Saturation Properties for Ammonia — Temperature Increments

- Liquid Phase Data
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- Important Information About This Data
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- **Other Data Available:**
  - View data with display applet. (requires Java capable browser).
  - Download data as a tab-delimited text file.
  - Main NIST Chemistry WebBook page for this species.
  - Recommended citation for data from this page.
  - Fluid data for other species

Liquid Phase Data

Data on Saturation Curve

Temperature (C)	Pressure (bar)	Density (mol/l)	Volume (l/mol)	Internal Energy (kJ/kg)	Enthalpy (kJ/kg)	Entropy (J/g*K)	Cv (J/g*K)	Cp (J/g*K)	Sound Spd. (m/s)	Joule-Thomson (K/bar)	Viscosity (uPa*s)	Therm. Cond. (W/m*K)	Surf Tensi (N/m
-30.000	1.1943	39.802	0.025125	206.58	206.76	0.94462	2.8492	4.4645	1744.4	-0.018184	244.07	0.65463	0.043
-25.000	1.5147	39.432	0.025360	228.94	229.17	1.0357	2.8408	4.4892	1708.8	-0.017564	228.45	0.63819	0.041
-20.000	1.9008	39.056	0.025604	251.42	251.71	1.1253	2.8325	4.5138	1673.2	-0.016914	214.41	0.62196	0.039
-15.000	2.3617	38.675	0.025856	274.01	274.37	1.2137	2.8243	4.5385	1637.7	-0.016228	201.73	0.60594	0.038
-10.000	2.9071	38.288	0.026118	296.72	297.16	1.3009	2.8162	4.5636	1602.1	-0.015498	190.22	0.59014	0.036
-5.0000	3.5476	37.895	0.026388	319.54	320.09	1.3868	2.8082	4.5895	1566.4	-0.014718	179.72	0.57456	0.034
0.0000	4.2938	37.496	0.026669	342.48	343.15	1.4716	2.8003	4.6165	1530.5	-0.013878	170.09	0.55920	0.032
5.0000	5.1575	37.091	0.026961	365.55	366.36	1.5553	2.7926	4.6451	1494.4	-0.012968	161.23	0.54406	0.031
10.000	6.1505	36.678	0.027264	388.74	389.72	1.6380	2.7851	4.6757	1458.1	-0.011978	153.03	0.52912	0.029
15.000	7.2852	36.258	0.027580	412.06	413.24	1.7197	2.7780	4.7088	1421.5	-0.010896	145.42	0.51439	0.027
20.000	8.5748	35.830	0.027909	435.53	436.94	1.8005	2.7711	4.7448	1384.5	-0.0097083	138.32	0.49986	0.026
25.000	10.032	35.394	0.028254	459.16	460.82	1.8804	2.7647	4.7844	1347.1	-0.0083982	131.68	0.48551	0.024
30.000	11.672	34.948	0.028614	482.95	484.91	1.9597	2.7587	4.8282	1309.3	-0.0069477	125.45	0.47135	0.023
35.000	13.508	34.492	0.028993	506.93	509.23	2.0382	2.7532	4.8771	1271.0	-0.0053350	119.58	0.45737	0.021
40.000	15.554	34.024	0.029391	531.11	533.79	2.1161	2.7484	4.9318	1232.1	-0.0035347	114.04	0.44354	0.020
45.000	17.827	33.544	0.029811	555.51	558.63	2.1936	2.7443	4.9935	1192.7	-0.0015164	108.78	0.42986	0.018
50.000	20.340	33.051	0.030256	580.16	583.77	2.2706	2.7411	5.0635	1152.6	0.00075673	103.79	0.41632	0.017
55.000	23.111	32.542	0.030730	605.09	609.26	2.3473	2.7389	5.1434	1111.7	0.0033291	99.031	0.40290	0.016
60.000	26.156	32.016	0.031234	630.33	635.12	2.4239	2.7379	5.2351	1070.2	0.0062555	94.483	0.38959	0.014
65.000	29.491	31.471	0.031775	655.91	661.42	2.5004	2.7382	5.3411	1027.7	0.0096041	90.124	0.37638	0.013
70.000	33.135	30.904	0.032358	681.90	688.20	2.5770	2.7402	5.4648	984.38	0.013461	85.933	0.36324	0.012
75.000	37.105	30.313	0.032990	708.34	715.53	2.6539	2.7441	5.6103	940.05	0.017935	81.891	0.35015	0.010
80.000	41.420	29.692	0.033679	735.31	743.50	2.7312	2.7503	5.7837	894.66	0.023169	77.979	0.33711	0.0096

Vapor Phase Data

Data on Saturation Curve

Temperature (C)	Pressure (bar)	Density (mol/l)	Volume (l/mol)	Internal Energy (kJ/kg)	Enthalpy (kJ/kg)	Entropy (J/g*K)	Cv (J/g*K)	Cp (J/g*K)	Sound Spd. (m/s)	Joule-Thomson (K/bar)	Viscosity (uPa*s)	Therm. Cond. (W/m*K)	Phase
-30.000	1.1943	0.060914	16.417	1451.3	1566.5	6.5367	1.7218	2.3259	388.08	6.1242	8.1516	0.021149	vapor
-25.000	1.5147	0.076093	13.142	1456.9	1573.8	6.4543	1.7495	2.3730	390.73	5.6050	8.3000	0.021444	vapor
-20.000	1.9008	0.094142	10.622	1462.3	1580.8	6.3757	1.7793	2.4245	393.18	5.1435	8.4495	0.021768	vapor

-15.000	2.3617	0.11543	8.6629	1467.4	1587.5	6.3005	1.8110	2.4807	395.42	4.7317	8.5999	0.022120	vapor
-10.000	2.9071	0.14037	7.1238	1472.3	1593.9	6.2285	1.8446	2.5419	397.45	4.3629	8.7511	0.022503	vapor
-5.0000	3.5476	0.16940	5.9033	1476.9	1599.8	6.1592	1.8802	2.6082	399.25	4.0315	8.9031	0.022918	vapor
0.0000	4.2938	0.20297	4.9268	1481.2	1605.4	6.0926	1.9176	2.6799	400.82	3.7330	9.0558	0.023365	vapor
5.0000	5.1575	0.24160	4.1390	1485.2	1610.5	6.0284	1.9569	2.7575	402.16	3.4633	9.2094	0.023847	vapor
10.000	6.1505	0.28584	3.4985	1488.9	1615.3	5.9662	1.9979	2.8413	403.24	3.2191	9.3638	0.024365	vapor
15.000	7.2852	0.33628	2.9737	1492.3	1619.5	5.9060	2.0406	2.9318	404.07	2.9975	9.5193	0.024922	vapor
20.000	8.5748	0.39356	2.5409	1495.4	1623.3	5.8475	2.0849	3.0296	404.63	2.7960	9.6761	0.025519	vapor
25.000	10.032	0.45841	2.1814	1498.1	1626.6	5.7904	2.1308	3.1353	404.92	2.6126	9.8346	0.026159	vapor
30.000	11.672	0.53160	1.8811	1500.4	1629.3	5.7347	2.1782	3.2500	404.92	2.4453	9.9953	0.026846	vapor
35.000	13.508	0.61401	1.6286	1502.3	1631.5	5.6801	2.2272	3.3745	404.63	2.2924	10.159	0.027585	vapor
40.000	15.554	0.70660	1.4152	1503.8	1633.1	5.6265	2.2776	3.5104	404.03	2.1524	10.325	0.028379	vapor
45.000	17.827	0.81048	1.2338	1504.8	1634.0	5.5736	2.3294	3.6593	403.12	2.0241	10.497	0.029234	vapor
50.000	20.340	0.92689	1.0789	1505.4	1634.2	5.5213	2.3828	3.8233	401.88	1.9063	10.673	0.030160	vapor
55.000	23.111	1.0573	0.94582	1505.4	1633.7	5.4693	2.4377	4.0051	400.29	1.7978	10.857	0.031165	vapor
60.000	26.156	1.2033	0.83103	1504.8	1632.4	5.4174	2.4942	4.2084	398.34	1.6978	11.049	0.032262	vapor
65.000	29.491	1.3670	0.73154	1503.6	1630.2	5.3655	2.5525	4.4376	396.01	1.6053	11.252	0.033467	vapor
70.000	33.135	1.5506	0.64490	1501.6	1627.1	5.3131	2.6126	4.6990	393.29	1.5194	11.468	0.034803	vapor
75.000	37.105	1.7571	0.56913	1498.9	1622.9	5.2601	2.6748	5.0009	390.14	1.4394	11.701	0.036299	vapor
80.000	41.420	1.9899	0.50255	1495.2	1617.5	5.2060	2.7393	5.3546	386.54	1.3646	11.954	0.037995	vapor

Auxiliary Data

Reference States

Internal energy	U = 0 at 273.16 K for saturated liquid.
Entropy	S = 0 at 273.16 K for saturated liquid.

Additional fluid properties

Critical temperature (T_c)	132.25 C
Critical pressure (P_c)	113.330 bar
Critical density (D_c)	13.2118 mol/l
Acentric factor	0.25601
Normal boiling point	-33.327 C
Dipole moment	1.470 Debye

References

Equation of state and auxiliary model

Tillner-Roth, R.; Harms-Watzenberg, F.; Baehr, H.D., *Eine neue Fundamentalgleichung für Ammoniak.*, **DKV-Tagungsbericht**, 1993, 20, 167-181. [all data]

Auxiliary model

Ahrendts, J.; Baehr, H.D., *The Thermodynamic Properties of Ammonia*, **VDI-Forsch.**, 1979, 596, 0. [all data]

Thermal conductivity

Tufeu, R.; Ivanov, D.Y.; Garrabos, Y.; Le Neindre, B., *Thermal conductivity of ammonia in a large temperature and pressure range including the critical region*, **Ber. Bunsenges. Phys. Chem.**, 1984, 88, 422-427. [all data]

Viscosity and auxiliary model

Fenghour, A.; Wakeham, W.A.; Vesovic, V.; Watson, J.T.R.; Millat, J.; Vogel, E., *The viscosity of ammonia*, **J. Phys. Chem. Ref. Data**, 1995, 24, 1649-1667. [all data]

Surface tension