Thermal data for non-metals

~~ *means decade for rest of column*

	Density (20°C) kg/dm³	Coeff. of linear expansion	Specific heat kj/kg °C	Specific heat cal/g. °C = Btu/lb F	Thermal conductivity[1] w/m °C	Thermal conductivity[1] kcal/m hr °C	Thermal diffusivity[2] cm²/s
Elements:							
Phosphorus, yellow	1.83	124×10^{-6}	0.791	0.189	—	—	—
Carbon, diamond	3.51	1.3	0.50	0.12	1.56	1.34	8.9×10^{-3}
Carbon, graphite	2.22	2.0	0.67	0.16	0.49	0.42	3.3
Selenium	4.8	37	0.38	0.09	—	—	—
Sulphur, monoclinic	1.96	120	0.452	0.181	0.20	0.17	2.3
Sulphur, rhombic	2.07	90	0.737	0.176	0.29	0.25	1.9
Minerals etc.:							
Asbestos, lightly packed	0.05	—	0.84	0.20	0.060	0.050	14
Asbestos, densely packed	0.58	—	0.84	0.20	0.200	0.170	4.1
Concrete, dry	2.3	≈12	0.92	0.22	1.8	1.5	8.5
Sandstone	2.3	—	0.85	0.20	≈0.5	≈0.4	2.0
Mica	2.8	3	0.88	0.21	0.5	0.4	2.0
Granite	2.7	8.3	0.80	0.19	3.5	3.0	16
Limestone	2.6	—	0.84	0.20	0.7–0.9	0.6–0.8	≈3.6
Quartz, ⊥ axis	2.65	14.4	0.749	0.179	6.8	5.8	34
Quartz, ‖ axis	2.65	8.0	0.749	0.179	11.6	10.0	58
Quartz, molten	2.20	0.6	0.711	0.170	1.3	1.15	8.3
Marble	2.7	12	0.88	0.21	≈3.0	≈2.5	≈13
Brick	1.8	—	0.75	0.18	0.6	0.5	4.4
Chemical products:							
Bakelite	1.3	30	0.92	0.22	0.2	0.2	1.7
Celluloid	1.4	100	—	—	0.23	0.20	—
Glass, sodium	2.5	8	0.84	0.20	0.9	0.8	4.3
Glasswool, normally packed	0.4	—	0.8	0.2	0.07	0.06	2.2
Ebonite	1.3	110	—	—	—	—	—
Plexiglas, Lucite etc.	1.18	—	1.7	0.4	1.9	1.6	9.5
Porcelain	2.4	2–5	0.8	0.2	1.0	0.9	5.2
Steatite	≈2.7	7–9	1.3	0.3	2.3	1.95	6.5
Wood and Wooden Products:							
Birch, ⊥ fibers	0.65	—	—	—	0.17	0.14	—
Oak, ‖	0.69	5	—	—	0.29	0.25	—
Oak, ⊥	0.69	50	—	—	0.16	0.14	—
Pine, ‖	0.52	5	—	—	0.35	0.30	—
Pine, ⊥	0.52	30	—	—	0.14	0.12	—
Wood fiber plate, hard	1.0	—	—	—	0.15	0.13	—
Wood fiber plate, porous	0.3	—	—	—	0.06	0.05	—
Cork	0.18	—	2.05	0.49	0.051	0.044	1.4
Pasteboard	0.6	—	—	—	0.09	0.08	—

[1] 1 w/m °C = 1.926×10^{-3} Btu in/ft² sec °F = 6.939 Btu in/ft² hr °F. [2] See footnote [2], p. 48.

Also see p. 52

~~ denotes *same decade for the whole column*

Physical properties of gases

	Density (0°C, 1 atm) kg/m³	c_p J/g °C	c_p cal/g °C	c_p/c_v	Melting point °C	Boiling point °C	Crit. temp. °C	Crit. press. bar	Heat conductivity w/m°C	Formula
Acetylene	1.171	1.68	0.402	1.23	− 81.7	− 83.6	+ 35.9	64	0.0188	C_2H_2
Ammonium	0.7714	2.06	0.492	1.32	− 77.7	− 33.4	+130	119	0.0276	NH_3
Air	1.293	1.00	0.241	1.40	—	−193	−143	38	0.0242	Air
Argon	1.784	0.523	0.125	1.66	−189	−185.9	−122	50	0.0162	Ar
Carbon dioxide	1.977	0.820	0.196	1.33	− 57	− 78.5	+ 31	73	0.0143	CO_2
Carbon monoxide	1.250	1.05	0.250	1.40	−199	−191	−139	36	0.0230	CO
Chlorine	3.22	0.489	0.117	1.36	−103	− 33.8	+144	84	0.0766	Cl_2
Cyan	2.32	1.71	0.41	1.26	− 34.4	− 21	+128	62	—	$(CN)_2$
Dichlorodifluoromethane	1.50	0.59	0.141	1.13	−155	− 30	+111	40	—	CF_2Cl_2
Ethane	1.356	1.72	0.411	1.23	−184	− 88.6	+ 32.1	49	0.0182	C_2H_6
Ethylene, Ethene	1.261	1.50	0.36	1.24	−169	−104	+ 9.5	51	0.0174	C_2H_4
Fluorine	1.695	0.749	0.179	—	−223	−188	−129	57	—	F_2
Helium	0.1785	5.14	1.25	1.66	−272.2	−268.9	−267.9	2.3	0.144	He
Hydrogen	0.08987	14.3	3.41	1.41	−259.1	−252.8	−240	20	0.174	H_2
Hydrogen chloride	1.639	0.812	0.194	1.41	−112	− 84	+ 52	82	—	HCl
Hydrogen sulfide	1.539	1.05	0.250	1.32	− 83	− 61	+100.4	89	0.0130	H_2S
Krypton	3.74	—	—	1.68	−157	−153	− 62.5	55	0.00875	Kr
Methane	0.7168	2.21	0.527	1.30	−183	−161	− 83	46	0.0302	CH_4
Methyl chloride	2.307	0.733	0.175	1.27	−104	− 24	+143	73	0.00908	CH_3Cl
Neon	0.8999	1.03	0.246	1.64	−249	−246	−229	27	0.0463	Ne
Nitrogen	1.250	1.04	0.249	1.40	−210	−196	−147.2	33	0.0243	N_2
Nitrogen oxide NO	1.340	1.00	0.239	1.40	−164	−152	+ 93	65	0.0237	NO
Nitrogen oxide N_2O	1.978	0.887	0.212	1.28	−102	− 91	+ 39	72	0.0151	N_2O
Oxygen	1.429	0.917	0.219	1.40	−218	−183	−118.9	51	0.0246	O_2
Ozone	2.22	—	—	1.29	−251	−112	− 5	70	—	O_3
Propane	2.019	—	—	1.13	−190	− 44	+ 97	44	0.0151	C_3H_8
Sulfur dioxide	2.926	0.636	0.152	1.27	− 73	− 10	+157.5	78	0.00837	SO_2
Xenon	5.89	—	—	1.66	−112	−108	+ 16	58	0.00519	Xe

The viscosity of gases (pp. 52–53) is, like the conductivity, a molecular property. Both are extremely dependent on the temperature. Note the great difference between the coefficients of thermal conductivity of different gases, the light gases (e.g., H_2, He) having large coefficients, the heavier gases (e.g., Kr), smaller coefficients. For the viscosity, which generally increases with an increase in temperature, only three typical values are given here, for comparison with liquids (p. 53). The difference between the values for heavy and light gases is not so marked as for heat conductivity.

The viscosity of clean, dry air, which is often used as a base for measurements of gases, at a temperature of t °C, is $181.8 + 0.495\,(t-20)$ micropoise.

As examples of a heavy gas and a light one, the following values may be mentioned:

hydrogen (20°C) ... .. 88 micropoise
krypton (20°C) ... ..245 "