

Physical Properties of Gases & Vapours - SI Units

Referred to 0°C (32F) and 1013,25 mbar (14,7 psia)								
ρ - mass per unit volume			V - specific volume					
t _f - melting temperature			C _p - specific heat at constant pressure					
t _e - boiling temperature			λ - thermal conductivity					
ρ _e - mass per unit volume of the liquid at t _e								
Gas or Vapour	Formula	ρ (kg/m ³)	t _f (°C)	t _e (°C)	ρ _e (kg/m ³)	V (m ³ /kg)	C _p (kcal/kg.h.°C)	λ (kcal/m.h.°C)
Acetone	C ₃ H ₆ O	2,591	-94,8	56,2	749	0,386	0,296	0,0083
Acetylene	C ₂ H ₂	1,162	-83,3	-83,6	613	0,861	0,386	0,0158
Ammonia	NH ₃	0,76	-77,9	-33,4	680	1,316	0,491	0,0187
Argon	Ar	1,782	189,2	-185,7	1820	0,561	0,125	0,014
Benzole	C ₆ H ₆	3,485	-	-	-	0,287	0,227	0,0076
Biogas (40% CH ₄)	-	1,467	-	-	-	-	-	-
Biogas (56% CH ₄)	-	1,267	-	-	-	-	-	-
Biogas (70% CH ₄)	-	1,092	-	-	-	-	-	-
Butane	C ₄ H ₁₀	2,593	-138,4	-0,5	602	0,386	0,382	0,0119
Carbon dioxide	CO ₂	1,964	-56,6	-78,2	1219	0,509	0,195	0,0122
Carbon disulphide	CS ₂	3,397	-	-	-	0,294	0,139	0,0058
Carbon monoxide	CO	1,25	-205	-191,6	801	0,8	0,248	0,0191
Chlorine	Cl ₂	3,164	-101	-34,6	1512	0,316	0,116	0,0073
Diethyl ether	C ₄ H ₁₀ O	3,307	-	-	-	0,302	0,345	0,0108
Dry air	-	1,293	-213	-192,3	875	0,773	0,24	0,0209
Ethane	C ₂ H ₆	1,342	-183,3	-88,6	546	0,745	0,394	0,0155
Ethyl alcohol	C ₂ H ₆ O	2,055	-114,2	78,3	747	0,487	0,364	0,0119
Ethylene	C ₂ H ₄	1,251	-169,5	-103,7	568	0,799	0,349	0,0144
Helium	He	0,179	-272,2	-268,9	125	5,599	1,25	0,1233
Hydrochloric acid	HCl	1,627	-111,2	-84,8	1135	0,615	0,19	0,0072
Hydrogen	H ₂	0,09	-259,1	-252,9	71	11,118	3,45	0,1508
Hydrogen sulphide	H ₂ S	1,52	-85,6	-60,4	957	0,658	0,237	0,0108
Methane	CH ₄	0,716	-182,5	-161,5	415	1,397	0,517	0,0263
Methyl alcohol	CH ₄ O	1,429	-97,6	64,7	737	0,7	0,32	0,012
Natural gas	-	0,6	-	-	-	-	-	-
Nitrogen	N ₂	1,25	-209,9	-195,8	810	0,8	0,247	0,0205
Oxygen	O ₂	1,428	-218,4	-183	1131	0,7	0,218	0,0208
Propane	C ₃ H ₈	1,968	-187,7	-42,1	585	0,508	0,37	0,013
Propylene	C ₃ H ₆	1,877	-185	-47,8	686	0,533	0,34	-
Sulfur dioxide	SO ₂	2,858	-	-	-	0,35	0,14	0,0072

Physical Properties of Water - SI Units

t _{ref} - reference temperature for					Ca - actual specific heat at t _{ref}				
M _s - mass per unit volume at 20°C (68°F)					λ - thermal conductivity at t _{ref}				
Temp. (°C)	M _s (kg/m ³)	V (m ³ /kgx1000)	Ca (kcal/kg.°C)	λ (kcal/m.h.°C)	Temp. (°C)	M _s (kg/m ³)	V (m ³ /kgx1000)	Ca (kcal/kg.°C)	λ (kcal/m.h.°C)
0	999,87	1,00013	-	-	70	977,81	1,02269	1,0002	0,57
4	999,99	1,00001	-	-	71	977,23	1,0233	-	-
6	999,97	1,00003	-	-	72	976,66	1,0239	-	-
8	999,89	1,00011	-	-	73	976,07	1,02452	-	-
10	999,75	1,00025	1	0,493	74	975,48	1,02514	-	-
12	999,55	1,00045	-	-	75	974,89	1,02576	1,0013	0,574
14	999,3	1,0007	-	-	76	974,29	1,02639	-	-
16	999	1,001	-	-	77	973,68	1,02703	-	-
18	998,65	1,00135	-	-	78	973,07	1,02768	-	-
20	998,2	1,0018	1	0,51	79	972,45	1,02833	-	-
22	997,83	1,00217	-	-	80	971,83	1,02899	1,0025	0,577
24	997,37	1,00264	-	-	81	971,21	1,02964	-	-
26	996,87	1,00314	-	-	82	970,57	1,03032	-	-
28	996,33	1,00368	-	-	83	969,94	1,03099	-	-
30	995,76	1,00426	1	0,526	84	969,3	1,03167	-	-
32	995,12	1,0049	-	-	85	968,65	1,03236	1,0037	0,58
34	994,49	1,00554	-	-	86	968	1,03306	-	-
36	993,74	1,0063	-	-	87	967,34	1,03376	-	-
38	993,02	1,00703	-	-	88	966,68	1,03447	-	-
40	992,24	1,00782	1	0,539	89	966,01	1,03519	-	-
41	991,86	1,00821	-	-	90	965,34	1,0359	1,0049	0,582
42	991,47	1,0086	-	-	91	964,67	1,03662	-	-
43	991,07	1,00901	-	-	92	963,99	1,03736	-	-
44	990,66	1,00943	-	-	93	963,3	1,0381	-	-
45	990,25	1,00985	-	-	94	962,61	1,03884	-	-
46	989,82	1,01028	-	-	95	961,92	1,03959	1,006	0,584
47	989,4	1,01071	-	-	96	961,22	1,04034	-	-
48	988,96	1,01116	-	-	97	960,51	1,04111	-	-
49	988,52	1,01161	-	-	98	959,81	1,04187	-	-
50	988,07	1,01207	1	0,551	99	959,09	1,04266	-	-
51	987,62	1,01254	-	-	100	958,38	1,04343	1,0061	0,586
52	987,15	1,01302	-	-	105	-	-	1,0071	0,588
53	986,69	1,01349	-	-	110	-	-	1,0084	0,589
54	986,21	1,01398	-	-	115	-	-	1,0098	0,59
55	985,73	1,01448	1	0,556	120	-	-	1,0114	0,591
56	985,25	1,01497	-	-	125	-	-	1,0132	0,591
57	984,75	1,01549	-	-	130	-	-	1,0152	0,592
58	984,25	1,016	-	-	135	-	-	1,0175	0,592
59	983,75	1,01652	-	-	140	-	-	1,02	0,592
60	983,24	1,01705	1	0,561	145	-	-	1,0228	0,591
61	982,72	1,01758	-	-	150	-	-	1,0258	0,591
62	982,2	1,01812	-	-	160	-	-	1,0328	0,589
63	981,67	1,01867	-	-	170	-	-	1,0411	0,586
64	981,13	1,01923	-	-	180	-	-	1,0507	0,582
65	980,59	1,01979	1	0,566	190	-	-	1,0619	0,578
66	980,05	1,02036	-	-	200	-	-	1,0746	0,572
67	979,5	1,02093	-	-	210	-	-	1,089	0,565
68	978,94	1,02151	-	-	220	-	-	1,1052	0,558
69	978,38	1,0221	-	-	230	-	-	1,1234	0,55

Physical Properties of Liquids - SI Units

t_{ref} - reference temperature for M_s - mass per unit volume at 20°C (68°F)					C_a - actual specific heat at t_{ref} λ - thermal conductivity at t_{ref}				
Liquid	t_{ref} (°C)	M_s (kg/m ³)	C_a (kcal/kg.°C)	λ (kcal/m.h.°C)	Liquid	t_{ref} (°C)	M_s (kg/m ³)	C_a (kcal/kg.°C)	λ (kcal/m.h.°C)
Acetic acid	25	1049	0,51	0,166	Methane	-90	162	-	-
Acetone	20	790	0,515	0,139	Methanol	20	791	0,33	-
Ammonia sol. (25%)	20	771	-	0,425	Methyl alcohol (95%vol.)	20	792	0,596	0,174
Apple juice	20	1356	0,446	-	Milk, cow, heavy cream	20	994	0,94	0,434
Argon	-186	1430	-	-	Naphta	15	665	0,92	-
Automobile oils	15	880-940	-	0,125	Nitric acid	20	1520	0,411	0,456
Beer	10	1010	-	-	Nitrogen	-201	808	-	-
Benzene	20	870	0,43	0,138	Oil, coconut	20	924	-	-
Benzole	20	879	0,43	0,132	Oil, corn	20	922	-	-
	80	-	0,44	0,13	Oil, castor	25	956,1	0,43	0,155
Butane	25	599	0,55	-	Oil, cotton seed	15	926	-	-
Butter	20	911	0,557-0,688	-	Oil, olive	10	918	0,47	0,146
Carbon tetrachloride	25	1584	0,207	0,089	Oil, palm	20	915	-	-
Carbon disulphide	20	1266	0,241	0,138	Oil, soya	20	927	0,47	-
Chloride	25	1560	-	-	Oil, sunflower	20	920	-	-
Chloroform	20	1489	0,251	0,11	Oil, peanut	20	914	-	-
Citric acid	25	1660	-	-	Oil, whale	15	925	-	-
Crude oil	20	900	-	0,113	Oxygen (liquid)	-186	1155	-	-
Diesel	20	800	-	-	Petrol	30	680 - 710	0,45	0,112
Ethane (liquid)	-89	570	-	-	Phenol	25	1072	0,34	0,163
Ethyl acetate	20	901	-	-	Propanol	25	804	-	-
Ethyl alcohol (95%vol.)	0	789	0,547	0,166	Propyl alcohol	25	800	0,57	0,138
	40	-	0,648	0,144	Sea water	25	1025	0,94	-
Fuel oil	20	840 - 920	0,471	0,103	Sodium carbonate	20	2530	0,86	0,516
Gasoline	20	803	0,53	0,129	Sodium Hydroxide (caustic soda)	15	1250	0,77	0,37
Glycerine	10	1260	0,576	0,25	Sulphuric acid	12	1853	0,33	0,28
Glycerol	25	1126	-	-	Sulphurous acid (96%)	20	1840	0,351	0,43
Helium	-271	147	-	-	Water	8	999,88	1	0,485
Honey	20	1420	0,54-0,6	0,00648		41	991,66	1	0,538
Hydrazine	25	795	-	-		72	976,36	1	0,58
Hydrochloric acid (25%)	20	1150	0,75	0,404		100	958,38	1,006	0,586
Kerosene	16	820,1	0,48	0,125		200	0 - 200	1,037	0,572
Lubricating oil	81	920	-	0,105					
	0	-	-	0,133					
	100	-	-	0,128					
	200	-	-	0,122					

Physical Properties of Metals - SI Units

Metal		t_{ref} (°C)	Ms (kg/m ³)	λ (kcal/m.h.°C)	Ca (kcal/kg.h.°C)
Alloy Steel	(5%Cr)	20	7790	28	0,11
	(20%Cr)	20	7670	20	0,11
	(10%Cr)	20	7760	27	0,11
Alloy Steel	(5%Ni)	30	7850	25	-
	(10%Ni)	30	-	22	-
	(40%Ni)	30	8120	9	-
	(20%Ni)	30	-	14	-
Aluminum		0	2700	173	0,21
		100	-	176	0,224
		300	-	198	0,241
Brass		20	8400	79-96	-
		100	-	90-110	-
Bronze		20	8700	50	0,0913
		100	-	62	0,0937
Carbon Steel (0,1%C)		100	7830	47	-
		300	-	43	-
		600	-	32	-
Carbon Steel (0,5%C)		100	7820	45	0,113
		300	-	38	-
		600	-	31	-
Carbon Steel (1,5%C)		100	7740	32	-
		300	-	31	-
		600	-	29	-
Cast Iron (4%C)		20	-	50	-
Chromium		0	7190	-	0,102
		100	-	-	0,113
		300	-	-	0,125
Copper		20	8960	332	0,0911
Gold		0	19320	268	0,0311
		200	-	266	-
Magnesium		100	1738	135	0,257
Nikel		10	8902	54	0,105
		500	-	44	-
Silver		0	10500	360	0,057
		100	-	312	0,0572
		900	-	-	0,0676
Tin		0	7310	56	0,0536
		200	-	52	-
Zinc		0	7133	95	0,0918
		200	-	90	-