

Published by Thermodynamics Research Center

Components: 1. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
 2. Ethyl methanoate, C₃H₆O₂
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): Ortega, J. (Universidad Politecnica de Las Palmas, Escuela Superior de Ingenieros Industriales, Cátedra de Termodinámica y Fisicoquímica, Las Palmas de Gran Canaria, Islas Canarias, Spain)
Edited by: Grolier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

SOURCE OF DATA

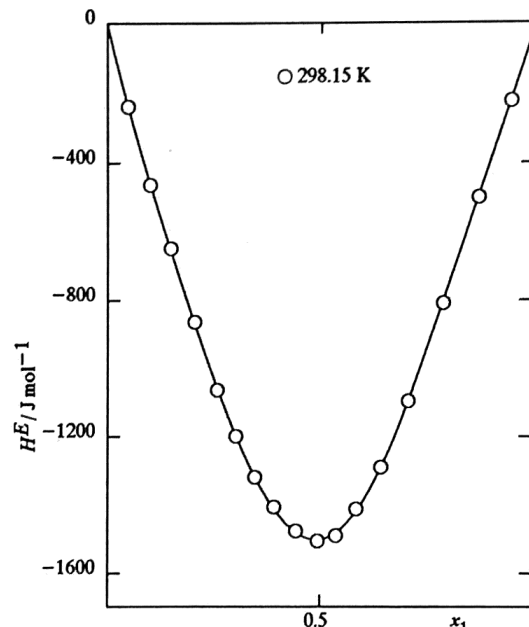
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0484	-240.1						
0.0997	-464.6						
0.1505	-648.5						
0.2067	-865.3						
0.2603	-1065.5						
0.3059	-1203.3						
0.3504	-1322.7						
0.3953	-1409.7						
0.4447	-1480.6						
0.4955	-1510.3						
0.5394	-1492.6						
0.5872	-1415.6						
0.6458	-1293.3						
0.7107	-1099.0						
0.7911	-811.0						
0.8712	-501.9						
0.9434	-223.4						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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	-6020 (12)	239 (40)	3500 (130)	360 (100)	-2310 (220)	6.0	9.8

The std. deviations σa_i of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{\text{calc}}^E - H^E|; \sigma_d = [\sum (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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, in agreement to within 1 % (over central range of concn.) with the data reported in ref. 3.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity ~ 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 1588.371; n(D, 298.15 K) = 1.4918.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity > 97 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 915.98; n(D, 298.15 K) = 1.3577.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/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*, 1973.
2. Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* **1988**, *43*, 295.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* **1969**, *1*, 589.

0147-1503/91/0104-247\$2.20

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247

Int. DATA Ser., Sel. Data Mixtures, Ser. A 1991(4), 247

0147-1503/91/9104-248\$2.20

Components: 1. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
 2. Propyl methanoate, C₄H₈O₂
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

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Edited by: Grolier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

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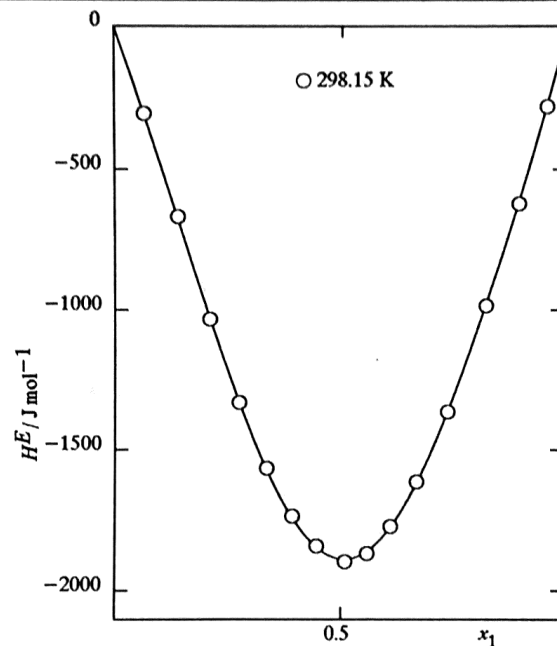
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0642	-303.9						
0.1385	-668.0						
0.2094	-1034.3						
0.2752	-1330.9						
0.3365	-1566.9						
0.3928	-1737.2						
0.4465	-1844.1						
0.5101	-1897.4						
0.5586	-1868.8						
0.6111	-1773.9						
0.6702	-1614.7						
0.7398	-1365.2						
0.8246	-984.3						
0.8942	-622.2						
0.9545	-279.6						



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

SMOOTHING EQUATION

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

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	-7553 (12)	-419 (40)	3500 (130)	-550 (100)	-1550 (220)	5.7	8.4

The std. deviations σa_i of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{calc}^E - H^E|; \sigma_d = [\sum (H_{calc}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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.

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Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity ~ 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 1588.371; n(D, 298.15 K) = 1.4918.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity > 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 897.75; n(D, 298.15 K) = 1.3744.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/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, 1973.*
2. Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* 1988, 43, 295.
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248

Int. DATA Ser., Sel. Data Mixtures, Ser. A 1991(4), 248

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. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
2. Ethyl ethanoate, C₄H₈O₂
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): Ortega, J. (Universidad Politecnica de Las Palmas, Escuela Superior de Ingenieros Industriales, Cátedra de Termodinámica y Fisicoquímica, Las Palmas de Gran Canaria, Islas Canarias, Spain)
Edited by: Grolrier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

SOURCE OF DATA

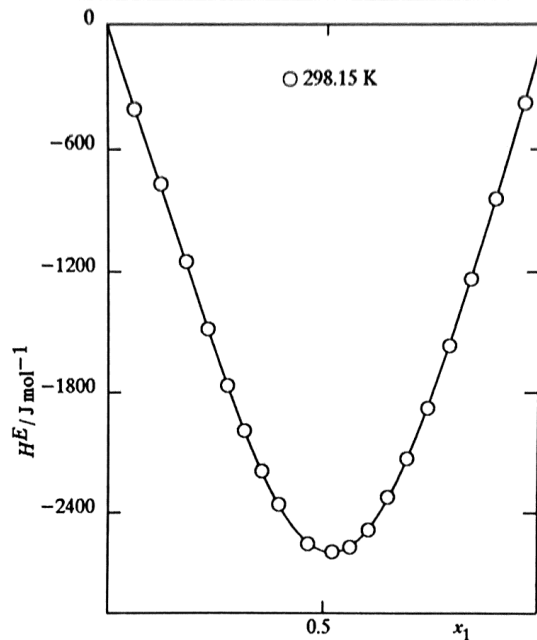
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0594	-407.4						
0.1200	-768.6						
0.1787	-1150.6						
0.2301	-1486.1						
0.2755	-1768.1						
0.3165	-1993.1						
0.3573	-2195.0						
0.3971	-2360.9						
0.4659	-2556.6						
0.5224	-2599.0						
0.5636	-2576.2						
0.6071	-2488.4						
0.6520	-2326.8						
0.6968	-2134.6						
0.7442	-1880.2						
0.7934	-1570.7						
0.8414	-1239.1						
0.8937	-843.1						
0.9541	-377.1						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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_a and max. deviation δ_m detd. by least-squares anal.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	σ _a	δ _m
	J mol ⁻¹						
298.15	-10374 (14)	-1386 (43)	5410 (140)	540 (120)	-2840 (250)	7.1	14

The std. deviations σ_a of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{\text{calc}}^E - H^E|; \sigma_a = [\sum (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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.

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2. Fluka AG (Buchs, St. Gallen, Switzerland) "puriss" grade material, of stated purity > 99.5 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 894.34; n(D, 298.15 K) = 1.3700.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/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, 1973.*
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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. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
2. Propyl ethanoate, C₅H₁₀O₂
State: Binary system, single-phase liquid; pure components, both liquid
Variables: H^E , molar excess enthalpy
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Edited by: Grolier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

SOURCE OF DATA

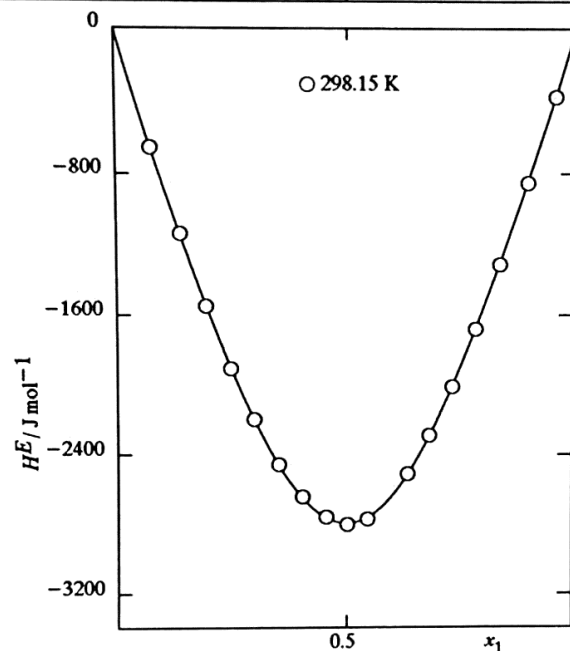
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	$H^E / \text{J mol}^{-1}$						
0.0739	-656.0						
0.1376	-1139.1						
0.1930	-1551.4						
0.2476	-1910.0						
0.2983	-2202.0						
0.3514	-2461.9						
0.4031	-2647.6						
0.4558	-2766.7						
0.5029	-2808.6						
0.5472	-2775.6						
0.6363	-2514.9						
0.6846	-2295.5						
0.7348	-2014.6						
0.7859	-1685.3						
0.8383	-1312.7						
0.8974	-855.5						
0.9566	-378.1						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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	-11206 (11)	-87 (38)	4550 (120)	380 (100)	-2800 (210)	5.7	8.3

The std. deviations σa_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, 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.

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2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity > 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 882.18$; $n(D, 298.15 \text{ K}) = 1.3820$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta T(\text{IPTS-68})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E / |H^E| = 0.02$ (over central range of concn.).

REFERENCES

- Int. DATA Ser., Ser. A, Guideline 1a, 1973.
- Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* 1988, 43, 295.
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250

Int. DATA Ser., Sel. Data Mixtures, Ser. A 1991(4), 250

Received: June 25, 1991

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

Published: October 31, 1991

0147-1503/91/9104-250\$2.20

Components: 1. 1,1,2,2-Tetrachloroethane, $C_2H_2Cl_4$
2. Ethyl propanoate, $C_5H_{10}O_2$
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
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Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i ; ref. 1

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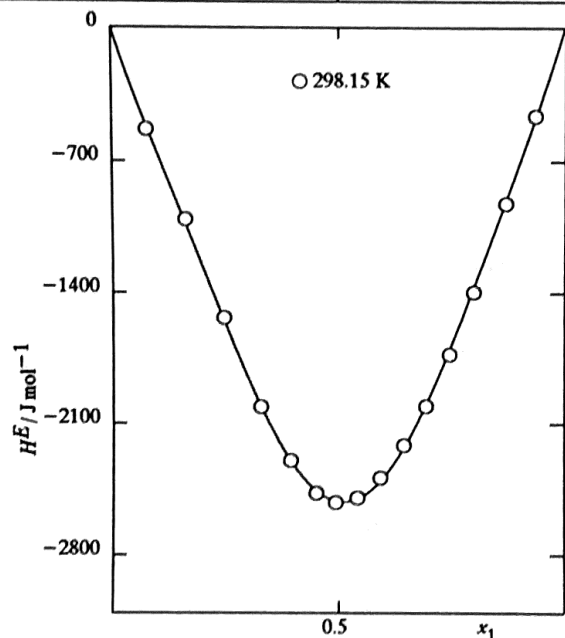
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P , atm.

$T/K = 298.15$

x_1	$H^E / J \text{ mol}^{-1}$						
0.0758	-533.4						
0.1600	-1006.4						
0.2449	-1531.7						
0.3273	-2007.7						
0.3928	-2295.5						
0.4495	-2467.4						
0.4934	-2518.5						
0.5410	-2494.8						
0.5917	-2387.6						
0.6432	-2215.3						
0.6924	-2005.4						
0.7448	-1726.4						
0.7985	-1392.8						
0.8694	-922.4						
0.9351	-460.9						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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
	$J \text{ mol}^{-1}$						
298.15	-10051 (31)	-700 (110)	6640 (360)	490 (300)	-4530 (640)	16	21

The std. deviations σa_i of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H^E_{\text{calc}} - H^E|; \sigma_d = [\sum (H^E_{\text{calc}} - H^E)^2 / (N - n)]^{1/2}$$

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2. Fluka AG (Buchs, St. Gallen, Switzerland) "puriss" grade material, of stated purity > 99.5 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 884.01$; $n(D, 298.15 \text{ K}) = 1.3815$.

Errors: $\delta T(\text{reproducibility})/K = 0.02$; $\delta T(\text{IPTS-68})/K = 0.02$; $\delta x_1 < 0.0005$; $\delta H^E/|H^E| = 0.02$ (over central range of concn.).

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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. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
2. Propyl propanoate, C₆H₁₂O₂
State: Binary system, single-phase liquid; pure components, both liquid
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Method: Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_i; ref. 1

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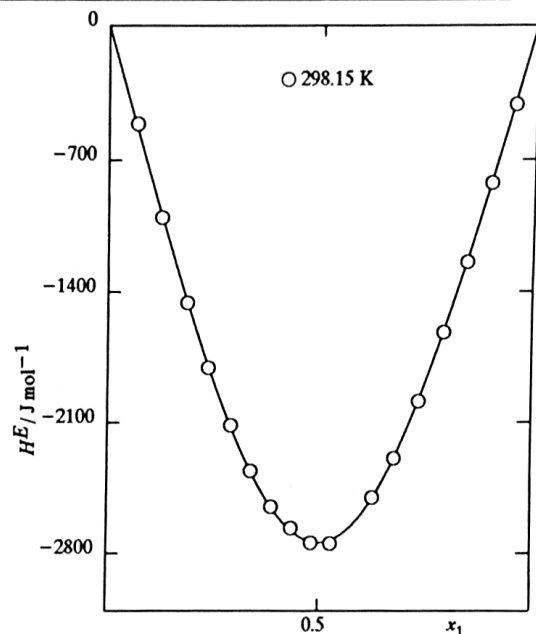
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0662	-511.8						
0.1260	-1003.8						
0.1863	-1458.7						
0.2384	-1805.8						
0.2916	-2112.8						
0.3397	-2358.2						
0.3892	-2550.1						
0.4367	-2664.1						
0.4841	-2742.6						
0.5296	-2745.1						
0.6292	-2501.8						
0.6793	-2291.2						
0.7354	-1988.4						
0.7924	-1618.8						
0.8451	-1242.4						
0.8995	-823.9						
0.9514	-410.7						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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	-10959 (21)	-117 (68)	3860 (220)	-70 (180)	-1190 (370)	10	19

The std. deviations σ_{a_i} of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{\text{calc}}^E - H^E|; \sigma_d = [\sum (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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, in agreement to within 1 % (over central range of concn.) with the data reported in ref. 3.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material, of stated purity ~ 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 1588.371; n(D, 298.15 K) = 1.4918.
2. Fluka AG (Buchs, St. Gallen, Switzerland) "purum" grade material, of stated purity > 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 875.65; n(D, 298.15 K) = 1.3908.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/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, 1973.*
2. Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* 1988, 43, 295.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.

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252

Int. DATA Ser., Sel. Data Mixtures, Ser. A 1991(4), 252

Received: June 25, 1991

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

Published: October 31, 1991

Components: 1. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
2. Ethyl butanoate, C₆H₁₂O₂
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): Ortega, J. (Universidad Politecnica de Las Palmas, Escuela Superior de Ingenieros Industriales, Cátedra de Termodinámica y Fisicoquímica, Las Palmas de Gran Canaria, Islas Canarias, Spain)
Edited by: Grolier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

SOURCE OF DATA

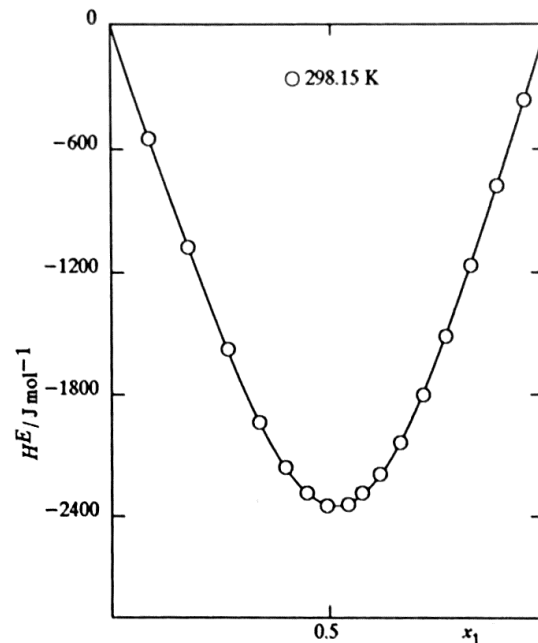
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0862	-551.2						
0.1765	-1077.8						
0.2677	-1577.5						
0.3402	-1941.6						
0.4001	-2163.5						
0.4494	-2287.9						
0.4958	-2350.5						
0.5460	-2346.6						
0.5784	-2290.9						
0.6198	-2197.6						
0.6663	-2041.3						
0.7203	-1804.7						
0.7734	-1517.6						
0.8304	-1168.2						
0.8892	-781.3						
0.9490	-364.9						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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	-9390 (11)	-1001 (41)	4790 (130)	720 (110)	-2720 (230)	5.9	8.5

The std. deviations σa_i of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{\text{calc}}^E - H^E|; \sigma_d = [\sum (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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.

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2. Fluka AG (Buchs, St. Gallen, Switzerland) "purum" grade material, of stated purity > 98 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 872.73; n(D, 298.15 K) = 1.3896.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/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*, 1973.
2. Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* 1988, 43, 295.
3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.

Components: 1. 1,1,2,2-Tetrachloroethane, C₂H₂Cl₄
 2. Propyl butanoate, C₇H₁₄O₂
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): Ortega, J. (Universidad Politecnica de Las Palmas, Escuela Superior de Ingenieros Industriales, Cátedra de Termodinámica y Fisicoquímica, Las Palmas de Gran Canaria, Islas Canarias, Spain)
Edited by: Grolier, J.-P. E. (Laboratoire de Thermodynamique et Cinétique Chimique, UA CNRS 434, Université Blaise Pascal Clermont-Ferrand, 63170 Aubière, France)

SOURCE OF DATA

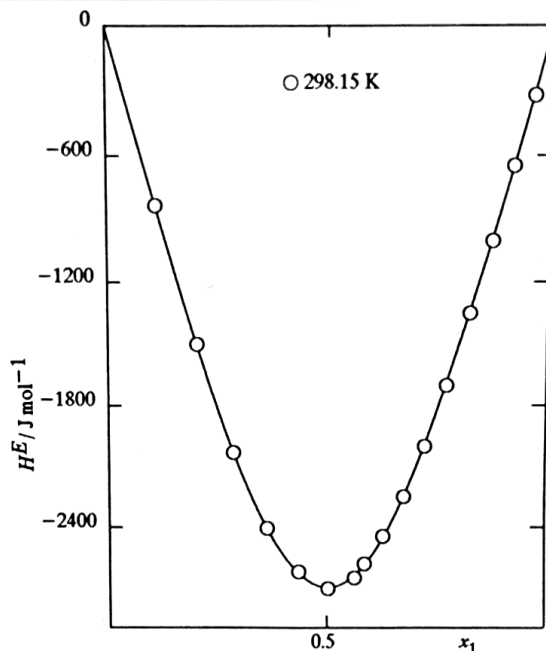
Ortega, J. (Polytechnic University of Canarias, Canary Islands, Spain); FIRST PUBLISHED DATA

DIRECT EXPERIMENTAL VALUES

Notes: P, atm.

T/K = 298.15

x ₁	H ^E / J mol ⁻¹						
0.1093	-836.9						
0.2034	-1501.9						
0.2864	-2033.7						
0.3644	-2409.7						
0.4355	-2624.0						
0.5031	-2705.6						
0.5649	-2656.4						
0.5892	-2586.4						
0.6323	-2448.8						
0.6790	-2252.5						
0.7266	-2002.8						
0.7756	-1705.2						
0.8263	-1355.1						
0.8745	-1003.7						
0.9197	-651.7						
0.9619	-321.8						



Points, direct experimental H^E values; curves, H^E_{calc} calculated from the smoothing 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	-10804 (12)	-257 (42)	4550 (130)	-70 (110)	-2100 (240)	5.9	11

The std. deviations σ_{a_i} of the coeffs. a_i are given in parentheses

$$\delta_m = \max |H_{\text{calc}}^E - H^E|; \sigma_d = [\sum (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$$

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, 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.

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 2. Fluka AG (Buchs, St. Gallen, Switzerland) "purum" grade material, of stated purity > 99 mole %, dried over mol. sieve Type 4 A (from Fluka) and used without further purification; ρ(298.15 K)/kg m⁻³ = 868.07; n(D, 298.15 K) = 1.3976.

Errors: δT(reproducibility)/K = 0.02; δT(IPTS-68)/K = 0.02; δx₁ < 0.0005; δH^E/|H^E| = 0.02 (over central range of concn.).

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3. McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* 1969, 1, 589.