

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methanol, CH₄O [67-56-1]
2. Methyl ethanoate, C₃H₆O₂ [79-20-9]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mącznycki, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

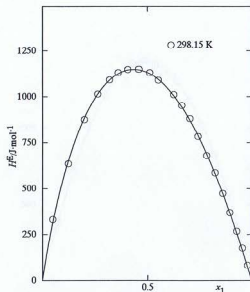
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E / J·mol ⁻¹	x ₁	H ^E / J·mol ⁻¹				
0.0486	332.5	0.6649	953.8				
0.1227	636.7	0.7031	881.1				
0.1998	876.2	0.7423	785.0				
0.2648	1016.4	0.7831	679.8				
0.3217	1092.8	0.8225	586.1				
0.3638	1132.1	0.8602	474.1				
0.4098	1149.1	0.8946	370.6				
0.4605	1151.3	0.9263	270.1				
0.5110	1131.4	0.9532	177.1				
0.5521	1091.5	0.9782	83.9				
0.6268	1012.4						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 / \left(1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right)$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	4541 (13)	0.224 (0.011)	-0.080 (0.013)	0.070 (0.027)		8.4	24.2

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 786.57; n_D(298.15 K) = 1.3273.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 927.03; n_D(298.15 K) = 1.3589.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1), 154-153

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethanol, C_2H_6O [64-17-5]
2. Methyl ethanoate, $C_3H_6O_2$ [79-20-9]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_i , mole fraction of component i
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)
Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	J·mol ⁻¹						
724.7	5766 (11)	-298 (47)	-225 (59)	599 (126)		7	14.1

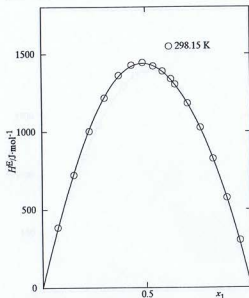
The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H_{\text{calc}}^E - H^E|$; $\sigma_d = [2 \sum (H_{\text{calc}}^E - H^E)^2 / (N \cdot n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
All direct exptl. values equally weighted

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E J·mol ⁻¹				
0.0735	387.6				
0.1518	724.7				
0.2274	1004.5				
0.3018	1219.3				
0.3705	1364.1				
0.4328	1429.8				
0.4862	1445.1				
0.5370	1422.3				
0.5816	1389.9				
0.6213	1341.3				
0.6420	1304.8				
0.6996	1185.2				
0.7601	1026.9				
0.8206	827.8				
0.8844	577.5				
0.9460	304.5				



Points, direct experimental H^E values, curve, H_{calc}^E calculated from the equation.

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedures: Calibration, filling and operation described in ref. 2. Check measurements on cyclohexane + hexane and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 784.94$; $n(D, 298.15 \text{ K}) = 1.3594$.

2. Fluka AG (Basch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 927.03$; $n(D, 298.15 \text{ K}) = 1.3589$.

Errors: δT (reproducibility)/K = 0.02; $\delta x_i < 0.0005$; $\delta H^E/|H^E| < 0.02$ (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Mendoña, C. J. *J. Chem. Thermodyn.* 1974, 6, 387.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

Published: July 31, 1995

SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methyl ethanoate, C₃H₆O₂ [79-20-9]
 2. 1-Butanol, C₄H₁₀O [71-36-3]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
 x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071- University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

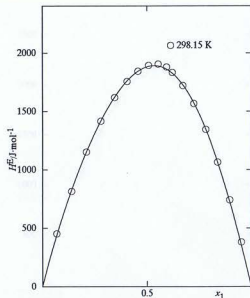
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071- University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹				
0.0679	453.5				
0.1379	816.4				
0.2097	1154.2				
0.2785	1417.9				
0.3445	1619.2				
0.4041	1757.8				
0.4573	1844.0				
0.5080	1893.5				
0.5534	1904.7				
0.5934	1881.5				
0.6223	1835.4				
0.6728	1722.4				
0.7250	1568.1				
0.7811	1344.9				
0.8389	1065.9				
0.8955	740.1				
0.9502	381.4				



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	7543 (17)	1135 (68)	-277 (83)	-895 (179)		10.3	17.6

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
 δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
 N, no. of direct exptl. values; n, no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 927.03; n(D, 298.15 K) = 1.3589.
 2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 805.93; n(D, 298.15 K) = 1.3974.

Errors: δT(reproducibility)/K = 0.02; dx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoekli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methyl ethanoate, C₃H₆O₂ [79-20-9]
2. 1-Hexanol, C₆H₁₄O [111-27-3]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

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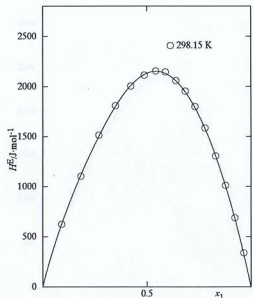
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

Notes: P, atm.

T/K = 298.15

x ₁	H ^E J·mol ⁻¹						
0.0906	626.2						
0.1828	1104.9						
0.2696	1514.4						
0.3498	1809.8						
0.4228	2006.7						
0.4871	2115.6						
0.5425	2155.1						
0.5893	2145.7						
0.6402	2060.2						
0.6839	1955.0						
0.7304	1801.6						
0.7778	1585.5						
0.8299	1307.5						
0.8772	1012.9						
0.9219	687.5						
0.9639	340.3						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d, and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	8543 (13)	1803 (44)	-1073 (139)	-935 (116)	1557 (242)	6.2	9.5

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
 δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
 N, no. of direct exptl. values; n, no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg m⁻³ = 927.03; n(D, 298.15 K) = 1.3589.
2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg m⁻³ = 815.26; n(D, 298.15 K) = 1.4160.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Storekii, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Mendiuna, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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Int. DATA Ser., Ser. A, Data Mixtures, Ser. A 1995, 23(3), 154-183

SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methyl ethanoate, C₃H₆O₂ [79-20-9]
2. 1-Octanol, C₈H₁₈O [111-87-5]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 -University of Las Palmas de G. C., Canary Islands, Spain)

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SOURCE OF DATA

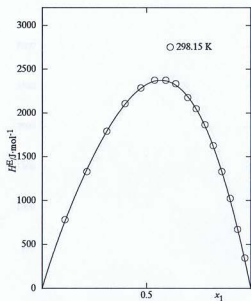
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 -University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹						
0.1091	782.6						
0.2132	1331.4						
0.3096	1795.2						
0.3966	2107.3						
0.4720	2289.6						
0.5383	2375.3						
0.5923	2377.0						
0.6399	2336.4						
0.6968	2179.4						
0.7369	2049.2						
0.7777	1865.7						
0.8190	1627.5						
0.8605	1334.5						
0.8999	1025.6						
0.9354	674.9						
0.9703	348.9						



Points, direct experimental H^E values, curve, H^E calculated from the equation.

SMOOTHING EQUATION

$$H^E_{\text{calc}} = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	9328 (23)	2712 (89)	358 (111)	-906 (232)		12.5	20.9

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
A_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated G.L.C. purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 927.03; n(D, 298.15 K) = 1.3589.
2. Fluka AG (Basch, St. Gallen, Switzerland), "puriss." grade material of stated G.L.C. purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 821.67; n(D, 298.15 K) = 1.4270.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-1111

Published by Thermodynamics Research Center

Components: 1. Methyl ethanoate, C₃H₆O₂ [79-20-9]
2. 1-Decanol, C₁₀H₂₂O [112-30-1]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

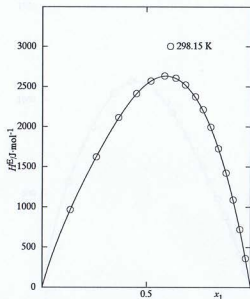
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.
T/K = 298.15

x ₁	H ^E /J·mol ⁻¹				
0.1341	965.9				
0.2585	1626.9				
0.3651	2115.3				
0.4506	2415.3				
0.5196	2571.7				
0.5859	2634.8				
0.6406	2609.0				
0.6866	2522.2				
0.7343	2377.6				
0.7710	2214.2				
0.8077	1996.5				
0.8451	1729.3				
0.8808	1424.1				
0.9158	1091.5				
0.9475	721.4				
0.9761	363.4				



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	10152 (14)	4105 (54)	504 (159)	-1069 (148)	1668 (289)	6.6	14.3

The std. deviations σ_d(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)²/(N-n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)g·m⁻³ = 927.03; n(D, 298.15 K) = 1.3589.

2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)g·m⁻³ = 826.42; n(D, 298.15 K) = 1.4349.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stockli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. *J. Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
INTERNATIONAL DATA SERIES*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methanol, C₂H₆O [67-56-1]
2. Ethyl ethanoate, C₄H₈O₂ [141-78-6]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_i , mole fraction of component i
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

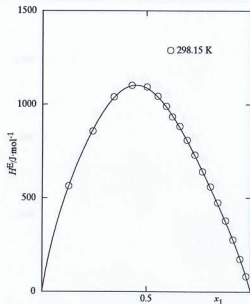
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E J·mol ⁻¹					
0.1260	563.9					
0.2414	858.9					
0.3429	1041.3					
0.4294	1102.8					
0.5023	1094.4					
0.5543	1044.6					
0.5940	991.7					
0.6238	935.3					
0.6578	883.5					
0.6944	810.7					
0.7305	731.9					
0.7682	641.9					
0.8057	561.1					
0.8411	476.0					
0.8786	378.8					
0.9141	277.9					
0.9484	174.7					
0.9772	83.0					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{\text{calc}} = x_1 x_2 a_1 / [1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1}]$$

Coeffs. a_i in the smoothing eq. std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	J·mol ⁻¹						
858.9	4366.3 (8.3)	0.2671 (0.0068)	0.359 (0.022)	-0.0214 (0.018)	-0.492 (0.04)	3.9	8.2

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{\text{calc}} - H^E|$; $\sigma_d = [\sum (H^E_{\text{calc}} - H^E)^2 / (N - n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 786.57$; $n(D, 298.15 \text{ K}) = 1.3273$.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 894.35$; $n(D, 298.15 \text{ K}) = 1.3699$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E/H^E < 0.02$ (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethanol, C₂H₆O [64-17-5]
2. Ethyl ethanoate, C₄H₈O₂ [141-78-6]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

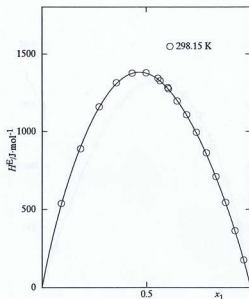
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹							
0.0928	539.2							
0.1848	892.1							
0.2737	1161.9							
0.3573	1315.6							
0.4329	1378.1							
0.4986	1379.7							
0.5557	1345.0							
0.5661	1328.0							
0.6028	1284.8							
0.6061	1277.3							
0.6478	1199.0							
0.6923	1109.3							
0.7387	997.1							
0.7862	864.5							
0.8330	712.3							
0.8787	545.2							
0.9229	363.7							
0.9651	177.5							



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
892.1	5520.1 (9.4)	0.1366 (0.0062)	0.07 (0.02)	-0.0221 (0.016)	-0.168 (0.034)	5	11.1

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on cyclohexane + hexane and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puris. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 784.94; n(D, 298.15 K) = 1.3594.
2. Fluka AG (Basel, St. Gallen, Switzerland), "puris. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 894.35; n(D, 298.15 K) = 1.3699.

Errors: δT(reproducibility)/K = 0.02; dx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stockill, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. I. *J. Chem. Thermodyn.* 1974, 6, 387.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

Published: July 31, 1995

SELECTED DATA ON MIXTURES
International Data Series*

Published by Thermodynamics Research Center

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Components: 1. Ethyl ethanoate, C₄H₈O₂ [141-78-6]
2. 1-Butanol, C₄H₁₀O [71-36-3]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

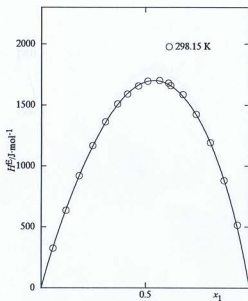
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.
T/K = 298.15

x ₁	H ^E J·mol ⁻¹					
0.0564	327.4					
0.1179	637.9					
0.1822	920.7					
0.2467	1167.8					
0.3079	1364.3					
0.3668	1509.3					
0.4134	1591.5					
0.4654	1659.2					
0.5107	1698.4					
0.5679	1701.8					
0.6104	1681.1					
0.6219	1660.1					
0.6793	1586.3					
0.7438	1424.8					
0.8102	1192.5					
0.8765	882.8					
0.9414	514.8					



Points, direct experimental H^E values; curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 \left[1 + \sum_{i=2}^N a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	6776 (16)	-0.1666 (0.008)	-0.004 (0.026)	-0.038 (0.021)	-0.116 (0.044)	8.3	18.2

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct expt. values; n, no. of coeffs. a_i
All direct expt. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 894.35; n_D(298.15 K) = 1.3699.
2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 805.93; n_D(298.15 K) = 1.3974.

Errors: dT(reproducibility)/K = 0.02; dx₁ < 0.0005; dH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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4. Diaz - Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethyl ethanoate, $C_4H_8O_2$ [141-78-6]
2. 1-Hexanol, $C_6H_{14}O$ [111-27-3]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_i , mole fraction of component i
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Maczynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

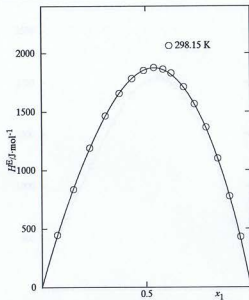
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E $J \cdot mol^{-1}$				
0.0744	447.6				
0.1526	836.7				
0.2307	1190.4				
0.3054	1465.8				
0.3731	1659.2				
0.4341	1784.6				
0.4901	1854.6				
0.5407	1877.4				
0.5844	1864.3				
0.6234	1831.1				
0.6818	1714.0				
0.7326	1566.7				
0.7882	1366.5				
0.8435	1101.0				
0.8986	777.7				
0.9505	431.9				



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 a_1 / [1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1}]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	$J \cdot mol^{-1}$						
298.15	7461 (11)	-0.182 (0.0053)	0.099 (0.017)	0.0014 (0.015)	-0.13 (0.029)	5.6	9.7

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{calc} - H^E|$; $\sigma_d = [2\sum(H^E_{calc} - H^E)^2 / (N \cdot n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm^3) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 894.35$; $n(D, 298.15 \text{ K}) = 1.3699$.

2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 815.26$; $n(D, 298.15 \text{ K}) = 1.4160$.

Errors: ΔT (reproducibility)/K = 0.02; $\Delta x_1 < 0.0005$; $\Delta H^E / |H^E| < 0.02$ (over central range of concn.).

REFERENCES

1. *Int. Data Ser., Ser. A, Guideline 1a, 1994, 22(1)*.
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

Published: July 31, 1995

SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethyl ethanoate, C₄H₈O₂ [141-78-6]
2. 1-Octanol, C₈H₁₈O [111-87-5]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fiscoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

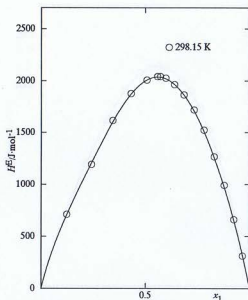
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fiscoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain), FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15							
x ₁	H ^E /J·mol ⁻¹						
0.1226	713.8						
0.2409	1194.1						
0.3449	1617.4						
0.4325	1878.7						
0.5079	2006.7						
0.5584	2042.6						
0.5728	2043.1						
0.5980	2027.4						
0.6397	1963.6						
0.6845	1865.2						
0.7317	1720.6						
0.7798	1525.2						
0.8285	1270.0						
0.8762	994.8						
0.9225	662.7						
0.9652	316.3						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	8011.52 (15)	2525 (58)	-1910 (175)	-1490 (158)	2840 (321)	7.5	13.3

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E| ; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 894.35; n_D(298.15 K) = 1.3699.
2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 821.67; n_D(298.15 K) = 1.4270.

Errors: ΔT(reproducibility)/K = 0.02; Δx₁ < 0.0005; ΔH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stockli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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Components: 1. Ethyl ethanoate, $C_4H_8O_2$ [141-78-6]
2. 1-Decanol, $C_{10}H_{22}O$ [112-30-1]

State: Binary system, single-phase liquid; pure components, both liquid

Variables: H^E , molar excess enthalpy
 x_1 , mole fraction of component 1

Parameters: T , temperature

Constants: P , pressure

Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

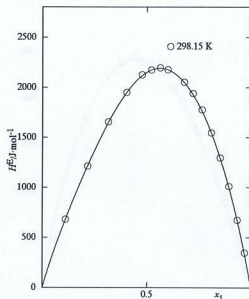
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E J·mol ⁻¹						
0.1110	682.5						
0.2168	1213.0						
0.3150	1654.9						
0.4032	1950.4						
0.4767	2125.7						
0.5219	2175.2						
0.5639	2196.9						
0.6016	2179.5						
0.6793	2052.8						
0.7214	1941.2						
0.7646	1778.6						
0.8091	1548.3						
0.8518	1298.8						
0.8937	1012.0						
0.9334	676.9						
0.9693	349.3						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{\text{calc}} = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	J·mol ⁻¹						
298.15	8624 (13)	2493 (51)	-721 (146)	-194 (133)	1524 (262)	6.5	11.5

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{\text{calc}} - H^E|$; $\sigma_d = [\sum (H^E_{\text{calc}} - H^E)^2 / (N - n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 894.35$; $n_D(298.15 \text{ K}) = 1.3699$.
 2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 826.42$; $n_D(298.15 \text{ K}) = 1.4349$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E/|H^E| < 0.02$ (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. *J. Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methanol, C₂H₆O [67-56-1]
2. Propyl ethanoate, C₅H₁₀O₂ [109-60-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

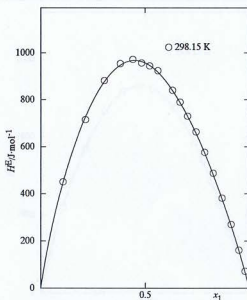
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹						
0.1064	452.5						
0.2136	716.1						
0.3049	882.8						
0.3816	954.7						
0.4418	971.5						
0.4826	957.6						
0.5221	945.3						
0.5621	924.0						
0.6321	842.0						
0.6676	791.3						
0.7090	731.8						
0.7435	664.1						
0.7843	577.1						
0.8254	488.9						
0.8693	382.4						
0.9117	270.3						
0.9486	162.1						
0.9785	71.7						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \rho_1 / \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
716.1	3837.2 (9.6)	0.207 (0.009)	0.071 (0.029)	0.0011 (0.024)	-0.169 (0.05)	5	11

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 786.57; n(D, 298.15 K) = 1.3273.
2. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 882.28; n(D, 298.15 K) = 1.3820.

Errors: δT (reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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4. Diaz-Pena, M.; Mendoña, C. *J. Chem. Thermodyn.* 1974, 6, 387.

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SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethanol, C₂H₆O [64-17-5]
2. Propyl ethanoate, C₅H₁₀O₂ [109-60-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

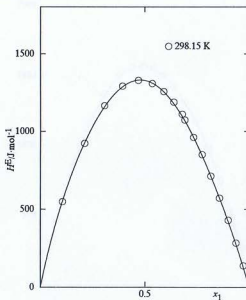
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

Notes: P, atm.

DIRECT EXPERIMENTAL VALUES

T/K = 298.15						
x ₁	H ^E /J·mol ⁻¹					
0.1054	549.7					
0.2123	924.7					
0.3074	1166.9					
0.3937	1292.7					
0.4693	1329.6					
0.5349	1310.4					
0.5905	1258.1					
0.6389	1189.9					
0.6792	1111.2					
0.6908	1074.1					
0.7321	964.3					
0.7733	852.6					
0.8151	715.6					
0.8570	573.0					
0.8977	430.4					
0.9351	284.4					
0.9705	138.1					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
924.7	5329 (12)	-503 (39)	-739 (124)	-371 (105)	975 (216)	5.4	10.3

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 784.94; n(D, 298.15 K) = 1.3594.
2. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 882.28; n(D, 298.15 K) = 1.3820.

Errors: δT(reproducibility)/K = 0.02, δx₁ < 0.0005, δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1)

SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. 1-Butanol, C₄H₁₀O [71-36-3]
 2. Propyl ethanoate, C₆H₁₀O₂ [109-60-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
 x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

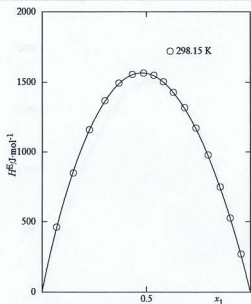
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹				
0.0698	465.6				
0.1494	851.2				
0.2264	1160.2				
0.2999	1368.2				
0.3682	1493.5				
0.4316	1555.0				
0.4866	1565.8				
0.5354	1549.6				
0.5808	1503.2				
0.6296	1428.6				
0.6824	1319.1				
0.7375	1171.7				
0.7948	979.8				
0.8532	751.5				
0.9009	529.3				
0.9541	273.4				



Points, direct experimental H^E values, curve, H^E calc.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
851.2	6266 (11)	0.0862 (0.0061)	0.004 (0.019)	-0.0001 (0.015)	-0.073 (0.033)	5.6	10.7

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
 δ_m = max |H^E_{calc.} - H^E|; σ_d = [Σ(H^E_{calc.} - H^E)²/(N - n)]^{1/2}
 N, no. of direct expl. values; n, no. of coeffs. a_i
 All direct expl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on cyclohexane + hexane and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 805.93; n(D, 298.15 K) = 1.3974.
 2. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 882.28; n(D, 298.15 K) = 1.3820.

Errors: δT (reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

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- Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1).
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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1)

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3611

Published by Thermodynamic Research Center

Components: 1. Propyl ethanoate, $C_3H_7O_2$ (109-66-4)
2. 1-Hexanol, $C_6H_{14}O$ (111-27-3)

State: Binary system, single-phase liquid; pure components, both liquid

Variables: H^E , molar excess enthalpy
 x_1 , mole fraction of component 1

Parameters: T , temperature

Constants: P , pressure

Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Moczyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kazimierza 44/52, 01-228 Warszawa, Poland)

SOURCE OF DATA

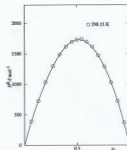
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E J/mol ¹						
0.0647	390.2						
0.1327	725.8						
0.2016	1025.9						
0.2717	1296.6						
0.3365	1489.6						
0.3978	1647.9						
0.4548	1695.4						
0.5011	1731.9						
0.5480	1741.1						
0.5957	1698.3						
0.6490	1618.2						
0.7057	1474.7						
0.7648	1289.3						
0.8278	1030.0						
0.8890	722.9						
0.9487	324.9						



Points, direct experimental H^E values; curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{\text{calc}} = x_1 x_2 \rho / [1 + \sum_{i=2}^6 a_i (x_1 - x_2)^{i-1}]$$

Coeff. a_i is the smoothing eq., std. deviation σ_{ij} and max. deviation δ_{ij} det'd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	a_6	δ_{ij}
	J/mol ¹						
298.15	0.038 (11)	-0.8987 (0.0014)	0.139 (0.017)	0.805 (0.014)	-0.136 (0.03)	5.8	7.2

The std. deviations (σ_{ij}) of the coeffs. a_i are given in parentheses
 $\delta_{ij} = \max |H^E_{\text{calc}} - H^E|$; $\sigma_{ij} = [2(H^E_{\text{calc}} - H^E)^2 / (N - 6)]^{1/2}$
 N , no. of direct expt. values; n , no. of coeffs. a_i
All direct expt. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Searan, Lyon, France) with stainless steel heat mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermogram.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane+benzene) and (benzene+heptane), in agreement to within 1 % (over central range of concs.) with the data reported in refs. 3 and 4.

Materials: 1. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 852.28$; $\alpha(1, 298.15 \text{ K}) = 1.3820$.

2. Fluka AG (Buchs, St. Gallen, Switzerland), "purity" grade material of stated OLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 815.26$; $\alpha(1, 298.15 \text{ K}) = 1.6190$.

Errors: ΔT (reproducibility)/K = 0.02; δa_i = 0.0005; ΔH^E (1%) < 0.02 (over central range of concs.).

REFERENCES

1. *Int. Data Ser., Ser. A, Guidelines Ia*, 1984, 22(1).
2. Ortega, J.; González, E.; Méndez, I. S.; Legido, J. I. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 593.
4. Dietz-Peen, M.; Mendicino, C. J. *Chem. Thermodyn.* 1978, 6, 387.

SELECTED DATA ON MIXTURES
International DATA Series*

Published by Thermodynamics Research Center

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-1111

Components: 1. Propyl ethanoate, C₅H₁₀O₂ [109-60-4]
2. 1-Octanol, C₈H₁₈O [111-87-5]
State: Binary system, single-phase liquid, pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

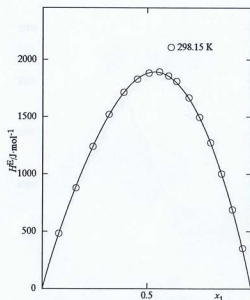
DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E / J·mol ⁻¹
----------------	-----------------------------------------

0.0784	483.4
0.1594	881.3
0.2395	1243.1
0.3171	1523.4
0.3884	1716.4
0.4519	1831.4
0.5079	1884.9
0.5578	1893.8
0.6017	1859.3
0.6403	1809.9
0.6982	1667.5
0.7498	1497.8
0.8034	1275.8
0.8575	1003.9
0.9099	688.8
0.9585	352.5



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \rho_1 / \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	7540 (10)	-0.1674 (0.0050)	0.137 (0.015)	0.026 (0.013)	-0.165 (0.027)	5.3	9.8

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct expl. values; n, no. of coeffs. a_i
All direct expl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on cyclohexane + hexane and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 882.28; n(D, 298.15 K) = 1.3820.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 821.67; n(D, 298.15 K) = 1.4270.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stockli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Meudina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1)

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Propyl ethanoate, C₅H₁₀O₂ [109-60-4]
2. 1-Decanol, C₁₀H₂₂O [112-30-1]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

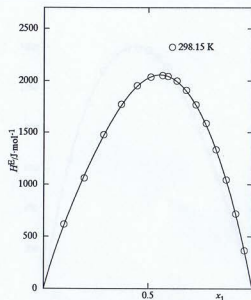
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹	x ₁	H ^E /J·mol ⁻¹			
0.0968	618.7					
0.1933	1061.2					
0.2864	1478.5					
0.3709	1774.3					
0.4457	1951.4					
0.5109	2036.5					
0.5675	2052.4					
0.5941	2041.2					
0.6365	1998.6					
0.6820	1910.5					
0.7282	1771.5					
0.7764	1591.2					
0.8249	1336.7					
0.8735	1046.3					
0.9196	719.2					
0.9623	368.7					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	8121.71 (20)	2083 (70)	-653 (220)	-596 (185)	1420 (386)	9.7	20.6

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Aldrich (Steinheim, Germany), material of stated purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 882.28; n(D, 298.15 K) = 1.3820.
2. Fluka AG (Basel, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 826.42; n(D, 298.15 K) = 1.4349.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/H^E < 0.02 (over central range of concn.).

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1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. *J. Chem. Thermodyn.* 1974, 6, 387.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1)

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Methanol, C₂H₆O [67-56-1]
2. Butyl ethanoate, C₆H₁₂O₂ [123-86-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mącztyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

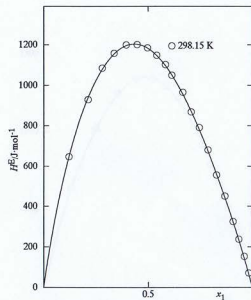
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E / J·mol ⁻¹	x ₁	H ^E / J·mol ⁻¹				
0.1201	647.6	0.6669	966.9				
0.2117	930.3	0.7055	869.2				
0.2807	1086.7	0.7447	792.6				
0.3369	1159.3	0.7860	681.1				
0.3953	1200.2	0.8274	556.3				
0.4478	1203.1	0.8683	451.7				
0.4973	1186.7	0.9055	326.2				
0.5414	1150.0	0.9338	238.5				
0.5825	1103.5	0.9598	153.6				
0.6137	1051.2	0.9812	70.8				



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
930.3	4742.68 (11)	-1274 (38)	19 (117)	-313 (108)	718 (213)	5.7	9.3

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 786.57; n(D, 298.15 K) = 1.3273.

2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 875.67; n(D, 298.15 K) = 1.3919.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Mendoña, C. *J. Chem. Thermodyn.* 1974, 6, 387.

Published by Thermodynamics Research Center

Components: 1. Ethanol, C₂H₆O [64-17-5]
 2. Butyl ethanoate, C₆H₁₂O₂ [123-86-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
 x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 -University of Las Palmas de G. C., Canary Islands, Spain)
Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

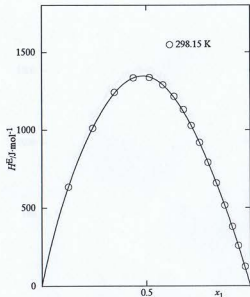
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 -University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E J·mol ⁻¹					
0.1266	635.9					
0.2426	1013.6					
0.3478	1243.5					
0.4387	1337.0					
0.5154	1339.3					
0.5803	1291.6					
0.6341	1217.6					
0.6787	1133.2					
0.7155	1030.7					
0.7557	921.0					
0.7959	793.4					
0.8361	660.7					
0.8758	516.4					
0.9126	380.6					
0.9421	260.3					
0.9736	126.1					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d, and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
1013.6	5399 (11)	-389 (38)	-831 (115)	-477 (103)	1071 (205)	4.8	10.3

The std. deviations σ_d(a_i) of the coeffs. a_i are given in parentheses
 δ_m = max |H^E_{calc} - H^E| ; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
 N, no. of direct exptl. values; n, no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 784.94; n(D, 298.15 K) = 1.3594.
 2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 875.67; n(D, 298.15 K) = 1.3919.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

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1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. 1-Butanol, C₄H₁₀O [71-36-3]
2. Butyl ethanoate, C₆H₁₂O₂ [123-86-4]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

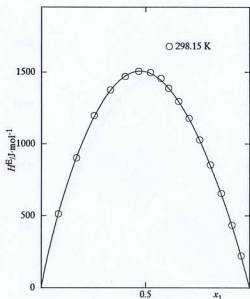
Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E J·mol ⁻¹					
	0.0809	512.6				
0.1683	903.8					
0.2529	1198.7					
0.3304	1376.1					
0.4013	1470.2					
0.4654	1505.5					
0.5229	1497.0					
0.5736	1456.7					
0.6115	1388.4					
0.6581	1296.8					
0.7071	1177.5					
0.7586	1027.6					
0.8111	855.3					
0.8631	655.2					
0.9131	435.8					
0.9590	223.4					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 / [1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1}]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
903.8	6024 (10)	0.1112 (0.0057)	0.088 (0.019)	0.019 (0.015)	-0.164 (0.032)	5	9.7

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 805.93; n_D(298.15 K) = 1.3974.
2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 875.67; n_D(298.15 K) = 1.3919.

Errors: δT (reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Mendiuna, C. *J. Chem. Thermodyn.* 1974, 6, 387.

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0147-1509/95/030303-1\$782/0

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Components: 1. Butyl ethanoate, C₆H₁₂O₂ [123-86-4]
2. 1-Hexanol, C₆H₁₄O [111-27-3]

State: Binary system, single-phase liquid; pure components, both liquid

Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1

Parameters: T, temperature

Constants: P, pressure

Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

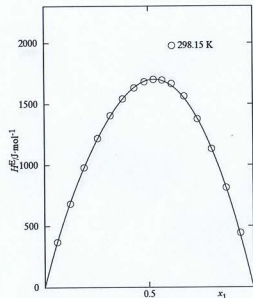
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E J·mol ⁻¹					
0.0597	369.8					
0.1226	683.5					
0.1886	982.0					
0.2538	1221.4					
0.3161	1407.8					
0.3756	1545.9					
0.4306	1634.6					
0.4799	1682.9					
0.5249	1702.7					
0.5656	1697.5					
0.6102	1669.5					
0.6703	1566.3					
0.7342	1379.8					
0.8020	1134.7					
0.8704	815.0					
0.9380	444.3					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	6805 (15)	-0.1215 (0.0082)	0.057 (0.026)	0.067 (0.021)	-0.113 (0.045)	8.2	12.4

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N · n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane+hexane) and (benzene+heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 875.67; n(D, 298.15 K) = 1.3919.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 815.26; n(D, 298.15 K) = 1.4160.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoekli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

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Components: 1. Butyl ethanoate, $C_6H_{12}O_2$ [123-86-4]
 2. 1-Octanol, $C_8H_{18}O$ [111-87-5]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_2 , mole fraction of component 1
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

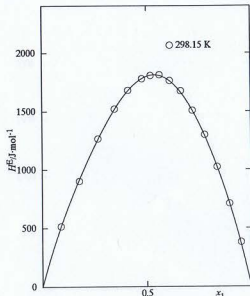
Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

 Notes: P , atm.

 $T/K = 298.15$

x_1	H^E J·mol ⁻¹
0.0888	515.5
0.1783	903.0
0.2674	1266.8
0.3476	1521.7
0.4123	1681.0
0.4788	1779.1
0.5197	1806.4
0.5638	1811.5
0.6129	1762.8
0.6646	1675.6
0.7203	1508.1
0.7785	1299.3
0.8374	1024.5
0.8956	710.6
0.9504	380.6



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 a_1 / [1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1}]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	J·mol ⁻¹						
298.15	7209 (14)	-0.1924 (0.0076)	0.249 (0.024)	0.094 (0.021)	-0.281 (0.042)	7.3	12.4

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{calc} - H^E|$; $\sigma_d = [\sum (H^E_{calc} - H^E)^2 / (N - n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of standard GLC purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 875.67$; $n(D, 298.15 \text{ K}) = 1.3919$.
 2. Fluka AG (Buchs, St. Gallen, Switzerland), "puriss." grade material of standard GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg}\cdot\text{m}^{-3} = 821.67$; $n(D, 298.15 \text{ K}) = 1.4270$.

Errors: δT (reproducibility)/K = 0.02; $\delta x_1 < 0.0005$; $\delta H^E / |H^E| < 0.02$ (over central range of concn.).

REFERENCES

- Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(1).
- Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
- McGlashan, M. L.; Stoekli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
- Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77803-3101

Published by Thermodynamics Research Center

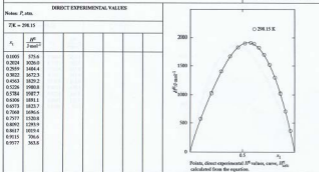
Components: 1. Butyl ethanoate, $C_4H_8O_2$ (123-86-4)
2. 1-Dioxolane, $C_3H_6O_2$ (112-30-1)
State: Binary system, single phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_1 , molar fraction of component 1
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Misyryński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS



SMOOTHING EQUATION

$$H_{calc}^E = x_1 x_2 \sum_{i=1}^n c_i (x_1 - x_2)^{i-1}$$

Coeffs. c_i in the smoothing eq., std. deviation σ_{ij} and max. deviation δ_{ij} (at) by least-squares anal.

TK	c_1	c_2	c_3	c_4	c_5	σ_{ij}	δ_{ij}
	J mol ⁻¹						
298.15	7561 (12)	1912 (42)	-763 (133)	495 (111)	1363 (235)	5.7	8.3

The std. dev. (at) of the coeffs. c_i are given in parentheses
 $\delta_{ij} = \max |H_{calc}^E - H^E|$; $\sigma_{ij} = [20] H_{calc}^E - H^E / (N - n) \times 10^{12}$
 N , no. of direct-expt. values; n , no. of coeffs. c_i
 All direct-expt. values equally weighted

AUXILIARY INFORMATION

Apparatus: Cubet-type microcalorimeter, model MS-8BD (Setram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by heat effect after each measurement. Energies measured by integrating the thermogram.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (methylcyclohexane + benzene) and (benzene + heptadecane), in agreement to within 1 % (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puriss." grade material of stated G.L.C. purity > 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K}) = 875.67$; $n_D(298.15 \text{ K}) = 1.3918$.
 2. Fluka AG (Basel, St. Gallen, Switzerland), "puriss." grade material of stated G.L.C. purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K}) = 826.42$; $n_D(298.15 \text{ K}) = 1.4349$.

Errors: ΔT reproducibility (K = 0.02); $\delta_{H^E} < 0.0005$; $\Delta H^E / H^E < 0.02$ (over central range of concn.).

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- Int. Data Ser., Ser. A, Guidelines for 1994, 22(1).
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- McGlashan, M. L.; Stowell, H. F. *J. Chem. Thermodyn.* 1969, 1, 188.
- Diaz-Pera, M.; Mendicuti, C. J. *Chem. Thermodyn.* 1974, 6, 367.

SELECTED DATA ON MIXTURES
International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

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Components: 1. Methanol, C₂H₆O [67-56-1]
2. Pentyl ethanoate, C₇H₁₄O₂ [628-63-7]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_i , mole fraction of component i
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071- University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

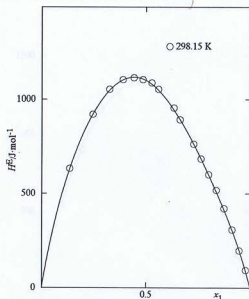
Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071- University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	$\frac{H^E}{J \cdot mol^{-1}}$	x_1	$\frac{H^E}{J \cdot mol^{-1}}$
0.1346	633.5	0.6636	893.1
0.2443	922.2	0.7277	763.1
0.3249	1054.8	0.7634	685.9
0.3896	1107.0	0.7993	601.9
0.4415	1117.4	0.8368	518.6
0.4850	1107.2	0.8745	420.3
0.5271	1088.6	0.9122	309.1
0.5606	1056.1	0.9467	197.1
0.6346	956.0	0.9764	93.2



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \sum_{i=1}^n a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	J·mol ⁻¹						
922.2	4418.7 (8.4)	-1149 (33)	-.397 (99)	13 (96)	1409 (186)	4.5	8

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{calc} - H^E|$; $\sigma_d = [\sum (H^E_{calc} - H^E)^2 / (N - n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puris. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 786.57$; $n_D(298.15 \text{ K}) = 1.3273$.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puris. p.a." grade material of stated GLC purity = 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 871.63$; $n_D(298.15 \text{ K}) = 1.4000$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E/H^E < 0.02$ (over central range of concn.).

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1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. *J. Chem. Thermodyn.* 1974, 6, 387.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

Published: July 31, 1995

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Ethanol, C_2H_6O [64-17-5]
2. Pentyl ethanoate, $C_7H_{14}O_2$ [628-63-7]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
 x_i , mole fraction of component i
Parameters: T , temperature
Constants: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

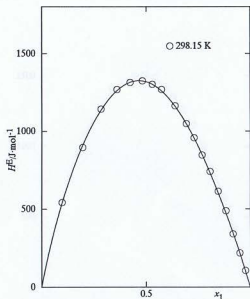
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	H^E $J \cdot mol^{-1}$	x_1	H^E $J \cdot mol^{-1}$				
0.0965	543.7	0.6926	1049.7				
0.1950	898.2	0.7298	958.7				
0.2835	1145.2	0.7681	848.6				
0.3602	1270.3	0.8065	744.2				
0.4229	1316.5	0.8444	615.3				
0.4815	1326.8	0.8810	490.3				
0.5288	1303.5	0.9154	341.7				
0.5740	1270.7	0.9476	219.6				
0.6392	1165.5	0.9758	107.4				



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 a_1 / [1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1}]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a_1	a_2	a_3	a_4	a_5	σ_d	δ_m
	$J \cdot mol^{-1}$						
898.2	5292 (14)	0.1461 (0.0091)	0.083 (0.028)	0.062 (0.023)	-0.105 (0.048)	6.9	11.7

The std. deviations $\sigma(a_i)$ of the coeffs. a_i are given in parentheses
 $\delta_m = \max |H^E_{calc} - H^E|$; $\sigma_d = [\sum (H^E_{calc} - H^E)^2 / (N - n)]^{1/2}$
 N , no. of direct exptl. values; n , no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm^3) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane+hexane) and (benzene+heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity > 99.8 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 784.94$; $n(D, 298.15 \text{ K}) = 1.3594$.
2. Fluka AG (Basel, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity ≈ 99 mole %, degassed with ultrasound and over mol. sieve type 3A (Fluka AG), used without further purification; $\rho(298.15 \text{ K})/\text{kg} \cdot \text{m}^{-3} = 871.63$; $n(D, 298.15 \text{ K}) = 1.4000$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E/|H^E| < 0.02$ (over central range of concn.).

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1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Lejido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
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SELECTED DATA ON MIXTURES
International DATA Series*

Published by Thermodynamics Research Center

as EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Component: 1. 1-butanol, C₄H₁₀O (77-26-7)
2. Propyl ethanoate, C₇H₁₄O₂ (928-63-7)
State: Binary system, single-phase liquid; pure components, both liquid
Variable: H^E , molar excess enthalpy
 x_1 , mole fraction of component 1
Parameter: T , temperature
Constant: P , pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) of table: Orta, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Muznyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

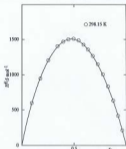
Orta, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Note: T , °K

$T/K = 298.15$

x_1	H^E J/mol	x_1	H^E J/mol				
0.0042	599.5	0.6331	1357.4				
0.1775	946.8	0.6791	1263.6				
0.2522	1206.2	0.7264	1149.8				
0.3620	1405.9	0.7751	1004.6				
0.3964	1489.4	0.8248	832.3				
0.4486	1499.5	0.8734	632.4				
0.4959	1510.7	0.9202	438.6				
0.5457	1486.7	0.9621	234.3				
0.5981	1428.2						
0.6520							
0.7070							
0.7630							
0.8200							
0.8780							
0.9370							
0.9960							



Points, direct experimental H^E values; curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \sum_{i=2}^6 a_i (x_1 - x_2)^{i-1}$$

Coeffs. a_i in the smoothing eq., std. deviation σ_{a_i} and max. deviation S_m (not by least-squares anal.)

TK	a_2	a_3	a_4	a_5	a_6	σ_{a_2}	σ_{a_3}
	J mol ⁻¹						
946.8	4625 (16)	0.0073 (0.0068)	0.011 (0.022)	0.009 (0.018)	0.134 (0.050)	6.1	11.9

The std. deviations (σ_{a_i}) of the coeffs. a_i are given in parentheses
 $S_m = \max |H^E_{calc} - H^E|$; $\sigma_{a_i} = [30 |H^E_{calc} - H^E| / (N - \nu)]^{1/2}$
 N , no. of direct-expt. values; ν , no. of coeffs. a_i
All direct-expt. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Enthalpies measured by integrating the thermogram.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (propylacetate + benzene) and (benzene + heptane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, St. Gallen, Switzerland), "puris. p.a." grade material of stated DLE purity = 99.3 mole %, degassed with ultrasonic and dried over mol. sieve type 3A (Fluka AG), and without further purification; $\rho(298.15 \text{ K}) = 805.93$; $n_D(298.15 \text{ K}) = 1.3974$.

2. Fluka AG (Buchs, St. Gallen, Switzerland), "puris. p.a." grade material of stated DLE purity = 99 mole %, degassed with ultrasonic and dried over mol. sieve type 3A (Fluka AG), and without further purification; $\rho(298.15 \text{ K}) = 871.63$; $n_D(298.15 \text{ K}) = 1.4006$.

Purity: $\Delta T(\text{propylacetate})/K = 4.03$, $\Delta n_D < 0.0005$, $\Delta \rho(\text{propyl})/(\text{kg m}^{-3}) < 0.02$ (over central range of concn.).

REFERENCES

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- Orta, J.; González, E.; Marín, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 35.
- McGlashan, M. L.; Szwedlik, H. P. *J. Chem. Thermodyn.* 1969, 1, 589.
- Dier-Pens, M.; Mendicino, C. *J. Chem. Thermodyn.* 1974, 6, 381.

Components: 1. 1-Hexanol, C₆H₁₄O [111-27-3]
2. Pentyl ethanoate, C₇H₁₄O₂ [628-63-7]

State: Binary system, single-phase liquid; pure components, both liquid

Variables: H^E, molar excess enthalpy
x₁, mole fraction of component 1

Parameters: T, temperature
P, pressure

Constants: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

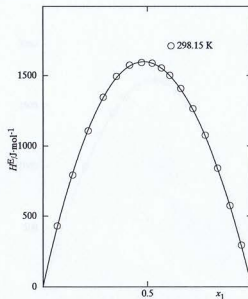
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071 - University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E / J·mol ⁻¹					
0.0684	433.4					
0.1411	795.4					
0.2152	1108.0					
0.2872	1347.7					
0.3529	1495.6					
0.4158	1575.1					
0.4719	1594.1					
0.5231	1588.6					
0.5680	1554.3					
0.6084	1503.8					
0.6602	1409.9					
0.7166	1266.5					
0.7757	1076.3					
0.8350	843.4					
0.8934	576.2					
0.9494	296.3					



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 / \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
795.4	6402 (10)	0.0647 (0.0065)	0.0113 (0.0078)	-0.017 (0.017)		6.1	10

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N - n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 815.26; n_D(298.15 K) = 1.4160.
2. Fluka AG (Basel, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity = 99 mole %, degassed with ultrasound and over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 871.63; n_D(298.15 K) = 1.4000.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

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3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Mendoza, C. J. *Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Pentyl ethanoate, C₇H₁₄O₂ [628-63-7]
2. 1-Octanol, C₈H₁₈O [111-87-5]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
x_i, mole fraction of component i
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

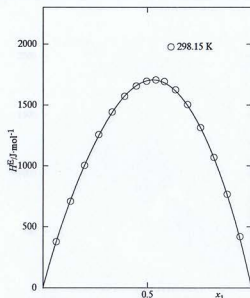
Ortega, J. (Laboratorio de Termodinámica y Físicoquímica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E J·mol ⁻¹						
0.0632	379.4						
0.1310	710.6						
0.1986	1005.9						
0.2667	1256.6						
0.3309	1444.1						
0.3908	1574.9						
0.4459	1657.1						
0.4958	1698.3						
0.5406	1708.5						
0.5808	1694.7						
0.6347	1627.6						
0.6930	1506.4						
0.7536	1315.1						
0.8178	1069.8						
0.8812	768.4						
0.9426	420.6						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \rho_1 / \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	4541 (13)	0.224 (0.011)	-0.080 (0.013)	0.070 (0.027)		8.4	24.2

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
δ_m = max |H^E_{calc} - H^E|; σ_d = [Σ(H^E_{calc} - H^E)² / (N · n)]^{1/2}
N, no. of direct exptl. values; n, no. of coeffs. a_i
All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane+hexane) and (benzene+heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Busch, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity = 99 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 871.63; n(D, 298.15 K) = 1.4000.
2. Fluka AG (Busch, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.5 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K)/kg·m⁻³ = 821.67; n(D, 298.15 K) = 1.4270.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

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Int. DATA Ser., Ser. A, Guideline 1a, 1994, 22(3), 154-183

SELECTED DATA ON MIXTURES

International DATA Series*

1a. EXCESS ENTHALPY

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Pentyl ethanoate, C₇H₁₄O₂ [628-63-7]
 2. 1-Decanol, C₁₀H₂₂O [112-30-1]
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E, molar excess enthalpy
 x₁, mole fraction of component 1
Parameters: T, temperature
Constants: P, pressure
Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x₁; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain)

Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

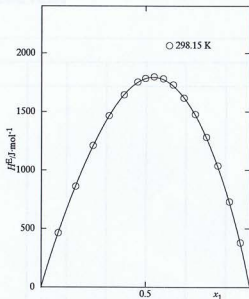
Ortega, J. (Laboratorio de Termodinamica y Fisicoquimica, 35071-University of Las Palmas de G. C., Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J·mol ⁻¹						
0.0815	464.5						
0.1648	862.1						
0.2476	1211.8						
0.3252	1466.0						
0.3969	1644.0						
0.4614	1754.1						
0.4980	1783.9						
0.5396	1799.8						
0.5845	1781.2						
0.6318	1730.4						
0.6829	1617.2						
0.7362	1477.6						
0.7911	1281.2						
0.8463	1037.0						
0.9009	729.9						
0.9535	382.3						



Points, direct experimental H^E values, curve, H^E_{calc} calculated from the equation.

SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 a_1 / \left[1 + \sum_{i=2}^n a_i (x_1 - x_2)^{i-1} \right]$$

Coeffs. a_i in the smoothing eq., std. deviation σ_d and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _d	δ _m
	J·mol ⁻¹						
298.15	7147.5 (8.3)	-0.1624 (0.0045)	0.113 (0.013)	-0.021 (0.012)	-0.149 (0.024)	4.4	8.5

The std. deviations σ(a_i) of the coeffs. a_i are given in parentheses
 δ_m = max |H^E_{calc} - H^E|; σ_d = [2(H^E_{calc} - H^E)²/(N·n)]^{1/2}
 N, no. of direct exptl. values; n, no. of coeffs. a_i
 All direct exptl. values equally weighted

AUXILIARY INFORMATION

Apparatus: Calvet type microcalorimeter, model MS-80D (Setaram, Lyon, France) with stainless steel batch mixing cell (vol. ca. 8 cm³) and with negligible vapor phase, described in ref. 2. Microcalorimeter calibrated by Joule effect after each measurement. Energies measured by integrating the thermograms.

Procedure: Calibration, filling and operation described in ref. 2. Check measurements on (cyclohexane + hexane) and (benzene + heptadecane), in agreement to within 1% (over central range of concn.) with the data reported in refs. 3 and 4.

Materials: 1. Fluka AG (Basel, St. Gallen, Switzerland), "puriss. p.a." grade material of stated GLC purity ≈ 99 mole %, degassed with ultrasound and over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K) kg m⁻³ = 871.63; n_D(298.15 K) = 1.4000
 2. Fluka AG (Basel, St. Gallen, Switzerland), "puriss." grade material of stated GLC purity > 99.0 mole %, degassed with ultrasound and dried over mol. sieve type 3A (Fluka AG), used without further purification; ρ(298.15 K) kg m⁻³ = 826.42; n_D(298.15 K) = 1.4349.

Errors: δT(reproducibility)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| < 0.02 (over central range of concn.).

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 1a*, 1994, 22(1).
2. Ortega, J.; Gonzalez, E.; Matos, J. S.; Legido, J. L. *J. Chem. Thermodyn.* 1992, 24, 15.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.
4. Diaz-Pena, M.; Menduina, C. J. *Chem. Thermodyn.* 1974, 6, 387.

SELECTED DATA ON MIXTURES
International DATA Series*

3a. LIQUID-VAPOR EQUILIBRIUM

The Texas A&M University System, College Station, TX 77843-3111

Published by Thermodynamics Research Center

Components: 1. Benzene, C₆H₆ [71-43-2]
2. Hexane, C₆H₁₄ [110-54-3]
State: Binary system, single-phase liquid in equilibrium with vapor; pure components, both liquid in equilibrium with vapor
Variables: P, pressure
x_i, mole fraction of component i in liquid phase
Parameters: T, temperature
Method: Direct measurement of P and x_i at constant T; ref. 1

Author(s):
of table: Goral, M. (Wydział Chemii, Uniwersytet Warszawski, ul. Pasteura 1, 02-093 Warszawa, Poland)
Edited by: Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

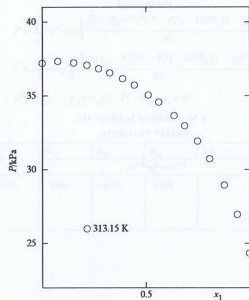
SOURCE OF DATA

Goral, M. (Department of Chemistry, Warsaw University, Poland); ref. 2

DIRECT EXPERIMENTAL VALUES

T/K = 313.15

x ₁	P/kPa																				
0.0000	37.250																				
0.0752	37.366																				
0.1522	37.269																				
0.2159	37.102																				
0.2728	36.861																				
0.3268	36.594																				
0.3877	36.206																				
0.4448	35.758																				
0.5120	35.084																				
0.5634	34.618																				
0.6370	33.700																				
0.6883	33.003																				
0.7488	31.963																				
0.8083	30.760																				
0.8783	28.979																				
0.9412	26.978																				
1.0000	24.366																				



Points, direct experimental P values.

AUXILIARY INFORMATION

Apparatus: Modified static method (ref. 3). Equilibrium temperature was monitored with a calibrated Beckman thermometer (0.001 K). Pressure measured with Hg-constant-dead-vol. manometer (single level accuracy 1.5 Pa).

Procedure: Operation described in ref. 3. Samples, 2.5 cm³, prepared by mass, quantitatively introduced into apparatus and degassed. Corrections for the loss during degassing and for the volume of vapor determined by mass balance.

Materials: 1. Polskie Odczynniki Chemiczne (Gliwice, Poland) analytical reagent grade material, was crystallized three times and fractionally distilled on an 80-theoretical plate column. Purity 99.90 mole % by GLC; water content on the limit of detectability by Karl Fischer reagent.
2. Polskie Odczynniki Chemiczne (Gliwice, Poland) analytical reagent grade material, was crystallized three times and fractionally distilled on an 80-theoretical plate column. Purity 99.98 mole % by GLC; water content on the limit of detectability by Karl Fischer reagent.

Errors: T (reproducibility)/K = 0.004; δT(TIS-90)/K < 0.02; |δP|/Pa = 4; |δx₁| = 0.002.

REFERENCES

1. *Int. DATA Ser., Ser. A, Guideline 3a, 1994*, 22(1).
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3. Janaszewski, B.; Oracz, P.; Goral, M.; Warycha, S. *Fluid Phase Equilib.* **1982**, 9, 295.

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*Ser. A. Thermodynamic Properties of Non-reacting Binary Systems

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