

GPA Data Bank - 5th Edition

Available Data Sets, Systems, and Components

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Introduction

The GPA data bank is the collection of several thousand datasets of mainly phase equilibrium data for components and mixture which are important for the processing of natural and other gases.

The fifth edition is twice as large as the fourth edition. Many new datasets have been added for low-boiling hydrocarbons and also other important gases.

The GPA edition is a joint effort of DDBST GmbH and EPCON International and has been created in close cooperation with leading GPA members.

Data Set Overview

The GPA data bank (5th edition) contains data from 333 sources including all GPA technical papers and reports.

The overview by data types shows that approx. half the data are stored in the standard DDB data banks and the other half has been entered in a new GPA specific data format (complex data).

Data Bank	Sets	Points	References
Activity coefficients at infinite dilution (binary systems)	73	73	4
Azeotropic/zeotropic information	128	128	16
Critical data of mixtures	27	162	15
Gas solubilities	207	1239	21
Gas solubilities (electrolyte containing systems)	2	10	1
Heats of mixing	320	962	6
Liquid-liquid equilibria	148	1194	19
Pure component properties	110	1230	19
Solid-liquid equilibria for systems without salts	60	852	17
Vapor-liquid equilibria (normal boiling point of a component below 0 °C)	688	5481	81
Vapor-liquid equilibria (normal boiling points of all components above 0 °C)	37	338	4
Further data (complex data)	1942	38586	130
Sum	3742	50255	333

The complex data bank has been introduced to store GPA specific sets containing multiple properties and data types that haven't been considered in the other data banks. This extended data bank contains systems with up to 10 components.

Data Types	Systems	Components	Sets	Points
Diffusion Coefficients (I in J)	12	8	18	276
Solid-Liquid-Vapor Equilibrium	18	11	21	346
Pressure-Volume/Density-Temperature-Composition	65	35	376	8489
Refractive Index	6	7	19	197
Vapor-Liquid Equilibrium	90	50	291	5251
Heat of Solution/Solvation	10	7	170	3874
Gas Solubilities	50	19	196	2485
Heat of Mixing	15	14	31	1063
Liquid-Hydrate I-Equilibrium	4	5	6	34
Initial Hydrate Formation Temperature	15	8	24	84
Liquid-Liquid-Equilibrium	13	17	60	1884
Partition Coefficients, KIJ, VLE	8	11	56	854
Ideal Gas Heat Capacities (related to moles)	5	3	6	150
Joule Thomson Coefficient	1	1	1	6
Phase Boundary Data, Critical Points, Univariant Data	13	9	52	2225
Hydrate Forming Conditions	12	8	20	326
Liquid Density	11	7	24	341
Speed of Sound	2	3	9	64
Dynamic Viscosity	17	19	39	585
Enthalpy Data at Saturation Conditions	4	4	8	40
Saturation Vapor Pressure	4	4	8	40
Solid-Liquid Equilibrium	7	12	9	43
Surface Tension	12	16	25	345
Isobaric Heat Capacity (related to mass)	11	13	55	1421
Isobaric Heat Capacity (related to moles)	7	4	10	103
Enthalpy Data at Different Conditions	58	25	329	9672
Dew Points	12	12	21	205
Vapor-Liquid-Liquid-Equilibrium	80	31	109	1937
VLLE, univariant T,P-data	19	12	25	649
Auxiliary Data	8	9	10	174
Reaction Kinetics	3	8	17	381
Chemical Reaction Equilibrium	3	8	3	20
Incipient Hydrate Formation Conditions	10	9	21	167
Rate of Absorption	11	8	36	644
Virial Coefficients	3	4	15	127
Bubble Points	7	14	9	104
Enthalpy of Hydrate Formation	2	4	7	21

Data Types	Systems	Components	Sets	Points
Gas-Liquid-Hydrate-Equilibrium	59	22	79	992
Hydrate Decomposition Conditions	1	4	3	16
Hydrate Liquid Equilibrium	4	4	11	128
Hydrate Gas/Vapor Equilibrium	1	2	2	11
pH as Function of T, x,	4	4	19	212
Phase Equilibria under Hydrate Forming Conditions	3	6	3	13

Systems Overview

The systems overview show that in total 627 different mixtures or pure component properties built from 114 components are available in the GPA data bank.

Data Bank	Components	Systems summary
=All=	114	627 systems 3742 sets 50255 points
Activity coefficients at infinite dilution (binary systems)	15	14 systems 73 sets 73 points
Azeotropic/zeotropic information	29	43 systems 128 sets 128 points
Critical data of mixtures	14	15 systems 27 sets 162 points
Different thermodynamic properties	80	409 systems 1942 sets 38586 points
Gas solubilities	40	82 systems 207 sets 1239 points
Gas solubilities (electrolyte containing systems)	3	1 system 2 sets 10 points
Heats of mixing	15	16 systems 320 sets 962 points
Liquid-liquid equilibria	37	79 systems 148 sets 1194 points
Pure component properties	27	27 systems 110 sets 1230 points
Solid-liquid equilibria for systems without salts	21	41 systems 60 sets 852 points

Data Bank	Components	Systems summary
Vapor-liquid equilibria (normal boiling point of a component below 0 °C)	53	147 systems 688 sets 5481 points
Vapor-liquid equilibria (normal boiling points of all components above 0 °C)	15	14 systems 37 sets 338 points

List of Components

Data for 114 pure components and their mixtures are available.

DDB Number	Name	CAS Registry Number	Empirical Formula
8	1,2-Ethanediol	107-21-1	C ₂ H ₆ O ₂
15	Formic acid	64-18-6	CH ₂ O ₂
25	Ethylbenzene	100-41-4	C ₈ H ₁₀
31	Benzene	71-43-2	C ₆ H ₆
32	Hydrogen cyanide	74-90-8	CHN
41	n-Butane	106-97-8	C ₄ H ₁₀
50	Cyclohexane	110-82-7	C ₆ H ₁₂
53	Methylcyclohexane	108-87-2	C ₇ H ₁₄
60	Decane	124-18-5	C ₁₀ H ₂₂
78	Dodecane	112-40-3	C ₁₂ H ₂₆
84	Acetic acid	64-19-7	C ₂ H ₄ O ₂
89	Hexane	110-54-3	C ₆ H ₁₄
91	Heptane	142-82-5	C ₇ H ₁₆
94	2-Methylbutane	78-78-4	C ₅ H ₁₂
97	2,2,4-Trimethylpentane	540-84-1	C ₈ H ₁₈
100	1-Hexene	592-41-6	C ₆ H ₁₂
108	1-Methyl naphthalene	90-12-0	C ₁₁ H ₁₀
110	Methanol	67-56-1	CH ₄ O
111	2-Methylpentane	107-83-5	C ₆ H ₁₄
128	Octane	111-65-9	C ₈ H ₁₈
129	1-Octene	111-66-0	C ₈ H ₁₆
134	Pentane	109-66-0	C ₅ H ₁₂
146	Hydrogen chloride	7647-01-0	HCl
148	Sulfuric acid	7664-93-9	H ₂ O ₄ S
149	Carbon disulfide	75-15-0	CS ₂
155	trans-Decahydronaphthalene	493-02-7	C ₁₀ H ₁₈
161	Toluene	108-88-3	C ₇ H ₈

DDB Number	Name	CAS Registry Number	Empirical Formula
174	Water	7732-18-5	H ₂ O
175	m-Xylene	108-38-3	C ₈ H ₁₀
176	p-Xylene	106-42-3	C ₈ H ₁₀
180	2-Propanethiol	75-33-2	C ₃ H ₈ S
210	Ammonia	7664-41-7	H ₃ N
237	Propane	74-98-6	C ₃ H ₈
297	Hexafluorobenzene	392-56-3	C ₆ F ₆
316	2-Methylpropane	75-28-5	C ₄ H ₁₀
322	o-Xylene	95-47-6	C ₈ H ₁₀
368	1-Butene	106-98-9	C ₄ H ₈
369	Propylbenzene	103-65-1	C ₉ H ₁₂
395	p-Diisopropylbenzene	100-18-5	C ₁₂ H ₁₈
398	Nonane	111-84-2	C ₉ H ₂₀
401	Ethylcyclohexane	1678-91-7	C ₈ H ₁₆
419	Ethyl methyl sulfide	624-89-5	C ₃ H ₈ S
443	Triethylene glycol	112-27-6	C ₆ H ₁₄ O ₄
463	Diethylene glycol	111-46-6	C ₄ H ₁₀ O ₃
487	1,3,5-Trimethylbenzene	108-67-8	C ₉ H ₁₂
516	Hexadecane	544-76-3	C ₁₆ H ₃₄
546	Monoethanolamine	141-43-5	C ₂ H ₇ NO
579	Methanethiol	74-93-1	CH ₄ S
651	Xylene <Isomer not specified>	1330-20-7	C ₈ H ₁₀
728	Propylene carbonate	108-32-7	C ₄ H ₆ O ₃
733	1-Ethyl-naphthalene	1127-76-0	C ₁₂ H ₁₂
894	2,2'-Diethanolamine (DEA)	111-42-2	C ₄ H ₁₁ NO ₂
913	Ethanethiol	75-08-1	C ₂ H ₆ S
927	Phenanthrene	85-01-8	C ₁₄ H ₁₀
1050	Carbon dioxide	124-38-9	CO ₂
1051	Methane	74-82-8	CH ₄
1052	Oxygen	7782-44-7	O ₂
1053	Ethylene	74-85-1	C ₂ H ₄
1054	Ethane	74-84-0	C ₂ H ₆
1055	Propylene	115-07-1	C ₃ H ₆
1056	Nitrogen	7727-37-9	N ₂
1057	Carbon monoxide	630-08-0	CO
1058	Argon	7440-37-1	Ar

DDB Number	Name	CAS Registry Number	Empirical Formula
1061	Dinitrogen monoxide	10024-97-2	N ₂ O
1063	Hydrogen	1333-74-0	H ₂
1064	Ethyne	74-86-2	C ₂ H ₂
1065	Hydrogen sulfide	7783-06-4	H ₂ S
1150	Dimethyl sulfide	75-18-3	C ₂ H ₆ S
1151	Perdeuterobenzene	1076-43-3	C ₆ D ₆
1158	Difluoromethane [R32]	75-10-5	CH ₂ F ₂
1223	N-Formylmorpholine	4394-85-8	C ₅ H ₉ NO ₂
1240	Triacontane	638-68-6	C ₃₀ H ₆₂
1241	2-Methylheptane	592-27-8	C ₈ H ₁₈
1243	Octacosane	630-02-4	C ₂₈ H ₅₈
1272	Tetracosane	646-31-1	C ₂₄ H ₅₀
1273	Hexatriacontane	630-06-8	C ₃₆ H ₇₄
1274	Dotriacontane	544-85-4	C ₃₂ H ₆₆
1292	Helium	7440-59-7	He
1300	Sulfur dioxide	7446-09-5	O ₂ S
1363	Carbonyl sulfide	463-58-1	COS
1512	1,3-Diethylbenzene	141-93-5	C ₁₀ H ₁₄
1543	n-Propyl cyclohexane	1678-92-8	C ₉ H ₁₈
1557	9-Methylanthracene	779-02-2	C ₁₅ H ₁₂
1693	Cyclopropane	75-19-4	C ₃ H ₆
1839	Diglycolamine	929-06-6	C ₄ H ₁₁ NO ₂
1917	n-Butylcyclohexane	1678-93-9	C ₁₀ H ₂₀
1935	iso-Butylmercaptan	513-44-0	C ₄ H ₁₀ S
2186	Diisopropanolamine (DIPA)	110-97-4	C ₆ H ₁₅ NO ₂
2187	Methyldiethanolamine (MDEA)	105-59-9	C ₅ H ₁₃ NO ₂
2245	Phosphoric acid	7664-38-2	H ₃ O ₄ P
2552	Adamantane	281-23-2	C ₁₀ H ₁₆
2928	2-Methyl-2-propanethiol	75-66-1	C ₄ H ₁₀ S
3492	Pentacosane	629-99-2	C ₂₅ H ₅₂
3681	3-Methylnonane	5911-04-6	C ₁₀ H ₂₂
3816	Nonacosane	630-03-5	C ₂₉ H ₆₀
4488	Tritriacontane	630-05-7	C ₃₃ H ₆₈
4577	Potassium chloride	7447-40-7	ClK
4907	Calcium chloride	10043-52-4	CaCl ₂
4911	Sodium chloride	7647-14-5	ClNa

DDB Number	Name	CAS Registry Number	Empirical Formula
4915	Strontium dichloride	10476-85-4	Cl_2Sr
4955	Magnesium chloride	7786-30-3	Cl_2Mg
6308	Sodium hydroxide	1310-73-2	HNaO
6311	Sodium sulfate	7757-82-6	$\text{Na}_2\text{O}_4\text{S}$
6331	Sodium acetate	127-09-3	$\text{C}_2\text{H}_3\text{NaO}_2$
9184	1,3-Dimethyl adamantane	702-79-4	$\text{C}_{12}\text{H}_{20}$
9185	Diamantane	2292-79-7	$\text{C}_{14}\text{H}_{20}$
12866	1,2-Epoxy-p-menth-8-ene	1195-92-2	$\text{C}_{10}\text{H}_{16}\text{O}$
17172	Polyethylene glycol 400	25322-68-3	
17173	1-Butyl-3-methylimidazolium tetrafluoroborate	174501-65-6	$\text{C}_8\text{H}_{15}\text{BF}_4\text{N}_2$
17278	Polyethyleneglycoldimethylether		
22902	Mixture of Compounds (available details are given in the corresponding dataset)		
24257	Highly Aromatic Lean Oil		
24258	Highly Naphthenic Lean Oil		
3000024	poly(1-vinyl-2-pyrrolidinone)		