

Methane / Ethane / Propane

Experimental data

Rapid compression machine data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.375	353	8.8	9.88	1055	13.3
0/100	0.373	353	8.8	9.82	1055	14.2
0/100	0.380	368	8.9	9.91	1092	4.1
0/100	0.380	368	8.9	9.91	1092	4.4

Table 1: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 0.5$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.720	322	9.1	20.21	992	2.3
0/100	0.720	322	9.1	20.24	993	1.1
0/100	0.750	322	9.2	21.40	997	4.0
0/100	0.760	338	9.2	21.41	1037	4.2
0/100	0.760	338	9.2	21.35	1036	4.4
0/100	0.720	338	9.1	20.07	1034	2.0
0/100	0.720	338	9.1	20.07	1034	1.9
0/100	0.750	353	9.1	20.63	1070	3.9
0/100	0.750	353	9.1	20.71	1071	3.5
15/85	0.780	353	9.3	20.80	1014	4.2
15/85	0.780	353	9.3	20.88	1016	4.5
15/85	0.795	368	9.3	21.10	1052	5.4
15/85	0.795	368	9.3	21.22	1054	6.0

Table 2: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 0.5$, p_C = 20 atm

Methane / Ethane / Propane data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.090	322	9.3	31.32	1000	15.52
0/100	1.090	322	9.2	31.16	988	16.4
0/100	1.092	338	9.3	31.10	1041	7.2
0/100	1.092	338	9.2	30.82	1038	7.0
0/100	1.098	353	9.3	31.09	1080	3.1
15/85	1.125	338	9.4	30.61	982	22.0
15/85	1.125	338	9.4	30.63	982	23.4
15/85	1.134	353	9.3	30.52	1017	7.8
15/85	1.134	353	9.4	30.74	1019	7.4
15/85	1.150	368	9.4	30.90	1056	3.4
15/85	1.150	368	9.4	31.06	1058	3.2

Table 3: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 0.5$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.38	330	9.5	10.34	950	–
0/100	0.38	343	9.7	10.66	991	90.0
0/100	0.38	349	9.6	10.49	1000	41.0
0/100	0.38	368	9.6	10.33	1042	16.0
0/100	0.38	368	9.6	10.35	1044	18.5

Table 4: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 1.0$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.760	315	9.7	21.74	927	109.0
0/100	0.760	315	9.7	21.60	925	125.0
0/100	0.760	330	9.8	21.66	963	26.3
0/100	0.760	330	9.9	22.08	969	25.0
0/100	0.760	349	9.8	21.53	1008	5.5
0/100	0.761	349	9.9	21.92	1014	5.7
0/100	0.760	368	9.9	21.51	1055	4.9
0/100	0.760	368	9.5	21.31	1052	5.1

Table 5: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 1.0$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.142	315	9.8	32.94	929	34.0
0/100	1.140	333	9.6	31.50	962	20.0

Table 6: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 1.0$, p_C = 30 atm

Experimental data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.42	359	9.6	10.22	912	–
0/100	0.42	365	9.5	10.05	920	–
0/100	0.42	365	9.5	10.05	920	–
0/100	0.43	393	9.4	10.03	969	48.5
0/100	0.43	393	9.5	10.07	969	48.0

Table 7: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 2.0$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.85	359	9.8	21.05	916	47.7
0/100	0.85	359	9.8	21.05	916	44.9
0/100	0.85	365	9.9	21.25	931	33.5
0/100	0.85	365	9.8	21.14	930	36.7
0/100	0.85	393	9.8	20.68	981	9.3
0/100	0.85	393	9.8	20.61	980	9.8

Table 8: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 2.0$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.24	359	9.6	30.42	914	39.0
0/100	1.25	359	9.6	30.72	916	37.7
0/100	1.24	365	9.8	30.90	930	17.5
0/100	1.24	365	9.8	30.86	930	18.2
0/100	1.26	393	9.8	30.98	985	3.9
0/100	1.26	393	9.8	30.89	984	4.0

Table 9: 90% CH₄ / 6.6% C₂H₆ / 3.3% C₃H₈ oxidation at $\phi = 2.0$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.350	322	9.6	10.46	1006	18.3
0/100	0.352	322	9.6	10.49	1007	18.1
0/100	0.350	338	9.4	10.14	1040	9.7
0/100	0.350	338	9.5	10.27	1044	9.8
0/100	0.360	368	9.5	10.46	1122	2.8
0/100	0.360	368	9.5	10.43	1121	2.8

Table 10: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 0.5$, p_C = 10 atm

Methane / Ethane / Propane data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.70	322	9.8	21.71	1018	12.7
0/100	0.70	322	9.8	21.77	1019	12.3
0/100	0.71	338	9.8	21.72	1058	5.1
0/100	0.71	338	9.8	21.66	1057	5.0
0/100	0.71	353	9.7	21.29	1093	2.2
0/100	0.71	353	9.7	21.42	1095	2.1
0/100	0.71	368	9.7	21.08	1130	1.4
0/100	0.71	368	9.6	20.91	1127	1.4

Table 11: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 0.5$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.010	307	9.6	30.52	969	17.5
0/100	1.010	307	9.6	30.68	971	20.5
0/100	1.020	322	9.8	31.56	1019	7.6
0/100	1.021	322	9.9	31.80	1021	7.2
0/100	1.020	338	9.9	31.54	1063	3.0
0/100	1.063	338	9.2	31.55	1050	2.9

Table 12: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 0.5$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.400	333	9.5	10.71	946	–
0/100	0.400	359	9.4	10.44	1001	19.9
0/100	0.400	359	9.4	10.45	1001	19.8
0/100	0.410	378	9.4	10.58	1039	7.3
0/100	0.410	378	9.4	10.57	1039	7.3
0/100	0.414	400	9.4	10.59	1087	1.4
0/100	0.414	400	9.2	10.33	1080	1.4

Table 13: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 1.0$, p_C = 10 atm

Experimental data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.760	333	9.6	20.86	950	35.4
0/100	0.760	333	9.6	20.70	943	36.7
0/100	0.780	359	9.5	20.68	1002	6.5
0/100	0.780	359	9.5	20.74	1003	6.3
0/100	0.785	378	9.4	20.42	1041	2.8
0/100	0.785	378	9.4	20.44	1042	2.8
0/100	0.795	400	9.5	20.47	1089	1.4
0/100	0.795	400	9.5	20.51	1090	1.4
0/100	0.780	333	9.7	21.65	953	20.5
0/100	0.780	333	9.5	21.14	946	21.8
0/100	0.780	354	9.7	21.40	1000	6.6
0/100	0.780	354	9.7	21.46	1001	6.3

Table 14: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 1.0$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.10	290	9.7	31.58	856.2	–
0/100	1.10	307	9.7	30.87	892.9	–
0/100	1.10	307	9.7	31.07	894.7	–
0/100	1.11	333	9.7	30.56	954.0	12.3
0/100	1.11	333	9.6	30.31	952.0	13.9
0/100	1.13	359	9.5	30.16	1004.0	3.8
0/100	1.15	359	9.6	30.93	1006.0	3.5
0/100	1.11	333	9.8	31.09	955.0	10.6
0/100	1.11	333	9.8	30.97	954.0	10.4
0/100	1.11	354	9.8	30.68	1002.0	3.4
0/100	1.11	354	9.7	30.60	1001.0	3.3

Table 15: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 1.0$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.455	355	9.7	10.96	890	–
0/100	0.460	378	9.7	10.89	883	–
0/100	0.460	378	9.7	10.89	883	–
0/100	0.480	397	9.4	10.83	872	–
0/100	0.480	397	9.4	10.78	871	–

Table 16: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 2.0$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.88	355	9.7	21.39	888	54.1
0/100	0.88	355	9.8	21.65	890	50.7
0/100	0.88	378	9.6	20.74	926	18.7
0/100	0.80	378	10.3	20.66	948	18.7
0/100	0.90	397	9.4	20.44	955	11.4
0/100	0.90	397	9.5	20.57	956	11.2

Table 17: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 2.0$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.280	314	9.8	32.27	812	–
0/100	1.280	314	9.7	32.04	810	–
0/100	1.280	335	9.9	32.29	856	100.4
0/100	1.280	335	9.9	32.31	856	96.0
0/100	1.280	355	9.8	31.24	889	24.3
0/100	1.280	355	9.8	31.51	891	23.7
0/100	1.300	378	9.7	31.19	931	8.8
0/100	1.287	378	9.7	30.85	929	9.9

Table 18: 70% CH₄ / 20% C₂H₆ / 10% C₃H₈ oxidation at $\phi = 2.0$, p_C = 30 atm

Experimental data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.360	353	9.3	10.13	1074	7.3
0/100	0.460	353	9.4	13.11	1077	6.6
0/100	0.358	368	9.4	10.21	1118	4.2
0/100	0.360	368	9.2	9.93	1108	4.3
0/100	0.365	322	9.2	10.26	986	29.6
0/100	0.365	322	9.2	10.25	985	32.6
0/100	0.375	338	9.2	10.47	1027	7.2
0/100	0.375	338	9.2	10.43	1025	7.8
0/100	0.380	368	9.2	10.55	1105	2.5
0/100	0.380	368	9.2	10.50	1104	2.4
15/85	0.362	353	9.3	9.59	1005	19.8
15/85	0.380	353	9.2	9.93	1001	20.0
15/85	0.385	368	9.3	10.10	1040	6.8
15/85	0.385	368	9.3	10.05	1039	7.1

Table 19: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 0.5$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.710	307	9.5	21.00	960	37.6
0/100	0.710	307	9.5	21.08	961	38.0
0/100	0.710	322	9.5	20.87	1000	10.8
0/100	0.710	322	9.5	21.09	1003	11.6
0/100	0.710	338	9.5	20.88	1044	4.4
0/100	0.710	338	9.5	20.87	1044	4.3
0/100	0.713	353	9.3	20.37	1076	1.9
0/100	0.710	353	9.4	20.35	1076	2.0
0/100	0.720	307	9.5	21.50	963	45.8
0/100	0.720	307	9.5	21.47	962	44.0
0/100	0.725	322	9.5	21.26	999	7.1
0/100	0.725	322	9.5	21.25	999	6.6
0/100	0.735	338	9.4	21.04	1035	2.5
0/100	0.735	338	9.4	21.06	1035	2.4
0/100	0.745	368	9.3	20.81	1107	1.0
0/100	0.745	368	9.3	20.89	1109	1.0
15/85	0.760	338	9.6	21.27	983	11.4
15/85	0.760	338	9.6	21.05	980	12.2
15/85	0.765	353	9.6	21.21	1019	5.1
15/85	0.767	353	9.6	21.34	1021	5.0
15/85	0.770	368	9.6	21.14	1054	2.6
15/85	0.770	368	9.6	21.20	1055	2.7

Table 20: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 0.5$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.070	307	9.6	32.06	965	31.5
0/100	1.070	307	9.6	31.77	963	30.4
0/100	1.080	322	9.5	31.82	1000	6.7
0/100	1.080	322	9.5	31.82	1000	4.4
0/100	1.076	289	9.6	32.69	918	77.2
0/100	1.076	289	9.6	32.99	920	70.9
0/100	1.076	289	9.6	32.93	920	70.6
0/100	1.080	307	9.5	31.99	960	55.2
0/100	1.080	307	9.5	31.93	960	51.0
0/100	1.090	322	9.4	31.75	997	4.7
0/100	1.090	322	9.4	31.81	997	4.4
15/85	1.090	338	9.7	31.04	989	4.2
15/85	1.090	338	9.7	30.68	985	4.5

Table 21: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 0.5$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.395	352	9.4	10.30	979	38.8
0/100	0.395	352	9.5	10.53	985	33.2
0/100	0.400	372	9.6	10.60	1031	8.2
0/100	0.400	372	9.4	10.38	1024	9.2
0/100	0.410	393	9.4	10.45	1068	3.9
0/100	0.410	393	9.4	10.45	1068	4.1

Table 22: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 1.0$, p_C = 10 atm

Experimental data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.75	322	9.6	20.63	922	39.0
0/100	0.75	322	9.7	20.89	925	36.5
0/100	0.75	352	9.7	20.45	992	8.3
0/100	0.75	352	9.7	20.40	991	8.5
0/100	0.76	372	9.6	20.62	1042	2.7
0/100	0.76	372	9.6	20.62	1042	3.0

Table 23: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 1.0$, p_C = 20 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.11	307	9.7	31.26	891	40.0
0/100	1.11	307	9.7	31.33	892	41.4

Table 24: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 1.0$, p_C = 30 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.46	355	9.5	10.74	878	–
0/100	0.46	355	9.3	10.50	872	–
0/100	0.46	378	9.3	10.27	913	–
0/100	0.46	378	9.3	10.39	915	–
0/100	0.48	398	9.1	10.38	944	46.0
0/100	0.48	398	9.1	10.38	944	46.1

Table 25: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 2.0$, p_C = 10 atm

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	0.88	307	9.8	22.22	796	–
0/100	0.88	336	9.8	21.89	853	–
0/100	0.88	336	9.8	21.87	853	–
0/100	0.88	355	9.7	21.33	886	42.9
0/100	0.88	355	9.7	21.37	887	45.0
0/100	0.88	378	9.8	21.28	932	14.5
0/100	0.88	378	9.8	21.21	931	14.7
0/100	0.90	398	9.5	20.48	956	9.5
0/100	0.90	398	9.5	20.37	955	9.9

Table 26: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 2.0$, p_C = 20 atm

Methane / Ethane / Propane data

% N ₂ / % Ar	p _i / bar	T _i / K	CR	p _C / bar	T _C / K	/ ms
0/100	1.34	290	9.8	34.42	770.5	241.0
0/100	1.28	290	9.7	32.48	768.3	329.0
0/100	1.28	290	9.7	32.37	767.5	–
0/100	1.28	298	9.8	32.98	789.2	43.0
0/100	1.28	298	9.8	32.98	789.8	230.0
0/100	1.28	307	9.7	32.08	802.2	61.0
0/100	1.28	307	9.7	32.00	801.6	274.0
0/100	1.28	316	9.9	32.64	825.3	149.0
0/100	1.28	316	9.8	32.09	822.7	166.0
0/100	1.28	336	9.9	32.18	854.0	70.0
0/100	1.28	336	9.9	32.35	855.0	67.8
0/100	1.28	355	9.8	31.23	886.0	19.6
0/100	1.28	355	9.8	31.25	886.0	19.7
0/100	1.28	378	9.7	30.57	927.0	8.2
0/100	1.30	378	9.6	31.13	928.0	8.4
0/100	1.30	398	9.6	30.08	959.0	4.3
0/100	1.32	398	9.5	30.10	955.0	4.8

Table 27: 70% CH₄ / 15% C₂H₆ / 15% C₃H₈ oxidation at $\phi = 2.0$, p_C = 30 atm