

Properties of gases

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No.	Component	Formula	Molar mass M kg/kmol	Real molar density at 0°C, 101325 Pa V m ³ /kmol	ρ kg/m ³	Net calorific value at 0°C, 101325 Pa MJ/kmol MJ/kg		Combustion			
								Oxygen required mol/mol O ₂	kg/kg O ₂	(dry) air required kg/kg	vol/vol
1	methane	CH ₄	16.043	22.36	0.717	802.32	50.011	2	3.989	17.235	9.564
2	ethane	C ₂ H ₆	30.069	22.1875	1.355	1427.83	47.485	3.5	3.725	16.093	16.867
3	propane	C ₃ H ₈	44.096	21.9297	2.011	2044.01	46.354	5	3.628	15.676	24.379
4	isobutane	C ₄ H ₁₀	58.123	21.6159	2.689	2648.68	45.570	6.5	3.578	15.461	32.152
5	butane	C ₄ H ₁₀	58.123	21.5195	2.701	2657.05	45.714	6.5	3.578	15.461	32.296
6	2,2-dimethylpropane	C ₅ H ₁₂	72.15	21.2842	3.39	3252.56	45.081	8	3.548	15.330	40.189
7	isopentane	C ₅ H ₁₂	72.15	21.0556	3.427	3264.06	45.240	8	3.548	15.330	40.625
8	pentane	C ₅ H ₁₂	72.15	20.8874	3.454	3272.1	45.351	8	3.548	15.330	40.952
9	2,2-dimethylbutane	C ₆ H ₁₄	86.177	20.5154	4.201	3869.78	44.905	9.5	3.527	15.241	49.513
10	2,3-dimethylbutane	C ₆ H ₁₄	86.177	20.5	4.204	3877.86	44.999	9.5	3.527	15.241	49.550
11	3-methylpentane	C ₆ H ₁₄	86.177	20.5	4.204	3881.71	45.043	9.5	3.527	15.241	49.550
12	isohexane	C ₆ H ₁₄	86.177	20.5	4.204	3879.07	45.013	9.5	3.527	15.241	49.550
13	hexane	C ₆ H ₁₄	86.177	20.5	4.204	3886.81	45.103	9.5	3.527	15.241	49.550
14	isoheptane	C ₇ H ₁₆	100.203	20.5	4.888	4494.37	44.853	11	3.513	15.177	57.373
15	heptane	C ₇ H ₁₆	100.203	20.5	4.888	4501.44	44.923	11	3.513	15.177	57.373
16	octane	C ₈ H ₁₈	114.23	20.5	5.572	5115.57	44.783	12.5	3.502	15.129	65.197
17	nonane	C ₉ H ₂₀	128.257	20.5	6.256	5730.87	44.683	14	3.493	15.091	73.021
18	decane	C ₁₀ H ₂₂	142.284	20.5	6.941	6345.54	44.598	15.5	3.486	15.061	80.844
19	undecane	C ₁₁ H ₂₄	156.311	20.5	7.625	6960.25	44.528	17	3.480	15.036	88.668
20	dodecane	C ₁₂ H ₂₆	170.337	20.5	8.309	7575.01	44.471	18.5	3.475	15.015	96.492
21	tridecane	C ₁₃ H ₂₈	184.364	20.5	8.993	8189.72	44.421	20	3.471	14.998	104.315
22	tetradecane	C ₁₄ H ₃₀	198.391	20.5	9.678	8804.43	44.379	21.5	3.468	14.983	112.139
23	cyclohexane	C ₆ H ₁₂	84.161	20.5	4.105	3688.87	43.831	9	3.422	14.784	46.942
24	methylcyclohexane	C ₇ H ₁₄	98.188	20.5	4.79	4292.57	43.718	10.5	3.422	14.784	54.766
25	benzene	C ₆ H ₆	78.113	20.5	3.81	3169.46	40.575	7.5	3.072	13.274	39.118
26	toluene	C ₇ H ₈	92.14	20.5	4.495	3771.88	40.936	9	3.126	13.504	46.942
27	xylene(o)	C ₈ H ₁₀	106.167	20.5	5.179	4376.21	41.220	10.5	3.165	13.673	54.766
28	methylmercaptane	CH ₃ SH	48.1	21.7907	2.208	1161.54	24.148	3	1.996	8.623	14.720
29	ethylmercaptane	C ₂ H ₅ SH	62.13	21.3402	2.911	1767.79	28.453	4.5	2.318	10.013	22.547
30	propylmercaptane	C ₃ H ₇ SH	76.16	20.5647	3.703	2372.45	31.151	6	2.521	10.892	31.196
31	carbonyl sulphide	COS	60.07	22.0642	2.723	548.76	9.135	1.5	0.799	3.452	7.269
32	hydrogen sulphide	H ₂ S	34.08	22.1875	1.536	518.52	15.215	1.5	1.408	6.085	7.229
33	sulphur dioxide	SO ₂	64.06	21.9431	2.919	0	0.000	0.5	0.250	1.079	2.436
34	ethene	C ₂ H ₄	28.054	22.2435	1.261	1322.96	47.158	3	3.422	14.784	14.421
35	propene	C ₃ H ₆	42.08	21.9902	1.914	1926.43	45.780	4.5	3.422	14.785	21.880
36	1-butene	C ₄ H ₈	56.107	21.6159	2.596	2520.5	44.923	6	3.422	14.785	29.679
37	1-pentene	C ₅ H ₁₀	70.134	21.0443	3.333	3130	44.629	7.5	3.422	14.785	38.106
38	1,2-butadiene	C ₄ H ₆	54.091	21.4904	2.517	2437.5	45.063	5.5	3.254	14.058	27.365
39	1-butyne	C ₄ H ₆	54.091	21.3402	2.535	2440.5	45.118	5.5	3.254	14.058	27.557
40	methanol	CH ₃ OH	32.042	21.4523	1.494	675.98	21.097	1.5	1.498	6.472	7.476
41	ethanol	C ₂ H ₅ OH	46.069	20.5557	2.241	1293.97	28.088	3	2.084	9.003	15.605
42	argon	Ar	39.948	22.3937	1.784	0	0.000	0	0.000	0.000	0.000
43	helium	He	4.0026	22.434	0.178	0	0.000	0	0.000	0.000	0.000
44	carbon dioxide	CO ₂	44.01	22.2569	1.977	0	0.000	0	0.000	0.000	0.000
45	carbon monoxide	CO	28.01	22.4026	1.25	282.989	10.103	0.5	0.571	2.468	2.386
46	hydrogen	H ₂	2.0158	22.4362	0.09	241.827	119.966	0.5	7.937	34.292	2.383
47	nitrogen	N ₂	28.0134	22.4049	1.25	0	0.000	0	0.000	0.000	0.000
48	oxygen	O ₂	31.9988	22.3914	1.429	0	0.000	0	0.000	0.000	0.000
49	nitric oxide	NO	30.0061	22.4004	1.34	0	0.000	0	0.000	0.000	0.000
50	nitrogen dioxide	NO ₂	46.0055	21.8019	2.11	0	0.000	0	0.000	0.000	0.000
51	water vapour	H ₂ O	18.0152	21.629	0.833	0	0.000	0	0.000	0.000	0.000
52	air (dry)	-	28.964	22.4004	1.293	0	0.000	0	0.000	0.000	0.000