

4c. Critical Constants

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The critical temperature, critical pressure, and critical density of elements and inorganic compounds are given in Table 4c-1; those for organic compounds are listed in Table 4c-2. The numbers in the reference column refer to authors and journals listed after Table 4c-2.

TABLE 4c-1. CRITICAL TEMPERATURE, PRESSURE, AND DENSITY OF ELEMENTS AND INORGANIC COMPOUNDS

Element or compound	T_c , K	P_c , atm	ρ_c , g/cm ³	V_c , cm ³ /mole	Ref.
Ammonia.....	405.51	111.3	0.235	72.5	1
Antimony trichloride.....	794.1	.....	0.842	271	2
Argon.....	150.72	48.00	0.5308	75.25	1
Arsenic trichloride.....	311.29	.....	0.720	252	2
Bismuth tribromide.....	1220	.....	1.487	301.8	3
Bismuth trichloride.....	1178	.....	1.210	261	4
Boron tribromide.....	573	.....	0.90	278	1
Boron trichloride.....	452.0	38.2	.....	.....	1
Boron trifluoride.....	260.9	49.2	0.59	115	5
Bromine.....	584	102	1.18	135	1
Carbon dioxide.....	304.20	72.85	0.468	94.0	1
Carbon diselenide.....	612	69	0.850	200	6
Carbon disulfide.....	552	78	0.441	173	1
Carbon monoxide.....	133.0	34.5	0.3010	93.06	1
Carbonyl sulfide.....	378	61	.....	.....	1
Cesium.....	2056	130.8	0.451	295	7
Chlorine.....	417.2	76.1	0.573	124	1
Chlorotrifluorosilane.....	307.64	34.20	.....	.....	1
Cyanogen.....	400	59	.....	.....	1
Deuterium (equilibrium).....	38.26	16.28	0.0668	60.33	1
Deuterium (normal).....	38.35	16.43	.....	.....	1
Dichlorodifluorosilane.....	368.93	35.54	.....	.....	1
Dichlorosilane.....	470	44.7	0.515	196	8
Fluorine.....	144	55	.....	.....	9
Gallium.....	5410	250	1.58	44.1	10
Germanium tetrachloride.....	550.1	38	.....	.....	1
Helium-3.....	3.38	1.22	0.041	97.6	11
Helium-4.....	5.21	2.26	0.0693	57.76	1
Hydrazine.....	653	145	.....	.....	1
Hydrogen (equilibrium).....	32.94	12.77	0.0308	65.45	1
Hydrogen (normal).....	33.24	12.80	0.03102	64.99	1

TABLE 4c-1. CRITICAL TEMPERATURE, PRESSURE, AND DENSITY OF ELEMENTS AND INORGANIC COMPOUNDS (Continued)

Element or compound	T_c , K	P_c , atm	ρ_c , g/cm ³	V_c , cm ³ /mole	Ref.
Hydrogen bromide.....	362.96	84.00	.....	.....	1
Hydrogen chloride.....	324.7	81.5	0.45	81.0	12
Hydrogen cyanide.....	456.7	53.2	0.195	139	1
Hydrogen deuteride.....	35.91	14.65	0.0481	62.99	1
Hydrogen fluoride.....	461	64.1	0.29	96.0	13
Hydrogen iodide.....	423.2	80.8	.....	.....	1
Hydrogen selenide.....	411	88	.....	.....	1
Hydrogen sulfide.....	373.6	88.9	0.3488	97.71	1
Iodine.....	785	116	.....	.....	9
Krypton.....	209.39	54.27	0.9085	92.24	1
Lead.....	5400	850	2.2	94.2	14
Mercuric chloride.....	972	.....	1.555	174.6	15
Monochlorosilane.....	409	47.5	0.444	150	8
Neon.....	44.44	26.86	0.4835	41.74	1
Niobium pentabromide.....	1009	.....	1.05	469	16
Niobium pentachloride.....	807	46	0.68	397	17
Nitric oxide.....	180.3	64.6	0.52	58	1
Nitrogen.....	126.3	33.54	0.3110	90.10	1
Nitrogen dioxide.....	431	100	0.56	82.2	1
Nitrogen trifluoride.....	233.90	44.72	.....	.....	18
Nitrous oxide.....	309.59	71.596	0.4525	97.28	19
Nitryl fluoride.....	349.5	.....	.....	.....	20
Oxygen.....	154.78	50.14	0.41	78.0	1
Oxygen fluoride.....	215.2	48.9	0.553	97.6	21
Ozone.....	285.3	54.6	.....	.....	22
Perchloryl fluoride.....	368.4	53.0	0.637	161	23
Phosgene.....	455	56	0.52	190	1
Phosphine.....	324.5	64.5	.....	.....	1
Phosponium chloride.....	322.3	72.7	.....	.....	1
Phosphorous.....	993.8	120.8	.....	.....	9
Phosphorous trichloride.....	793	.....	0.520	264	2
Radon.....	377.16	62.0	.....	.....	9
Rubidium.....	2111	.....	0.334	256	7
Silane.....	270	42.2	0.309	104	8
Silicon tetrachloride.....	506.8	37.1	0.584	291	8, 24
Silicon tetrafluoride.....	259.01	36.66	.....	.....	1
Silver.....	7500	.....	1.85	58.3	14
Stannic chloride.....	591.9	36.95	0.7419	351.2	1
Sulfur.....	1313	116	.....	.....	1
Sulfur dioxide.....	430.7	77.808	0.525	122	25
Sulfur hexafluoride.....	318.71	37.11	0.7517	194.3	1, 26
Sulfur tetrafluoride.....	364.1	.....	.....	.....	27
Sulfur trioxide.....	491.4	83.8	0.633	126	1
Tantalum pentabromide.....	973	.....	1.26	461	16
Tantalum pentachloride.....	767	.....	0.89	402	17
Titanium tetrachloride.....	.....	45.7	.....	.....	28
Trichlorofluorosilane.....	438.42	35.33	.....	.....	1
Trichlorosilane.....	495	41.2	0.533	254	8
Tritium.....	40.0	.....	0.109	27.7	29
Uranium hexafluoride.....	503.4	45.5	.....	.....	1
Water.....	647.4	218.3	0.326	55.3	1
Water (heavy).....	644.1	216	.....	.....	30
Xenon.....	289.75	58.0	1.105	118.8	1

TABLE 4c-2. CRITICAL TEMPERATURE, PRESSURE, AND DENSITY OF ORGANIC COMPOUNDS

Compound	T_c , K	P_c , atm	ρ_c , g./cm ³	V_c , cm ³ /mole	Ref.
Acetic acid.....	594.8	57.1	0.351	171	1
Acetic anhydride.....	569	46.2	.....	...	1
Acetone.....	508.7	46.6	0.273	213	1
Acetonitrile.....	547.9	47.7	0.237	173	1
Acetylene.....	309.5	61.6	0.231	113	1
Aniline.....	698.8	52.3	0.340	274	1
Benzene.....	562.7	48.6	0.300	260	1
Bromobenzene.....	670.9	44.6	0.458	343	1
<i>n</i> -Butane.....	425.17	37.47	0.228	255	1
Butanol.....	560.11	48.60	0.270	275	31
1-Butene.....	419.6	39.7	0.234	240	1
2-Butene (<i>cis</i>).....	428.2	40.5	0.236	238	1
2-Butene (<i>trans</i>).....	433.2	41.5	0.240	234	1
Carbon tetrachloride.....	556.4	44.97	0.558	276	1
Carbon tetrafluoride.....	227.9	.....	0.60	147	32
Chlorobenzene.....	632.4	44.6	0.365	308	1
Chlorodifluoromethane.....	369.6	48.48	0.525	165	1
Chloroform.....	536.6	54	0.496	241	1
Chlorotrifluoroethylene.....	379	40	0.55	212	1
Chlorotrifluoromethane.....	302.02	38.2	0.578	181	1
1-Chloro-1,1-difluoroethane.....	410.3	40.7	0.435	231	33
2-Chloro-1,1-difluoroethylene.....	400.6	44.0	0.499	197	33
Cyclohexane.....	554.2	40.57	0.273	308	1
Cyclopentane.....	511.8	44.55	0.27	260	1
Cyclopropane.....	397.81	54.23	.....	...	34
Dibromomethane.....	583.0	70.6	.....	...	1
1,1-Dichloroethane.....	523	50	.....	...	1
1,2-Dichloroethane.....	561	53	0.44	225	1
1,1-Dichloro-1,2,2,2-tetrafluoroethane.....	418.7	32.6	0.582	294	33
Dichlorodifluoromethane.....	384.7	39.0	0.555	218	1
Dichlorofluoromethane.....	451.7	51.0	0.522	197	1
Diethyl ether.....	467.8	35.6	0.265	280	1
Diethyl ketone.....	561.0	36.9	0.256	336	35
1,1-Difluoroethane.....	386.7	44.4	0.365	181	33
1,1-Difluoroethylene.....	303.3	43.8	0.417	154	33
Dimethylamine.....	437.7	52.4	.....	...	1
2,2-Dimethylbutane.....	489.4	30.67	0.240	359	36
2,3-Dimethylbutane.....	550.3	30.99	0.241	358	36
Dimethyl ether.....	400.1	52.6	0.246	187	1
Dimethyl oxalate.....	628	39.3	.....	...	37
Dioxane.....	585	50.7	0.36	245	1
Ethane.....	305.43	48.20	0.203	148	1
Ethyl acetate.....	523.3	37.8	0.308	286	1
Ethyl alcohol.....	516	63.0	0.276	167	1
Ethylamine.....	456.4	55.54	.....	...	1
Ethyl bromide.....	503.9	61.5	0.507	215	1
Ethyl chloride.....	460.4	51.72	.....	...	1
Ethyl cyclopentane.....	569.5	33.53	0.262	268	18
Ethyl fluoride.....	375.32	46.62	.....	...	1
Ethyl formate.....	508.5	46.8	0.323	229	1
Ethyl mercaptan.....	499	54.2	0.300	207	1
Ethyl methyl ether.....	437.9	43.4	0.272	221	1
Ethyl methyl ketone.....	533.7	39.46	0.252	286	1
Ethyl propyl ether.....	500.6	32.1	0.260	339	1
Ethyl sulfide.....	498.7	54.2	0.300	301	1
Ethylene.....	283.06	50.50	0.227	124	1

TABLE 4c-2. CRITICAL TEMPERATURE, PRESSURE, AND DENSITY OF ORGANIC COMPOUNDS (Continued)

Compound	T_c , K	P_c , atm	ρ_c , g/cm ³	V_c , cm ³ /mole	Ref.
Ethylene oxide.....	469.0	70.97	0.32	137	1
Fluorobenzene.....	560.08	44.91	0.269	357	39
Hexafluorobenzene.....	516.91	.....	.....	...	40
<i>n</i> -Hexane.....	507.9	29.94	0.234	368	1
Iodobenzene.....	721	44.6	0.581	351	1
Isobutane.....	408.14	36.00	0.221	263	41
Isopentane.....	461.0	32.9	0.234	308	1
Methane.....	191.1	45.80	0.162	99	1
Methyl acetate.....	506.9	46.3	0.325	228	1
Methyl alcohol.....	513.2	78.47	0.272	118	1
Methylamine.....	430.1	73.6	.....	...	1
Methyl borate.....	501.7	35.4	.....	...	42
Methyl bromide.....	464	.....	.....	...	1
Methyl butyrate.....	554.5	34.3	0.300	340	1
Methyl chloride.....	416.28	65.93	0.353	143	1
Methylcyclopentane.....	532.77	37.36	0.264	212	38
Methyl fluoride.....	317.71	58.0	0.300	113	1
Methyl formate.....	487.2	59.2	0.349	172	1
Methyl iodide.....	523	.....	.....	...	1
Methyl isobutyl ketone.....	571.5	32.3	.....	...	35
Methyl isopropyl ketone.....	553.4	38.0	0.278	310	35
2-Methylpentane.....	497.9	29.95	0.235	367	36
3-Methylpentane.....	504.4	30.83	0.235	367	36
Methyl <i>n</i> -propyl ketone.....	564.0	38.4	0.286	301	35
Methyl sulfide.....	503.1	54.6	0.309	201	1
Methylene chloride.....	510.2	59.97	.....	...	1
Neopentane.....	433.76	31.57	0.238	303	43
Nitromethane.....	588	62.3	0.352	172	1
<i>n</i> -Octane.....	569.4	24.64	0.235	486	1
<i>n</i> -Pentane.....	569.78	33.31	0.232	311	1
Perfluorobutane.....	386.4	22.93	0.600	397	44
Perfluorocyclohexane.....	457.2	24	.....	...	45
Perfluoro- <i>n</i> -heptane.....	474.8	16.0	0.584	664	1
Perfluorohexane.....	447.7	.....	.....	...	46
Perfluoromethylcyclohexane.....	486.8	23	.....	...	45
Phenol.....	692.4	60.5	.....	...	1
Propane.....	370.0	42.01	0.220	200	1
Propene.....	365.0	45.6	0.233	181	1
Propionic acid.....	612	53	0.32	232	1
Propionitrile.....	564.4	41.3	0.240	230	1
<i>n</i> -Propyl acetate.....	549.4	32.9	0.296	345	1
<i>n</i> -Propyl alcohol.....	537.3	50.2	0.273	220	1
Propyl formate.....	538.1	40.1	0.309	285	1
Propyne.....	401	52.8	.....	...	1
Pyridine.....	617.4	60.0	.....	...	1
Toluene.....	594.0	41.6	0.29	318	1
Trichlorotrifluoromethane.....	471.2	43.2	0.554	189	1
Trichlorotrifluoroethane.....	487.3	33.7	0.576	325	1
1,1,1-Trifluoroethane.....	346.3	37.1	0.434	194	33
Trimethylamine.....	433.3	40.2	0.233	254	1

References for Table 4c-1 and 4c-2

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