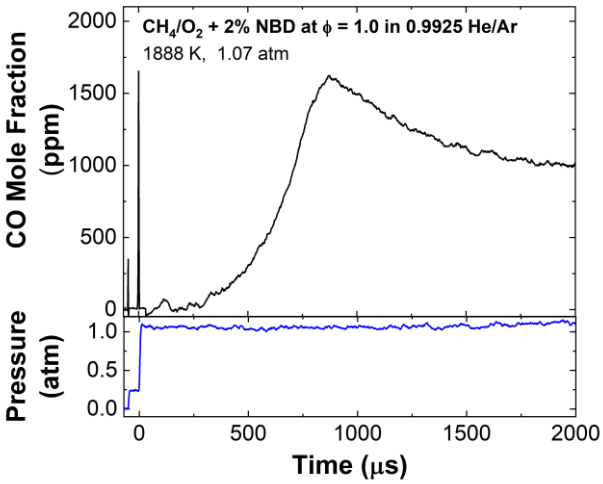
Figure S2. Experimental CO time-history profiles for the oxidation of CH_4 + 1% NBD at ϕ = 1.01 in 99.25% He/Ar.

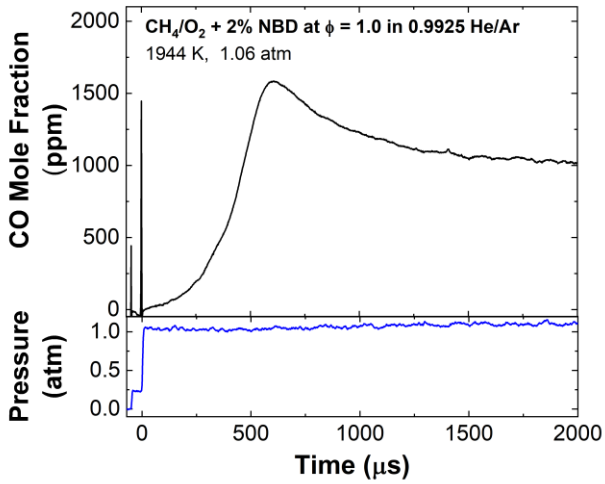
8/ CO time-history profiles: methane oxidation + 2% NBD, ϕ = 1.0, T = 1778 – 2091 K, P = 0.97 – 1.07 atm

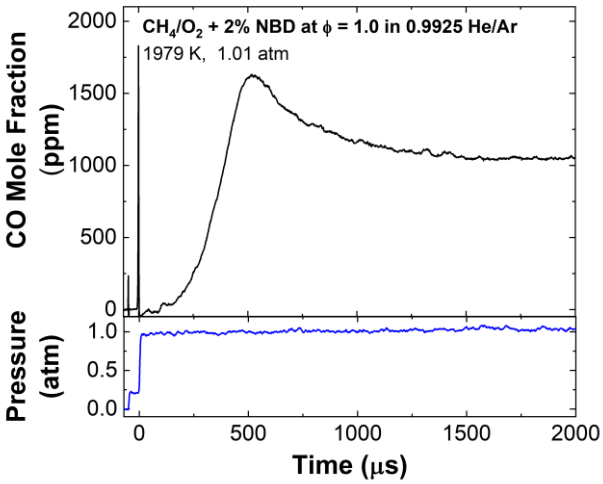












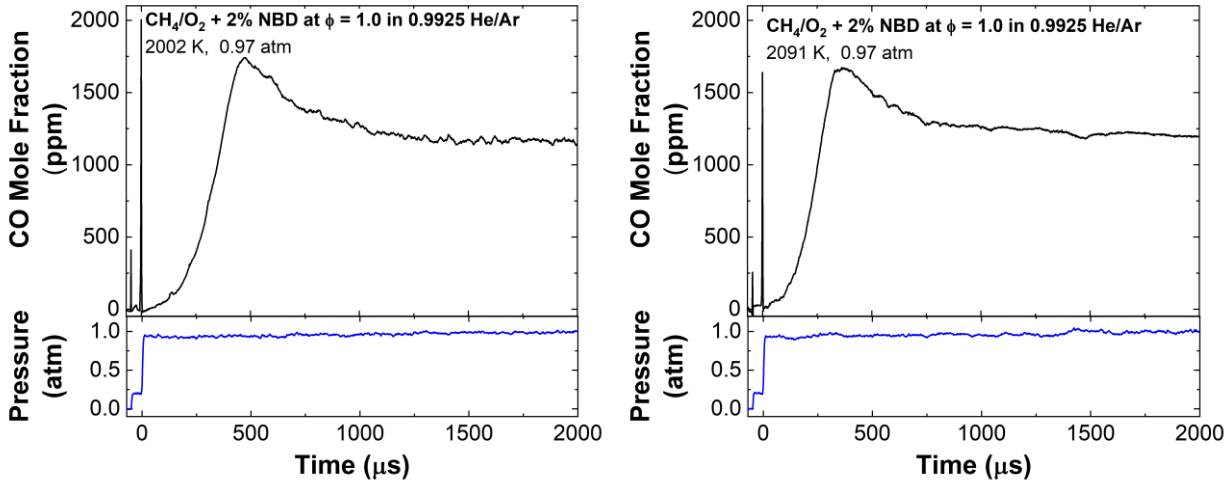


Figure S3. Experimental CO time-history profiles for the oxidation of CH_4 + 2% NBD at ϕ = 1.0 in 99.25% He/Ar.