

SELECTED DATA ON MIXTURES
International Data Series*

1a. EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80505-3328

Compiled by Thermodynamic Research Center

Components: 1. 1,2-Dichloroethane, $C_2H_4Cl_2$ (187-06-2)
2. Ethyl methanesulfonate, $C_2H_5SO_3C_2H_5$ (309-94-4)

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

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

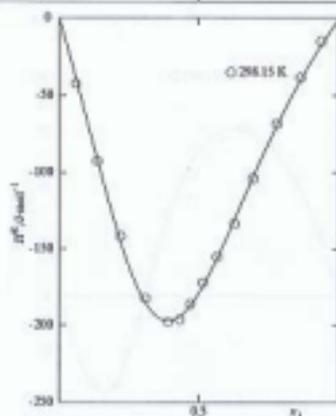
Author(s): Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

Edited by: Skowron, A.; Moczyłowski, 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, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES						
Notes: P , 101.325 kPa						
$T/K = 298.15$						
x_1	H^E J/mol ¹					
0.0585	-42.4					
0.1356	-52.6					
0.2189	-141.5					
0.3075	-182.3					
0.3895	-197.7					
0.4581	-196.1					
0.4609	-185.9					
0.5146	-171.8					
0.5653	-155.1					
0.6256	-135.5					
0.6907	-105.9					
0.7791	-68.5					
0.8612	-38.4					
0.9372	-14.9					



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

SMOOTHING EQUATION							
$H^E_{\text{calc}} = x_1 x_2 \sum_{i=1}^6 a_i (x_1 - x_2)^{i-1}$							
Coefficients a_i in the smoothing equation, standard deviation σ_{a_i} , and maximum deviation δ_{max} , determined by least-squares analysis.							
T/K	a_1	a_2	a_3	a_4	a_5	a_6	δ_{max}
	J/mol ¹						J/mol ¹
298.15	-703.4 (4.0)	0.886 (0.015)	1.007 (0.041)			2.4	1.3

The standard deviations σ_{a_i} of the coefficients a_i are given in parentheses
 $\delta_{\text{max}} = \max |H^E_{\text{calc}} - H^E|$; $a_4 = [20 \sigma_{a_4}^2 / (N - 6)]^{1/2}$
 N , number of direct experimental values; n , number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Cabot type microcalorimeter, model MS-88D (System, Lyon, France) with stainless steel batch mixing cell (volume about 6 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptadecane system were in agreement to within 1% (near central range of concentration) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Fluka AG (Buchs, Switzerland) "pure" grade material of stated g.c. purity > 99.3 mole %, degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 1203.30$; $n_D(298.15 \text{ K}) = 1.4422$.
2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated g.c. purity > 97 mole %, degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 915.98$; $n_D(298.15 \text{ K}) = 1.3577$.

Notes: 1873 K = 0.02; $\ln x_1 = 0.0005$; $[\ln^2] = 1.5 \text{ mol}^{-1} < 5$.

REFERENCES

- Int. J. Chem. Eng., Ser. A, Goldilike Jr., 1994, 22(1).
- Chacón, M.; Ortega, J.; Talanda-Morales, F. J.; González, C. J. Chem. Thermodyn., 2004, 32, 689.
- McGlashan, M. I.; Stoeckli, H. P. J. Chem. Thermodyn., 1968, 1, 589.
- Dierckx, M.; Mendilic, C. J. Chem. Thermodyn., 1974, 6, 387.

SELECTED DATA FROM MIXTURES
International Data Series*
1a. EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80505-3328

Compiled by Thermodynamics Research Center

Components:	1, 1,3-Dichloropropane, $C_3H_6Cl_2$ (142-29-8)
	2, Ethyl methacrylate, $C_7H_{12}O_2$ (109-94-7)
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 ; cf. 1

Author(s): Ortega, J. (Laboratorio de Termodinámica y Psicogenética, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

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

SOURCE OF DATA

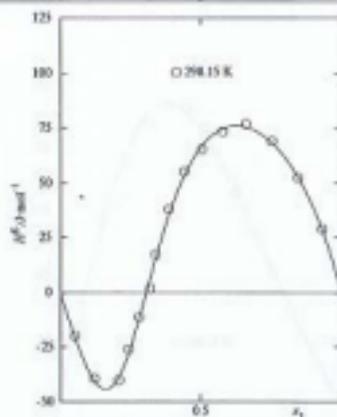
Ortega, J. (Laboratorio de Termodinámica y Psicogenética, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain). FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa

T , 298.15

x_1	H^E J/mol
0.0528	-18.7
0.1212	-38.2
0.2098	-48.0
0.2630	-25.7
0.2816	-13.2
0.3219	2.1
0.3601	17.3
0.3889	38.2
0.4405	55.3
0.5044	65.4
0.5786	73.4
0.6636	77.0
0.7540	69.2
0.8438	52.6
0.9317	28.1



SMOOTHING EQUATION

$$H_{\text{calc}}^E = a_1 x_1 \sum_{j=1}^n a_j (x_1 - a_j)^{2j-1} + \sum_{j=1}^n a_j (x_1 - a_j)^{2j} \quad n = 2$$

Coefficients a_j in the smoothing equation, standard deviation σ_j and maximum deviation δ_{max} determined by least-square analysis.

T , K	a_1	a_2	a_3	a_4	a_5	a_6	δ_{max}
	J/mol		-				J/mol
298.15	286.3 (4.9)	687.7 (18.0)	1.309 (0.085)	0.467 (0.086)	-0.950 (0.159)	2.6	5.3

The standard deviations σ_j of the coefficients a_j are given in parentheses
 $\delta_{\text{max}} = \max |H_{\text{calc}}^E - H^E|$; $\sigma_j = [20 \sum_{i=1}^N (H_{\text{calc}}^E - H^E)^2 / (N - n)]^{1/2}$
 N , number of direct experimental values; n , number of coefficients a_j
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Sereno, Leoa, France) with stainless steel batch mixing cell (volume about 6 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptadecane systems were in agreement to within 1% (over central range of concentrations) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 1178.45$, $n_D(298.15 \text{ K}) = 1.4015$.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 97 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 913.98$, $n_D(298.15 \text{ K}) = 1.3737$.

Errors: $|H^E|$ (K = 0.02; $\ln x_1 = 0.005$); $|H^E|$ (J/mol) ≤ 5 .

REFERENCES

- Int. Data Ser., Ser. A, Goldfarb Jg, 1984, 22(1).
- Chase, M.; Ortega, J.; Toledo-Marcos, F. J.; González, C. *J. Chem. Thermodyn.*, 2001, 33, 609.
- McGlashan, M. L.; Bicerano, H. F. *J. Chem. Thermodyn.*, 1969, 1, 589.
- Diaz-Pera, M.; Mendilina, C. *J. Chem. Thermodyn.*, 1974, 6, 387.

Received: October 1, 2002

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

Published: October 31, 2002

Compiled by Thermodynamics Research Center

Components: 1. Ethyl methacrylate, $C_5H_8O_2$ [109-94-4]
 2. 1,6-Dichlorohexane, $C_6H_{12}Cl_2$ [110-36-5]
 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_2 ; ref. 1

Author(s) of table: Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Facultad Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

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

SOURCE OF DATA

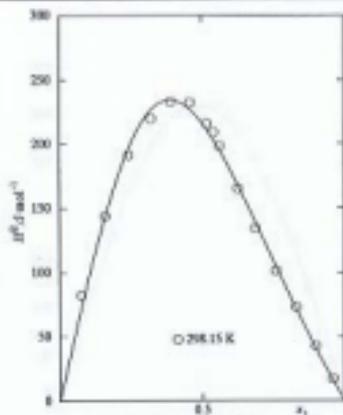
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Facultad Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain), FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa

TRK = 298.15

x_1	H^E $J \cdot mol^{-1}$						
0.0368	82.4						
0.1005	143.5						
0.2438	191.4						
0.3214	219.9						
0.3915	233.2						
0.4589	232.4						
0.5178	216.2						
0.5707	209.3						
0.5820	186.9						
0.6263	165.4						
0.6884	134.1						
0.7599	101.4						
0.8294	73.2						
0.8986	48.0						
0.9579	17.2						



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

SMOOTHING EQUATION

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

Coefficients a_i in the smoothing equation, standard deviation σ_{a_i} and maximum deviation δ_{a_i} determined by least-squares analysis.

TRK	a_1	a_2	a_3	a_4	a_5	a_6	δ_{a_i}
	$J \cdot mol^{-1}$						$J \cdot mol^{-1}$
298.15	804.9 (8.7)	6.677 (0.020)	6.598 (0.050)			5.3	10.4

The standard deviations σ_{a_i} of the coefficients a_i are given in parentheses
 $\delta_{a_i} = \max |H^E_{calc} - H^E|$; $\sigma_{a_i} = [20 \sum_{j=1}^N (H^E_{calc} - H^E)^2 / (N-6)]^{1/2}$
 N , number of direct experimental values; n , number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Setram, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptane systems were in agreement to within 1% (over central range of concentration) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 97 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 915.88$, $n_D(298.15 \text{ K}) = 1.3577$.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 1133.06$, $n_D(298.15 \text{ K}) = 1.4522$.

Errors: $|u_T| \leq 0.02$; $|u_{P_1}| = 0.0005$; $|u_{H^E}| \leq 1 \text{ J} \cdot \text{mol}^{-1}$.

REFERENCES

- Int. DATA Ser., Ser. A, *Guidelines*, No. 1994, 22(1)
- Chassat, M.; Ortega, J.; Toledo-Morante, F. J.; González, C. *J. Chem. Thermodyn.*, 2001, 33, 609.
- McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.*, 1969, 1, 589.
- Dier-Pfeil, M.; Mandelka, C. *J. Chem. Thermodyn.*, 1994, 4, 383.

SELECTED DATA ON MIXTURE*

International Data Series[†]

1a. EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80505-3328

Compiled by Thermodynamics Research Center

Components	1. Ethyl methacrylate, $C_6H_{10}O_2$ (709-94-7) 2. 1,5-Dichlorobenzene, $C_6H_4Cl_2$ (629-76-2)
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
Methods	Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) Ortega, J. (Laboratorio de Termodinámica y Fluidoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

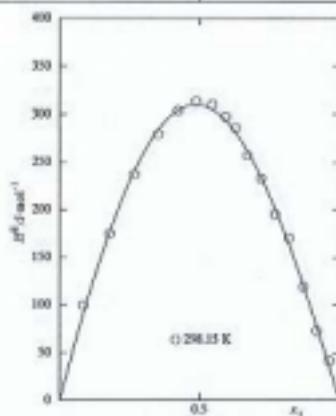
Edited by Siroc, A.; Maczynski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kaspraka 44/52, 01-324 Warszawa, Poland)

SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinámica y Fluidoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa	
T/K = 298.15	
x_1	$\frac{H^E}{J \cdot mol^{-1}}$
0.0550	99.8
0.1779	175.0
0.2658	236.9
0.3900	279.2
0.4229	284.0
0.4888	303.7
0.5456	309.1
0.5888	297.5
0.6293	285.9
0.6717	257.1
0.7215	232.8
0.7708	195.3
0.8206	170.5
0.8716	109.6
0.9292	73.3
0.9628	42.2



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

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \rho_1 \left[1 + \sum_{i=1}^6 \rho_i (x_1 - x_2)^{i-1} \right]$$

Coefficients ρ_i in the smoothing equation, standard deviation σ_{ρ_i} and maximum deviation δ_{ρ_i} determined by least-squares analysis.

T/K	ρ_1	ρ_2	ρ_3	ρ_4	ρ_5	ρ_6	δ_{ρ_6}
	$J \cdot mol^{-1}$					$J \cdot mol^{-1}$	
298.15	1261.7 (9.2)	0.067 (0.017)	0.174 (0.036)			5.2	9.1

The standard deviations $\sigma(\rho_i)$ of the coefficients ρ_i are given in parentheses
 $\delta_{\rho_6} = \max |H^E_{calc} - H^E|$; $\rho_6 = 10 |H^E_{calc} - H^E| / (x_1 - x_2)^6$
 N , number of direct experimental values; n , number of coefficients ρ_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus A Cohen type microcalorimeter, model MS-380 (Desorm, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the ethylbenzene + benzene and benzene + 1-hexylbenzene systems were in agreement to within 1% (over central range of concentration) with the data reported, respectively, in refs. 1 and 4.

Materials 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated g/c purity > 97 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 915.96$; $\alpha(0)$, 298.15 K) = 1.3577.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated g/c purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 1095.27$; $\alpha(0)$, 298.15 K) = 1.4545.

Errors ± 0.7 K; $|\delta T| = 0.0085$; $|dW^E| \leq 3 \text{ J} \cdot \text{mol}^{-1} < 1$.

REFERENCES

- Int. Data Ser., Ser. A, Guidelines, No. 1996, 2(1).
- Chao, M.; Ortega, J.; Toledo-Morales, F. J.; González, C. *J. Chem. Thermodyn.*, **2001**, *33*, 685.
- McGlashan, M. L.; Szwedlik, H. F. *J. Chem. Thermodyn.*, **1969**, *1*, 589.
- Diaz-Pena, M.; Mendilute, C. *J. Chem. Thermodyn.*, **1994**, *6*, 387.

Compiled by Thermodynamics Research Center

Components:	1. Ethyl methacrylate, $C_5H_8O_2$ (100-04-4) 2. 1,4-Dichlorobenzene, $C_6H_4Cl_2$ (106-09-0)
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) Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

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

SOURCE OF DATA

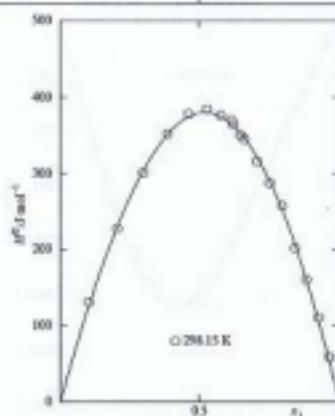
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa

TR = 296.15

x_1	H^E J mol ⁻¹						
0.1037	130.9						
0.2048	227.5						
0.2982	301.5						
0.3809	352.3						
0.4619	378.4						
0.5272	384.4						
0.5770	376.7						
0.6032	370.4						
0.6231	364.5						
0.6479	350.8						
0.6699	341.4						
0.7009	304.2						
0.7115	288.0						
0.7968	257.4						
0.8409	201.9						
0.8830	160.7						
0.9269	110.9						
0.9646	58.7						



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

SMOOTHING EQUATION

$$H^E_{calc} = a_1 x_1^2 / (1 + \sum_{i=2}^6 a_i (x_1 - a_i)^{1+i})$$

Coefficient a_i in the smoothing equation, standard deviation σ_{a_i} and maximum deviation δ_{a_i} determined by least-squares analysis.

TR	a_1	a_2	a_3	a_4	a_5	a_6	a_7
	J mol ⁻¹						J mol ⁻¹
296.15	1323.4 (8.50)	-4.0835 (8.0008)	0.074 (0.020)				4.3 6.4

The standard deviations σ_{a_i} of the coefficients a_i are given in parentheses. $\delta_{a_i} = \max |H^E_{calc} - H^E|$; $\sigma_{a_i} = [210 H^E_{calc} - N H^E (N - 1)]^{1/2}$. N , number of direct experimental values; a_i , number of coefficients a_i . All direct experimental values equally weighted.

AUXILIARY INFORMATION

Apparatus: A Cahn type microcalorimeter, model MS-800 (Oxford, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptadecane systems were in agreement to within 1% (over central range of concentration) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Aldrich-Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 97 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification, ρ (298.15 K) = 915.98, n_D (298.15 K) = 1.3777.
2. Aldrich-Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification, ρ (298.15 K) = 1067.50; n_D (298.15 K) = 1.4555.

Errors: ± 0.17 K = 0.32; $|\partial x_1| = 0.0003$; $|\partial H^E| \leq 1$ J mol⁻¹.

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- Int. Geol. Sci., Ser. A, *Goldfuss*, 1996, 22(1).
- Chaz, M.; Ortega, J.; Toledo-Martinez, F. J.; González, C. *J. Chem. Thermodyn.*, 1996, 28, 685.
- McGlashan, M. L.; Szwarc, H. P. *J. Chem. Thermodyn.*, 1969, 1, 385.
- Diaz-Pelta, M.; Merchante, C. *J. Chem. Thermodyn.*, 1974, 6, 387.

SELECTED DATA ON MIXTURES
International Data Series*
In EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80505-3303

Compiled by Thermodynamic Research Center

Components: 1. 1,3-Dichloropropane, $C_3H_5Cl_2$ (142-28-9)
2. Ethyl ethanoate, $C_4H_8O_2$ (101-79-0)
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): Ortega, J. (Laboratorio de Termodinámica y Psicrometría, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)
Edited by: Skrzacz, A.; Mączyński, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

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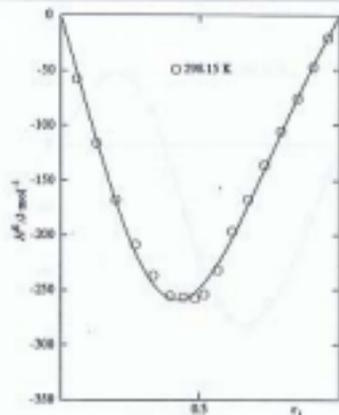
Ortega, J. (Laboratorio de Termodinámica y Psicrometría, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: 1. 298.15 K^b

T/K = 298.15

x_1	H^E J mol ⁻¹
0.0578	-37.3
0.1291	-116.1
0.1985	-367.6
0.2691	-208.1
0.3332	-236.8
0.3935	-234.9
0.4436	-236.1
0.4899	-237.4
0.5168	-233.7
0.5646	-231.4
0.6136	-196.2
0.6734	-167.3
0.7320	-136.3
0.7904	-105.2
0.8303	-75.3
0.8932	-47.0
0.9381	-20.6



SMOOTHING EQUATION

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

Coefficients a_i in the smoothing equation, standard deviation s_{a_i} and maximum deviation δ_{a_i} determined by least-squares analysis.

T/K	a_1	a_2	a_3	a_4	a_5	a_6	δ_{a_i}
	J mol ⁻¹						J mol ⁻¹
298.15	-309.9 (9.1)	0.520 (0.025)	0.083 (0.007)			5.6	10.9

The standard deviations s_{a_i} of the coefficients a_i are given in parentheses
 $\delta_{a_i} = \max |H^E_{calc} - H^E|$; $a_i = [20 H^E_{calc} - (H^E)^2] / (N - 1)^{1/2}$
 N , number of direct experimental values; n , number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Cohen-type microcalorimeter, model MS-8ED (Setaram, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptadecane systems were in agreement to within 2% (over central range of concentration) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; ρ (298.15 K)(kg m⁻³) = (1136.4) ± 0.2; 298.15 K) = 1.4153.
2. Fluka AG (Buchs, Switzerland) 'specis' grade material of stated glc purity > 99.3 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; ρ (298.15 K)(kg m⁻³) = 894.34 ± 0.1; 294.15 K) = 1.3700.

Source: 1(7)K = 0.02; $|s_{a_i}| = 0.0005$; $|H^E|$ J mol⁻¹ < 30.

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SELECTED DATA ON MIXTURES*
International Data Series[†]

1a. EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80503-3328

Compiled by Thermodynamics Research Center

Components:	1. Ethyl ethanoate, C ₄ H ₈ O ₂ [141-79-4] 2. 1,3-Dichloropropane, C ₃ H ₄ Cl ₂ [520-79-2]
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

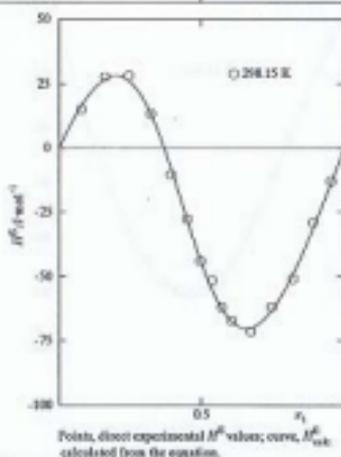
Author(s):	Ortega, I. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)
Editor(s):	Slawski, A.; Majumdar, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/2, 01-224 Warszawa, Poland)
SOURCE OF DATA	
Ortega, I. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain), FIRST PUBLISHED RESULTS	

DIRECT EXPERIMENTAL VALUES

Notes: P, 101.325 kPa

T/K = 298.15

x ₁	H ^E /J mol ⁻¹						
0.0794	15.2						
0.1836	27.8						
0.2836	28.4						
0.3225	13.5						
0.3940	-18.3						
0.4509	-27.6						
0.4871	-43.9						
0.5363	-51.4						
0.5708	-61.9						
0.6061	-67.3						
0.6738	-71.4						
0.7609	-61.7						
0.8219	-58.8						
0.8928	-28.9						
0.9547	-12.9						



SMOOTHING EQUATION

$$H_{\text{calc}}^E = x_1 x_2 \sum_{i=1}^m a_i (x_1 - x_2)^{2i-1} + \sum_{j=1}^n b_j (x_1 - x_2)^{2j} \quad m = 2$$

Coefficients a_i in the smoothing equation, standard deviation s_{a_i}, and maximum deviation Δ_{a_i} determined by least-squares analysis.

T/K	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆	a ₇
	J mol ⁻¹		-			J mol ⁻¹	
298.15	-177.2 (8.25)	-687.3 (15.21)	0.303 (0.043)	1.523 (0.100)		1.8	3.2

The standard deviation s(a_i) of the coefficients a_i are given in parentheses
 $\Delta_{a_i} = \max |H_{\text{calc}}^E - H^E|$; s₁ = [20(H^E_{calc} - H^E)² / (N - 6)]^{1/2}
 N, number of direct experimental values; n, number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Setram, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and heptane + benzene systems were in agreement to within 1% (over central range of concentrations) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Fluka AG (Buchs, Switzerland) "puriss" grade material of styrol glc purity > 99.5 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; ρ(298.15 K) kg m⁻³ = 894.34; n_D(298.15 K) = 1.3780.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; ρ(298.15 K) kg m⁻³ = 1095.23; n_D(298.15 K) = 1.4545.

Errors: ±H(T)K = 0.02; |Δx₁| = 0.0005; |ΔH^E(T)J mol⁻¹ < 5.

REFERENCES

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Components: 1. 1,2-Dichloroethane, $C_2H_4Cl_2$ [207-86-2]
2. Ethyl propionate, $C_5H_{10}O_2$ [105-37-1]
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
 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, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

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

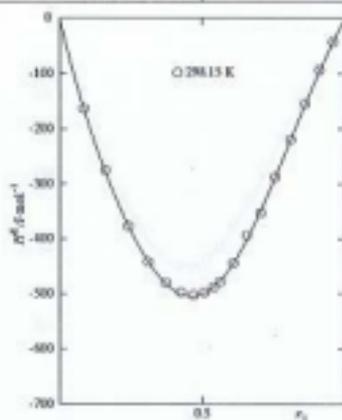
SOURCE OF DATA

Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain), FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa

T/K = 298.15							
x_1	H^E J/mol ¹						
0.0852	-162.5						
0.1607	-234.5						
0.2399	-326.5						
0.3095	-441.3						
0.3724	-479.8						
0.4246	-496.7						
0.4697	-501.2						
0.5088	-496.8						
0.5397	-488.1						
0.5638	-477.5						
0.6093	-443.5						
0.6364	-393.2						
0.7058	-352.8						
0.7374	-286.5						
0.8100	-209.3						
0.8814	-154.8						
0.9127	-92.8						
0.9397	-42.4						



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

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \rho_1 / (1 + \sum_{i=1}^6 a_i (x_1 - x_2)^{i+1})$$

Coefficients a_i in the smoothing equation, standard deviation σ_{calc} , and maximum deviation δ_{calc} determined by least-squares analysis:

T/K	a_1	a_2	a_3	a_4	a_5	a_6	δ_{calc}
	J/mol ¹						J/mol ¹
298.15	-1994.2 (4.3)	0.2116 (0.0405)	0.4811 (0.0443)	0.340 (0.030)			2.9 7.3

The standard deviations σ_{calc} of the coefficients a_i are given in parentheses
 $\delta_{calc} = \max |H^E_{calc} - H^E|$; $\sigma_{calc} = [DW^2_{calc} / (n - 6)]^{1/2}$
 n , number of direct experimental values; ρ_1 , number of coefficients a_i
All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Cabot type microcalorimeter, model MS-88D (Ortman, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptadecane systems were in agreement to within 1% (over central range of concentrations) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Fluka AG (Buchs, Switzerland) "spec" grade material of stated glc purity > 99.5 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 1263.36$; $\alpha_D(298.15 \text{ K}) = 1.4422$.
2. Fluka AG (Buchs, Switzerland) "spec" grade material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 884.0$; $\alpha_D(298.15 \text{ K}) = 1.3815$.

Errors: $|H^E|/K = \pm 0.2$; $|x_1| = \pm 0.0005$; $|H^E|/J \text{ mol}^{-1} < 1$.

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Compiled by Thermodynamic Research Center

Components:	1. 1,2-Dichloroethane, $C_2H_4Cl_2$ (142-28-9) 2. Ethyl propanoate, $C_5H_{10}O_2$ (105-17-0)
State:	Binary system, single-phase liquid; pure components, both liquid
Variables:	M^E , molar excess enthalpy x_1 , mole fraction of component 1
Parameters:	T , temperature
Constants:	P , pressure
Methods:	Direct calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; cf. 1

Author(s): Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

Editor(s): Szwarc, A.; Maciejak, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kasprzaka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

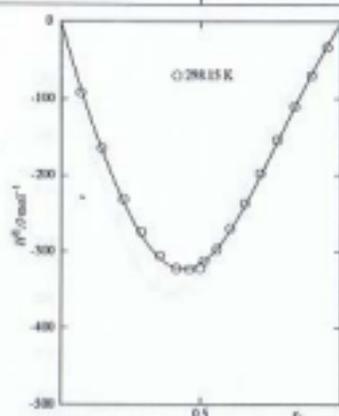
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101.325 kPa

TC = 298.15

x_1	M^E J/mol								
0.0712	-92.2								
0.1465	-164.9								
0.2233	-231.1								
0.2877	-274.2								
0.3520	-304.9								
0.4029	-321.6								
0.4582	-322.4								
0.4870	-328.8								
0.5107	-311.8								
0.5571	-296.3								
0.6033	-268.5								
0.6536	-236.9								
0.7030	-197.1								
0.7521	-153.8								
0.8036	-99.8								
0.8933	-69.9								
0.9496	-32.9								



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

SMOOTHING EQUATION

$$M^E_{calc} = x_1 x_2 a_1 \left[1 + \sum_{i=2}^6 a_i (x_1 - x_2)^{i-1} \right]$$

Coefficients a_i in the smoothing equation, standard deviation σ_{a_i} , and maximum deviation δ_{max} determined by least-squares analysis.

TC	a_1	a_2	a_3	a_4	a_5	a_6	δ_{max}
	J/mol						J/mol
298.15	-1256.8 (5.00)	0.3707 (0.0180)	0.594 (0.0162)	0.230 (0.0151)			3.2 5.9

The standard deviations (s.d.) of the coefficients a_i are given in parentheses
 $\delta_{max} = \max |M^E_{calc} - M^E|$; $\sigma_{a_i} = [20 \sum_{j=1}^N (M^E_{calc,j} - M^E_j)^2 / (N - 7)]^{1/2}$
 N , number of direct experimental values; n , number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Thermo, Eden, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + hexane and hexane + heptadecane systems were in agreement to within 1% (over central range of concentrations) with the data reported, respectively, in refs. 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated g_c purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, and without further purification, $\rho_{298.15 \text{ K}} = 1138.41$; $n_D^{20} = 1.4055$.
 2. Fluka AG (Buchs, Switzerland) "pure" grade material of stated g_c purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, and without further purification, $\rho_{298.15 \text{ K}} = 884.81$; $n_D^{20} = 1.3815$.

Notes: 187 K = 0.02; $|\sigma_{a_i}| = 0.0005$; $|\delta_{max}^E| \leq 5$.

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- Chen, M.; Ortega, J.; Toledo-Martín, P. J.; González, C. *J. Chem. Thermodyn.* **2000**, *32*, 609.
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Compiled by Thermodynamics Research Center

Components	1. 1,6-Dichlorobutane, $C_4H_8Cl_2$ [120-38-3] 2. Ethyl propanoate, $C_5H_{10}O_2$ [105-37-3]
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) Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

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

SOURCE OF DATA

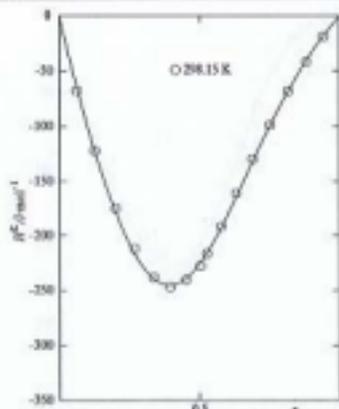
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain); FIRST PUBLISHED 82031135

DIRECT EXPERIMENTAL VALUES

Notes: P : 101.325 kPa

TK: 298.15

x_1	H^E J/mol ¹						
0.0617	-67.3						
0.1256	-122.3						
0.1978	-174.8						
0.2684	-211.9						
0.3368	-237.9						
0.3996	-246.6						
0.4580	-243.1						
0.5025	-227.5						
0.5258	-216.3						
0.5785	-191.3						
0.6303	-164.1						
0.6982	-129.8						
0.7527	-98.3						
0.8186	-68.0						
0.8803	-41.7						
0.9429	-18.8						



SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \rho_1 \left(1 + \sum_{i=1}^6 a_i (x_1 - x_2)^{2i} \right)$$

Coefficients a_i in the smoothing equation, standard deviation σ_{a_i} , and maximum deviation δ_{a_i} , determined by least-squares analysis.

TK	a_1	a_2	a_3	a_4	a_5	a_6	δ_{a_i}
	J/mol ¹						J/mol ¹
298.15	-498.9 (4.6)	0.769 (0.021)	0.598 (0.037)	0.301 (0.002)			2.7

The standard deviations σ_{a_i} of the coefficients a_i are given in parentheses
 $\delta_{a_i} = \max |H^E_{calc} - H^E|$; $\sigma_{a_i} = [2(H^E_{calc} - H^E)^2 / (N - 6)]^{1/2}$
 N, number of direct experimental values; a, number of coefficients a_i
 All direct experimental values equally weighted

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-810 (Sereno, Lyon, France) with stainless-steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptane systems were in agreement to within 1% (over central range of concentration) with the data reported, respectively, in refs 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 1133.06$; $n_D(298.15 \text{ K}) = 1.4522$.
 2. Fluka AG (Buchs, Switzerland) "puriss" grade material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 884.01$; $n_D(298.15 \text{ K}) = 1.3815$.

Error: $|H^E|/K = 0.01$; $|a_1| = 0.001$; $|H^E|/(\text{J mol}^{-1}) < 5$.

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- Diaz-Pala, M.; Mandula, C. *J. Chem. Thermodyn.* 1994, 6, 383.

Compiled by Thermodynamics Research Center

Component:	1. 1,5-Dichloroethane, $C_2H_4Cl_2$ (69-79-2) 2. Ethyl acetate, $C_4H_8O_2$ (105-37-5)
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
Condition:	P , pressure
Method:	Dilute calorimetric measurement of the enthalpy of mixing at constant T and P and variable x_1 ; ref. 1

Author(s) Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain)

Edited by Szwarc, A.; Mieczyski, A. (Instytut Chemii Fizycznej, Polska Akademia Nauk, ul. Kaspraka 44/52, 01-224 Warszawa, Poland)

SOURCE OF DATA

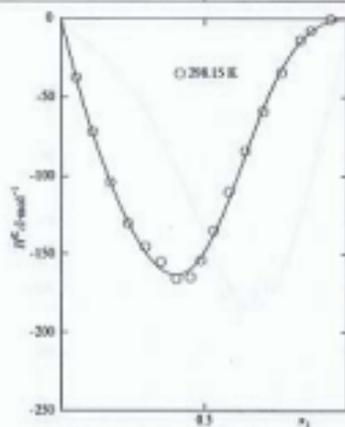
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain), FIRST PUBLISHED 1978, 15

DIRECT EXPERIMENTAL VALUES

States: T , 101.325 kPa

TR = 298.15

x_1	$H^E / \text{J mol}^{-1}$						
0.0323	-37.6						
0.1112	-71.8						
0.1728	-105.9						
0.2342	-130.2						
0.2942	-143.1						
0.3479	-154.8						
0.4019	-163.5						
0.4513	-164.7						
0.4883	-154.8						
0.5308	-134.6						
0.5819	-110.8						
0.6423	-84.1						
0.7043	-58.9						
0.7676	-34.7						
0.8322	-14.1						
0.8699	-8.9						
0.9384	-6.5						



SMOOTHING EQUATION

$$H^E_{\text{calc}} = x_1 x_2 \sum_{i=1}^m a_i (x_1 - x_2)^i T^i + \sum_{j=1}^n b_j (x_1 - x_2)^{j+1/2}, \quad m=2$$

Coefficients a_i in the smoothing equation, standard deviation σ_m , and maximum deviation f_{max} determined by least-squares analysis.

TK	a_1	a_2	a_3	a_4	a_5	a_6	σ_m
	J mol ⁻¹						J mol ⁻¹
298.15	-591.6	604	-0.022	1.369	0.77	3.2	1.9
	16.25	(90)	19.094	19.198	19.20		

The standard deviation σ_m of the coefficients a_i are given in parentheses. $\sigma_m = \max |a_i^{\text{calc}} - a_i^{\text{expt}}|$; $a_2 = [2H^E_{\text{calc}} - H^E] / (2M - 1)^{1/2}$; M , number of direct experimental values; n , number of coefficients b_j . All direct experimental values equally weighted.

AUXILIARY INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Cassas, Lyon, France) with stainless steel lunch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and benzene + heptane systems were in agreement to within 1% (lower oxalate cage of oxoacetic acid) with the data reported, respectively, in refs. 3 and 4.

Materials: 1. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieve 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 999.21$; $n_D(298.15 \text{ K}) = 1.4343$.
2. Fluka AG (Buchs, Switzerland) "pure" grade material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieve 3A, used without further purification; $\rho(298.15 \text{ K})/\text{kg m}^{-3} = 884.01$; $n_D(298.15 \text{ K}) = 1.3815$.

Error: $\pm 7 \text{ K}$; ± 0.2 ; $\pm 1.1 = 6.0005$; $1 \text{ M}^3 / 10 \text{ mol}^{-1} < 5$.

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SELECTED DATA ON MIXTURES

International Data Series*

1a. EXCESS ENTHALPY

National Institute of Standards and Technology, Boulder, CO 80505-3328

Compiled by Thermodynamics Research Center

Components:	1. Ethyl propionate, $C_5H_{10}O_2$ (193-17-7) 2. 1,4-Dichlorobenzene, $C_6H_4Cl_2$ (129-00-0)
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 fixed variable x_1 ; ref. 1

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

SOURCE OF DATA

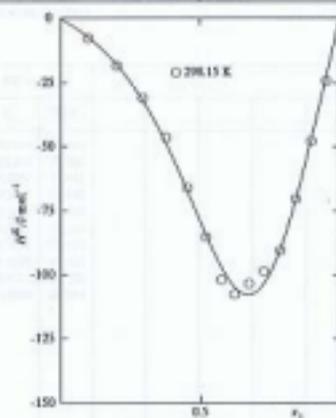
Ortega, J. (Laboratorio de Termodinámica y Fisicoquímica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, Canary Islands, Spain), FIRST PUBLISHED RESULTS

DIRECT EXPERIMENTAL VALUES

Notes: P , 101 325 kPa

TZK = 298.15

x_1	H^E J/mol
0.0999	-7.8
0.2039	-18.5
0.2944	-30.9
0.3790	-46.5
0.4540	-65.9
0.5281	-85.1
0.5755	-108.7
0.6202	-107.5
0.6791	-103.8
0.7281	-98.5
0.7871	-98.5
0.8425	-78.2
0.9082	-47.7
0.9537	-24.2



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

SMOOTHING EQUATION

$$H^E_{calc} = x_1 x_2 \left[1 + \sum_{i=1}^6 a_i (x_1 - x_2)^i \right]$$

Coefficients a_i in the smoothing equation, standard deviation σ_{fit} , and maximum deviation δ_{fit} , determined by least-squares analysis.

TZK	a_1	a_2	a_3	a_4	a_5	a_6	δ_{fit}
	J/mol ²						J/mol ²
298.15	-315.2 (8.2)	-1.641 (0.062)	2.041 (0.147)	-8.75 (0.20)			3.0 5.0

The standard deviations (σ_{fit}) of the coefficients a_i are given in parentheses
 $\delta_{fit} = \max |H^E_{calc} - H^E|$; $\sigma_{fit} = \sqrt{\sum (H^E_{calc} - H^E)^2 / (N - 6)}$
 N , number of direct experimental values; n , number of coefficients a_i
 All direct experimental values equally weighted

ADDITIONAL INFORMATION

Apparatus: A Calvet type microcalorimeter, model MS-80D (Setram, Lyon, France) with stainless steel batch mixing cell (volume about 8 cm³) and with negligible vapor phase was used, as described in ref. 2.

Procedure: The microcalorimeter was calibrated electrically after each measurement by the Joule effect, as described in ref. 2. Test measurements on the cyclohexane + benzene and heptadecane systems were in agreement to within 1% (over central range of concentration) with the data reported, respectively, in refs. 3 and 4.

Materials: 1. Fluka AG (Buchs, Switzerland) "pure" grade material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 884.0$; $\sigma(0, 298.15 \text{ K}) = 1.3815$.
 2. Aldrich Chem. Co., Inc. (Milwaukee, WI, USA), material of stated glc purity > 99 mole %; degassed ultrasonically, dried over molecular sieves 3A, used without further purification; $\rho(298.15 \text{ K}) = 1867.59$; $\sigma(0, 298.15 \text{ K}) = 1.4555$.

Errors: $| \partial T / \partial K | = 0.02$; $| \partial x_1 | = 0.0005$; $| \partial H^E / \text{J mol}^{-1} | < 5$.

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