

Property of gas and liquid

1. Property of molecule

Alphabetical order	Substance	Chemical formula	Molecular weight	Boiling point (at 1atm) °C	Specific gravity of liquid (°)	Adiabatic index Cp/Cv k(°)	Coefficient C' according to adiabatic index k(°)
A	Acetaldehyde	C ₂ H ₄ O	44.05	20.2	0.80	—	—
	Acetic acid	CH ₃ CO ₂ H	60.05	117.8	1.05	—	—
	Acetone	C ₃ H ₆ O	58.08	56.3	0.80	—	—
	Acetylene	C ₂ H ₂	26.04	−84.0	—	1.26	26.0
	Acrylic acid	C ₃ H ₄ O ₂	72.06	141.0	1.05	—	—
	Air	—	29.0	—	—	1.40	27.0
	Ammonia(°)	NH ₃	17.03	−33.4	0.61(at 20°C)	1.31	26.3
	Aniline	C ₆ H ₅ NH ₂	93.13	184.6	1.02	—	—
B	Argon	Ar	39.95	−186.0	—	1.67	28.6
	Benzene	C ₆ H ₆	78.12	80.5	0.88	1.12	24.9
C	Butane (n)	C ₄ H ₁₀	58.12	−0.5	0.6	1.09	24.7
	Carbon dioxide	CO ₂	44.0	—	—	1.29	26.2
C	Carbon disulfide	CS ₂	76.14	46.3	1.26	1.21	25.6
	Carbon monoxide	CO	28.01	−191.3	—	1.40	27.0
C	Chlorine	Cl ₂	70.91	−33.8	1.57	1.36	26.7
	Coke furnace gas	—	mean 15	—	—	—	—
E I F	Ethane(°)	C ₂ H ₆	30.07	−88.6	0.45(at 0°C)	—	—
	Ether	(C ₂ H ₅) ₂ O	74.12	34.5	0.72	—	—
	Ethyl alcohol (Ethanol)	C ₂ H ₅ OH	46.07	78.3	0.79	—	—
	Ethyl chloride (Chloroethane)	C ₂ H ₅ Cl	64.52	12.2	0.92	—	—
	Ethylamine	C ₂ H ₅ NH ₂	45.1	16.6	0.69	—	—
	Ethylene	C ₂ H ₄	28.05	−103.7	—	1.24	25.8
	Ethylene chloride	C ₂ H ₄ Cl ₂	98.97	83.7	1.26	—	—
	Ethylene glycol	C ₂ H ₆ O ₂	62.07	197.9	1.11	—	—
	Ethylene oxide	C ₂ H ₄ O	44.1	10.8	0.90	—	—
	Formic acid (Methanoic acid)	HCO ₂ H	46.03	100.8	1.22	—	—
H	Helium	He	4.0	−268.9	0.13	1.66	28.6
	Heptane (n)	C ₇ H ₁₆	100.21	98.4	0.68	1.05	24.3
	Hexane (n)	C ₆ H ₁₄	86.18	68.9	0.68	1.06	24.4
	Hydrogen	H ₂	2.02	−252.8	0.07	1.41	27.0
	Hydrogen chloride	HCl	36.46	−84.8	1.19	1.41	27.0
	Hydrogen fluoride	HF	20.01	19.5	0.99	—	—
	Hydrogen peroxide	H ₂ O ₂	34.01	151.4	1.46	—	—
	Hydrogen sulfide	H ₂ S	34.08	−60.4	0.96	1.32	26.4
M	Methane	CH ₄	16.04	−164.0	0.42	1.31	26.3
	Methyl alcohol (Methanol)	CH ₃ OH	32.04	64.6	0.79	1.20	25.6
	Methyl chloride (Chloromethane)	CH ₃ Cl	50.49	−23.7	0.95	1.20	25.6
	Methylene chloride	CH ₂ Cl ₂	84.9	45.6	1.34	—	—
N	Natural gas	—	17	—	—	—	—
	Neon	Ne	20.18	−245.9	—	—	—
	Nitric acid	HNO ₃	63.01	86.0	1.50	—	—
	Nitric oxide	NO	30.0	−151.8	1.27	—	—
	Nitrogen	N ₂	28	−195.8	0.81	1.40	27.0
	Nitrous oxide	N ₂ O	44.0	−88.7	—	—	—
	Nonane (n)	CH ₃ (CH ₂) ₇ CH ₃	128.26	150.8	—	1.04	24.3
	Octane (n)	C ₈ H ₁₈	114.2	125.7	0.70	1.05	24.3
O	Oxygen	O ₂	32.0	−183.0	1.13	1.4	27.0
	Pentane (n)	C ₅ H ₁₂	72.15	36.2	0.63	1.07	24.5
P	Propane	C ₃ H ₈	44.10	−44.5	0.54	1.13	25.0
	Propyl alcohol (n)	C ₃ H ₇ OH	60.1	97.4	0.80	—	—
	Propylene	C ₃ H ₆	42.08	−47.5	0.65	1.15	25.1
S I X	Steam	H ₂ O	18	100.0	—	1.33	26.4
	Sulfur dioxide	SO ₂	64.06	−10.0	1.46	1.29	26.2
	Toluene	C ₆ H ₅ CH ₃	92.15	110.6	0.87	1.09	24.7
	Town gas (13A)	—	19	—	—	—	—
	Trimethylamine	(CH ₃) ₃ N	59.11	35.0	0.66	—	—
	Vinyl chloride	C ₂ H ₃ Cl	62.5	−13.9	0.98	—	—
	Xylene (o)	C ₆ H ₄ (CH ₃) ₂	106.0	144.4	0.88	—	—

Note (°) : At the condition below ambient temperature or the boiling point at atmospheric pressure.

(°) : At the condition of 0.861MPa (8.5atm) and 20°C .

(°) : At the condition of 2.381MPa (23.5atm) and 0°C .

(°) : C' which is not shown on this table, shall be 2.35 (adiabatic index = 1.0).

2. Property of fuel oil

Substance		Specific gravity of liquid (°)
Gasoline		0.65—0.75
Kerosene		0.79—0.85
Light oil		0.83—0.88
Heavy oil	A heavy oil	0.85—0.9
	B heavy oil	0.9 —0.92
	C heavy oil	0.92—1.0

Note (°) : At the condition of ambient temperature at atmospheric pressure

3. Property of heat medium

Substance	Chemical formula	Molecular weight	Boiling point °C (at 1atm)	Specific gravity of liquid (°)
Dowsum A		166.0	257.0	1.06
Dowsum E		147.0	178.0	1.31
NeoSK-Oil #240		142.0	241.0	1.02
KSK-OIL 260		180.0	268.0	0.96
ThermS 300			257.0	1.07
Freon 11	CCl ₃ F	137.4	23.8	1.48
Freon 12	CCl ₂ F ₂	120.9	−29.8	1.31
Freon 13	CF ₄	88.0	−128.0	1.32(at −80°C) (°)
Freon113	CCl ₂ F-CCl ₂ F	187.4	47.6	1.57

Note (°) : At the condition below ambient temperature and the boiling point at atmospheric pressure.

(°) : At the condition of 1.216MPa (12atm) and 80°C .