ORTJ0951

ELDATA: Int. Electron. J. Phys.-Chem. Data **1995**, *1*, 29-38

Excess enthalpies of 1,1,2,2-tetrachloroethane + methyl n-alkanoates

Ortega, J.

Laboratorio de Termodinamica y Fisicoquimica, Escuela Superior de Ingenieros Industriales, Universidad de Las Palmas de Gran Canaria, 35071 – Las Palmas de Gran Canaria, Canary Islands, Spain

(Received in final form July 20, 1994)

Enthalpy-of-mixing measurements are reported at 298.15 K *for methyl n-alkanoates (ethanoate through pentadecanoate) + 1,1,2,2-tetrachloroethane. All the mixtures are strongly exothermic suggesting the existence of strong specific interactions due to hydrogen bonding between the* H *atoms of the 1,1,2,2-tetrachloroethane and the* O *atoms of the n-alkanoates.*

1. INTRODUCTION

In continuation of our systematic experimental studies on the excess molar enthalpies H^E of 1,1,2,2-tetrachloroethane + ethyl n-alkanoates or + propyl n-alkanoates (**ORTJ0915**), we have determined H^E of 1,1,2,2-tetrachloroethane + methyl n-alkanoates. These data, along with data on vapor-liquid equilibria (**FARJ0950**) and excess volumes (**LINJ0950**), will be used to test the applicability of various group-contribution models to mixtures involving complex formation. As far as we know, no H^E measurements have been published previously on this class of mixtures.

2. EXPERIMENTAL SECTION

2.1. Apparatus and Procedure

The experimental data were taken at atmospheric pressure by means of a Calvet type microcalorimeter, model MS-80D (SETARAM, Lyon, France) with a stainless steel batch mixing cell (volume ca. 8 cm^3) and with negligible vapor phase. The temperature T was maintained constant to within 0.02 K at (298.15 ± 0.02) K. All temperatures are on ITS-90. The microcalorimeter was calibrated electrically after each measurement (see **ORTJ0881**). Check measurements on cyclohexane + hexane and benzene + heptadecane are in agreement to within 1 % (over central range of concentration) with the data reported in (**MCGM0690**) and (**DIAM0742**). The estimated uncertainties in the mole fraction composition x_i and H^E are, respectively, $\sigma(x_i)$ = 0.0005 and $\sigma(H^E)$ = 0.02 $|H^E|$ (over central range of concentration).

2.2. Materials

$C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane Aldrich Chem. Co., Inc. (Milwaukee, WI, USA) material of stated purity > 99 mole %, was degassed ultrasonically, dried over molecular sieves Type 3A (reference 69828, from Fluka), and used without further purification. n(D,298.15 K) = 1.4918; ρ_i(298.15 K)/kg m^{-3} = 1588.37.

$C_3H_6O_2$, Methyl ethanoate (Methyl acetate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.3589; ρ_i(298.15 K)/kg m^{-3} = 927.03.

$C_4H_8O_2$, Methyl propanoate (Methyl propionate). Fluka AG (Buchs, Switzerland) 'purum' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.3745; ρ_i(298.15 K)/kg m^{-3} = 909.30.

$C_5H_{10}O_2$, Methyl butanoate (Methyl butyrate). Fluka AG (Buchs, Switzerland) 'purum' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.3849; ρ_i(298.15 K)/kg m^{-3} = 892.31.

$C_6H_{12}O_2$, Methyl pentanoate (Methyl valerate). Fluka AG (Buchs, Switzerland) 'purum' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.3947; ρ_i(298.15 K)/kg m^{-3} = 884.52.

$C_7H_{14}O_2$, Methyl hexanoate (Methyl caproate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4035; ρ_i(298.15 K)/kg m^{-3} = 879.52.

$C_8H_{16}O_2$, Methyl heptanoate (Methyl enanthate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4095; ρ_i(298.15 K)/kg m^{-3} = 875.40.

$C_9H_{18}O_2$, Methyl octanoate (Methyl caprylate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4148; ρ_i(298.15 K)/kg m^{-3} = 872.38.

$C_{10}H_{20}O_2$, Methyl nonanoate (Methyl pelargonate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4208; ρ_i(298.15 K)/kg m^{-3} = 870.11.

$C_{11}H_{22}O_2$, Methyl decanoate (Methyl caprinate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4235; ρ_i(298.15 K)/kg m^{-3} = 868.09.

$C_{12}H_{24}O_2$, Methyl undecanoate. Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 98.0 mole %, purified as above; n(D, 293.15 K) = 1.4270; ρ_i(298.15 K)/kg m^{-3} = 866.75.

$C_{13}H_{26}O_2$, Methyl dodecanoate (Methyl laurate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.5 mole %, purified as above; n(D, 293.15 K) = 1.4298; ρ_i(298.15 K)/kg m^{-3} = 865.12.

$C_{14}H_{28}O_2$, Methyl tridecanoate. Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 98.0 mole %, purified as above; n(D, 293.15 K) = 1.4329; ρ_i(298.15 K)/kg m^{-3} = 863.94.

$C_{15}H_{30}O_2$, Methyl tetradecanoate (Methyl myristate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.5 mole %, purified as above; n(D, 293.15 K) = 1.4345; ρ_i(298.15 K)/kg m^{-3} = 863.27.

$C_{16}H_{32}O_2$, Methyl pentadecanoate. Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 293.15 K) = 1.4370; ρ_i(298.15 K)/kg m^{-3} = 862.35.

3. RESULTS

The direct experimental H^E values are tabulated and graphed in the Appendix and saved on disk as Standard ELDATA Files **ORTJ0951.001** through **ORTJ0951.014.**

The data were fitted to Eq. (1):

$$H^E_{calc}/\text{J mol}^{-1} = x_1x_2\Sigma A_i[x_1/(x_1 + kx_2)]^{i-1} \qquad (1)$$

all points weighted equally. With an adjusted coefficient k and n = 4 coefficients A_i the standard deviations $\sigma(H^E)$, defined by Eq.(2):

$$\sigma(H^E) = [\Sigma(H^E_{calc} - H^E)^2/(N-n)]^{1/2} \qquad (2)$$

where N is the number of experimental values, are less than 10 J mol^{-1} (ca. 0.4 % at x_1 = 0.5).

4. DISCUSSION AND CONCLUSIONS

The excess enthalpies of all the systems studied are strongly negative, of the order of -2500 J mol^{-1} at the minimum, close to the equimolar composition. This suggests that in 1,1,2,2-tetrachloroethane + methyl n-alkanoates there exist specific interactions between the unlike molecules mainly due to hydrogen bonding.

5. REFERENCES

DIAM0742 – Diaz Pena, M.; Menduina, C. *J. Chem. Thermodyn.* **1974,** *6,* 387.

FARJ0950 – Farkova, J.; Wichterle, I. *ELDATA: Int. Electron. J. Phys.-Chem. Data* **1995,** *1,* 13.

LINJ0950 – Linek, J. *ELDATA: Int. Electron. J. Phys.-Chem. Data* **1995,** *1,* 23.

MCGM0690 – McGlashan, M. L.; Stoeckli, H. F. *J. Chem. Thermodyn.* **1969,** *1,* 589.

ORTJ0881 – Ortega, J.; Matos, J. S.; Paz Andrade, M. I.; Fernandez, J.; Pias, L. *Fluid Phase Equilib.* **1988,** *43,* 295.

ORTJ0915 – Ortega, J. *Int. DATA Ser., Sel. Data Mixtures, Ser. A* **1991,** *19,* 247.

Ortega, Juan* [ORTJ0]

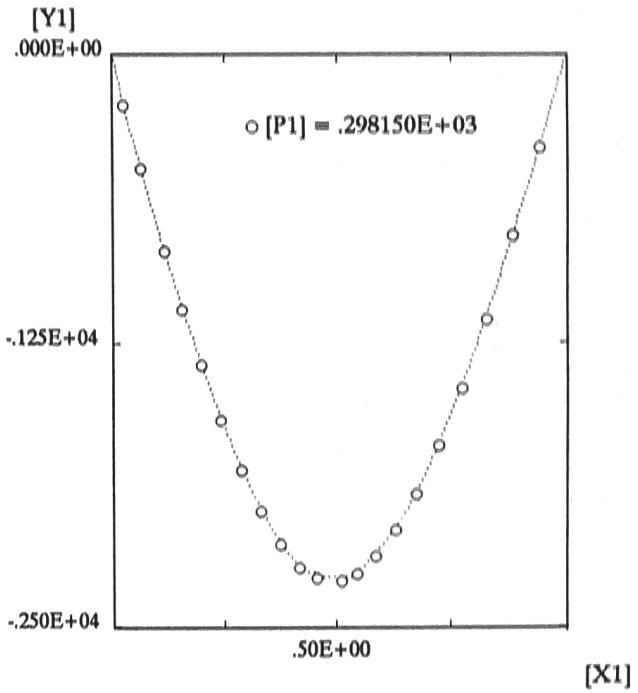
*Author to whom correspondence should be addressed: FAX +34-28-451022

Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.001**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_3H_6O_2$, Methyl ethanoate

[P1] = .298150E+03

[X1]	[Y1]
.264000E−01	−.219500E+03
.652000E−01	−.493800E+03
.117300E+00	−.852300E+03
.157100E+00	−.110160E+04
.200600E+00	−.134640E+04
.244900E+00	−.158870E+04
.291100E+00	−.180850E+04
.335900E+00	−.198930E+04
.379600E+00	−.213580E+04
.421000E+00	−.224040E+04
.460300E+00	−.228540E+04
.514600E+00	−.229930E+04
.549900E+00	−.226730E+04
.590600E+00	−.218860E+04
.633600E+00	−.207190E+04
.678700E+00	−.191340E+04
.727700E+00	−.170260E+04
.777700E+00	−.145130E+04
.830500E+00	−.114780E+04
.887300E+00	−.787100E+03
.944400E+00	−.404200E+03

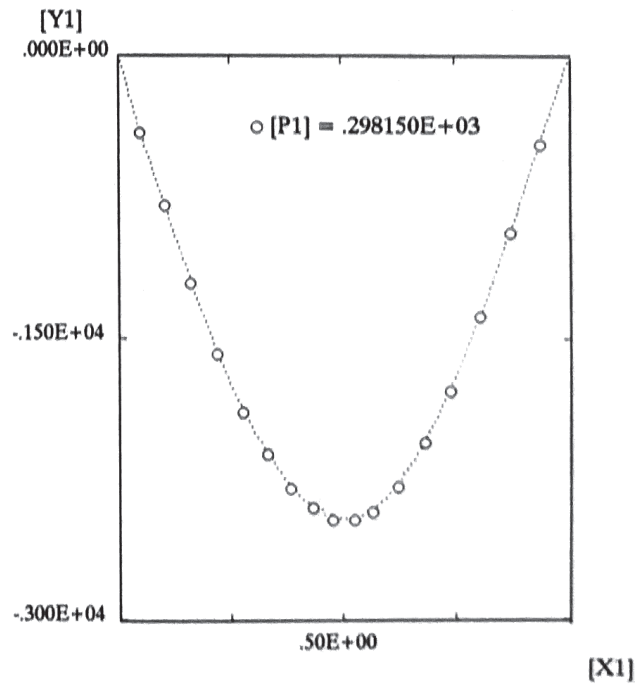


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.002**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_4H_8O_2$, Methyl propanoate

[P1] = .298150E+03

[X1]	[Y1]
.496000E−01	−.406300E+03
.104700E+00	−.797800E+03
.163400E+00	−.121020E+04
.222300E+00	−.158300E+04
.279900E+00	−.189420E+04
.335100E+00	−.211860E+04
.387400E+00	−.229530E+04
.436400E+00	−.239940E+04
.481200E+00	−.246180E+04
.528600E+00	−.246020E+04
.570100E+00	−.242240E+04
.625800E+00	−.229020E+04
.685200E+00	−.205510E+04
.741200E+00	−.178260E+04
.807500E+00	−.138650E+04
.873600E+00	−.942600E+03
.939200E+00	−.468900E+03

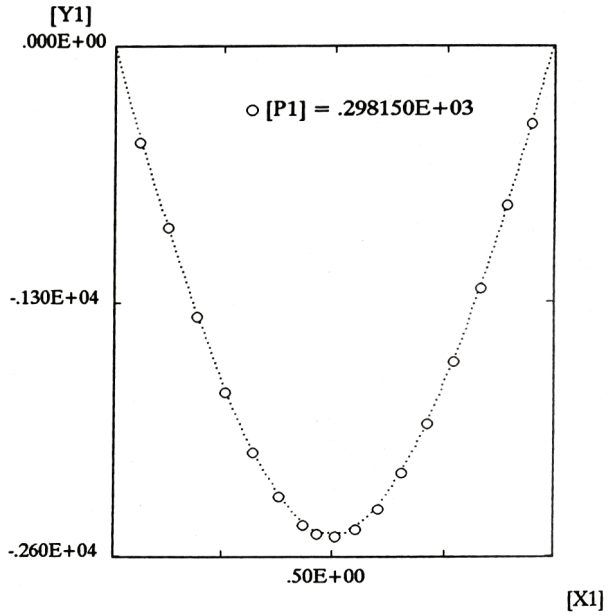


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.003**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_5H_{10}O_2$, Methyl butanoate

[P1] = .298150E+03

[X1]	[Y1]
.609000E−01	−.489400E+03
.126700E+00	−.922200E+03
.193900E+00	−.137260E+04
.260500E+00	−.176390E+04
.324100E+00	−.206810E+04
.383200E+00	−.229720E+04
.438400E+00	−.244200E+04
.469400E+00	−.248800E+04
.510400E+00	−.250150E+04
.555300E+00	−.246550E+04
.604900E+00	−.236140E+04
.657100E+00	−.217690E+04
.713000E+00	−.192520E+04
.771400E+00	−.160920E+04
.831800E+00	−.123300E+04
.892000E+00	−.815400E+03
.949100E+00	−.397400E+03

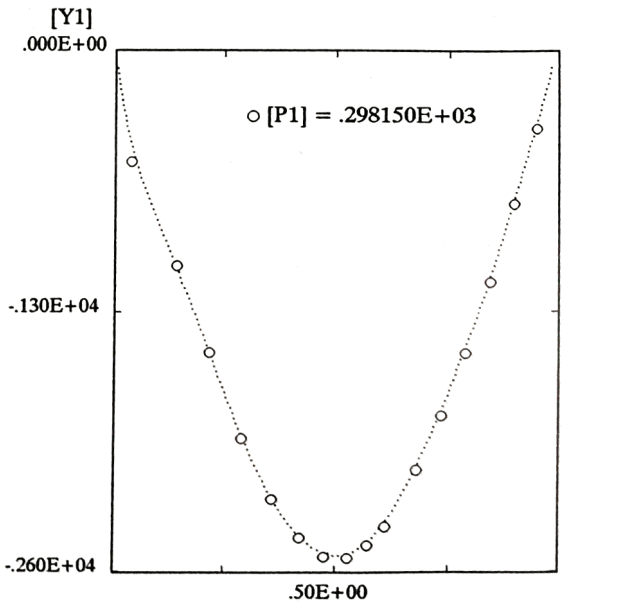


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.004**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_6H_{12}O_2$, Methyl pentanoate

[P1] = .298150E+03

[X1]	[Y1]
.394000E−01	−.553500E+03
.145300E+00	−.107120E+04
.220100E+00	−.150270E+04
.293300E+00	−.193140E+04
.361100E+00	−.223380E+04
.423800E+00	−.243040E+04
.479500E+00	−.252850E+04
.529800E+00	−.253210E+04
.574800E+00	−.246920E+04
.612600E+00	−.237530E+04
.682700E+00	−.209140E+04
.736700E+00	−.182270E+04
.790500E+00	−.151090E+04
.845200E+00	−.115360E+04
.899600E+00	−.765800E+03
.951900E+00	−.385900E+03

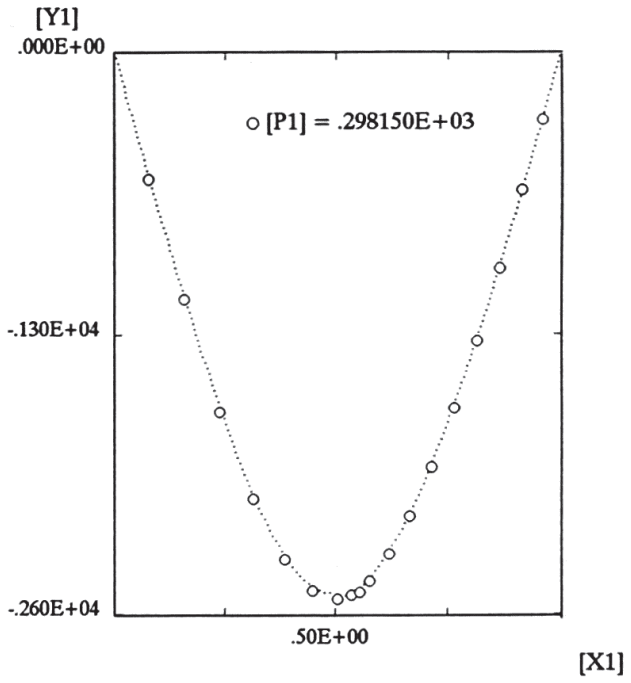


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.005**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_7H_{14}O_2$, Methyl hexanoate

[P1] = .298150E+03

[X1]	[Y1]
.783000E−01	−.584800E+03
.159400E+00	−.113120E+04
.241500E+00	−.165780E+04
.318300E+00	−.206080E+04
.389200E+00	−.234470E+04
.452600E+00	−.249070E+04
.509000E+00	−.253090E+04
.540600E+00	−.251130E+04
.558900E+00	−.249740E+04
.581000E+00	−.244410E+04
.623800E+00	−.231910E+04
.669400E+00	−.214460E+04
.717800E+00	−.191660E+04
.767700E+00	−.164210E+04
.818200E+00	−.132960E+04
.867700E+00	−.993100E+03
.916900E+00	−.635900E+03
.961200E+00	−.311600E+03

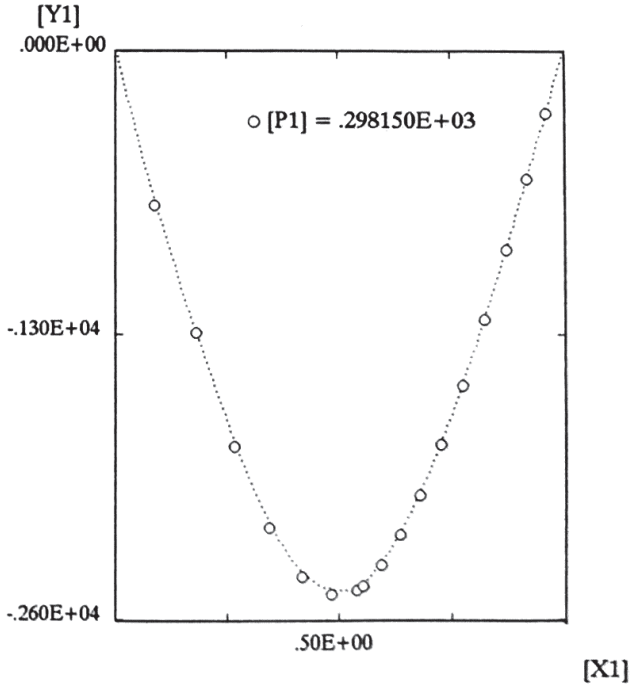


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.006**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_8H_{16}O_2$, Methyl heptanoate

[P1] = .298150E+03

[X1]	[Y1]
.900000E−01	−.712700E+03
.182900E+00	−.129340E+04
.269400E+00	−.180910E+04
.348400E+00	−.217440E+04
.421500E+00	−.240460E+04
.486100E+00	−.248510E+04
.542600E+00	−.246550E+04
.557700E+00	−.244490E+04
.597900E+00	−.234730E+04
.640100E+00	−.220910E+04
.684200E+00	−.202960E+04
.730800E+00	−.180280E+04
.778900E+00	−.153480E+04
.827400E+00	−.123440E+04
.875000E+00	−.914800E+03
.920800E+00	−.589100E+03
.963300E+00	−.284100E+03

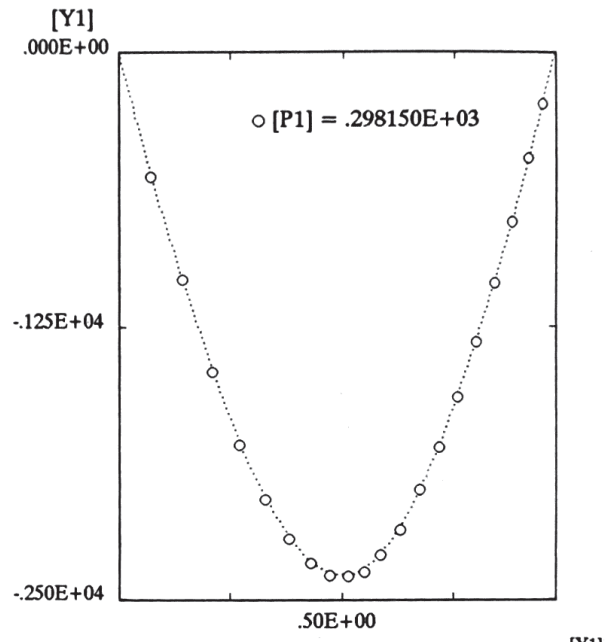


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.007**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_9H_{18}O_2$, Methyl octanoate

[P1] = .298150E+03

[X1]	[Y1]
.742000E−01	−.568200E+03
.146200E+00	−.103260E+04
.212800E+00	−.145690E+04
.274300E+00	−.179140E+04
.331700E+00	−.204220E+04
.385200E+00	−.222320E+04
.433000E+00	−.233570E+04
.476300E+00	−.239120E+04
.516100E+00	−.239570E+04
.551800E+00	−.237640E+04
.588200E+00	−.229790E+04
.631500E+00	−.218290E+04
.676400E+00	−.199860E+04
.718800E+00	−.180510E+04
.762300E+00	−.157620E+04
.806100E+00	−.132260E+04
.849700E+00	−.105120E+04
.891100E+00	−.774200E+03
.932500E+00	−.486700E+03
.968900E+00	−.234700E+03

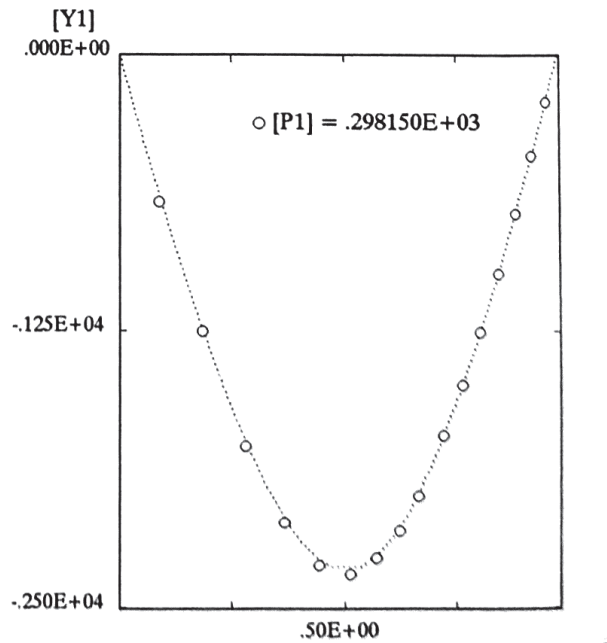


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.008**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{10}H_{20}O_2$, Methyl nonanoate

[P1] = .298150E+03

[X1]	[Y1]
.921000E−01	−.669000E+03
.188500E+00	−.125010E+04
.284100E+00	−.176380E+04
.369000E+00	−.210990E+04
.446300E+00	−.230680E+04
.514200E+00	−.234720E+04
.572800E+00	−.227290E+04
.623600E+00	−.214730E+04
.666500E+00	−.198810E+04
.723400E+00	−.171750E+04
.766600E+00	−.149210E+04
.807700E+00	−.125470E+04
.850200E+00	−.992900E+03
.892900E+00	−.724300E+03
.931900E+00	−.461900E+03
.969400E+00	−.214700E+03

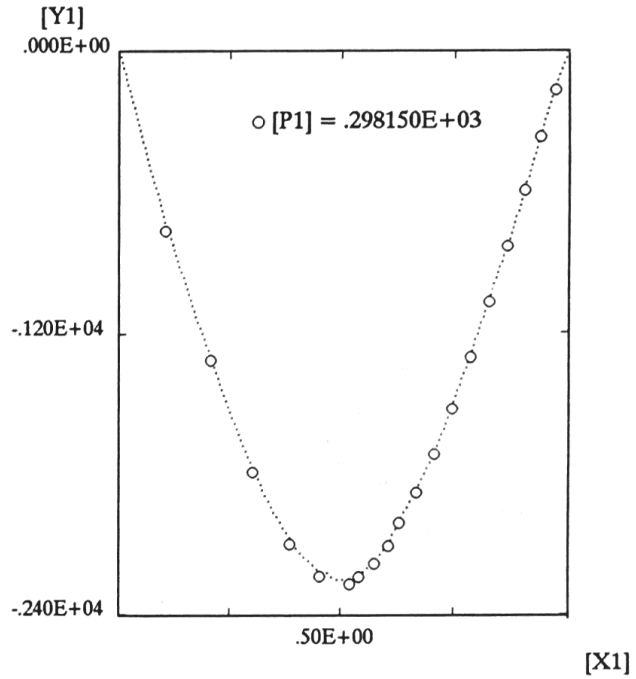


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.009**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{11}H_{22}O_2$, Methyl decanoate

[P1] = .298150E+03

[X1]	[Y1]
.106500E+00	−.758200E+03
.210000E+00	−.131370E+04
.305200E+00	−.179320E+04
.390500E+00	−.210090E+04
.457500E+00	−.223990E+04
.523800E+00	−.227350E+04
.544200E+00	−.224200E+04
.579200E+00	−.218430E+04
.609700E+00	−.210910E+04
.633700E+00	−.201210E+04
.670900E+00	−.188360E+04
.709500E+00	−.171670E+04
.749100E+00	−.152140E+04
.789400E+00	−.130350E+04
.830000E+00	−.106740E+04
.869400E+00	−.826400E+03
.906700E+00	−.589800E+03
.941900E+00	−.365500E+03
.974000E+00	−.165700E+03

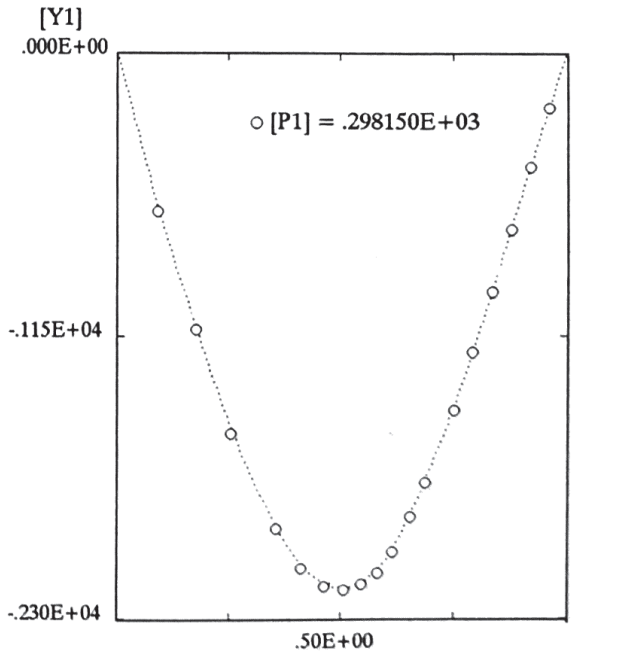


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.010**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{12}H_{24}O_2$, Methyl undecanoate

[P1] = .298150E+03

[X1]	[Y1]
.933000E−01	−.646300E+03
.178800E+00	−.112330E+04
.257100E+00	−.153960E+04
.359200E+00	−.193140E+04
.415100E+00	−.209560E+04
.466100E+00	−.216990E+04
.510600E+00	−.218490E+04
.548700E+00	−.215980E+04
.585100E+00	−.211520E+04
.617600E+00	−.202810E+04
.656700E+00	−.188470E+04
.690100E+00	−.174510E+04
.754200E+00	−.145120E+04
.795100E+00	−.121830E+04
.837900E+00	−.974600E+03
.880400E+00	−.721100E+03
.922200E+00	−.467600E+03
.962800E+00	−.226700E+03

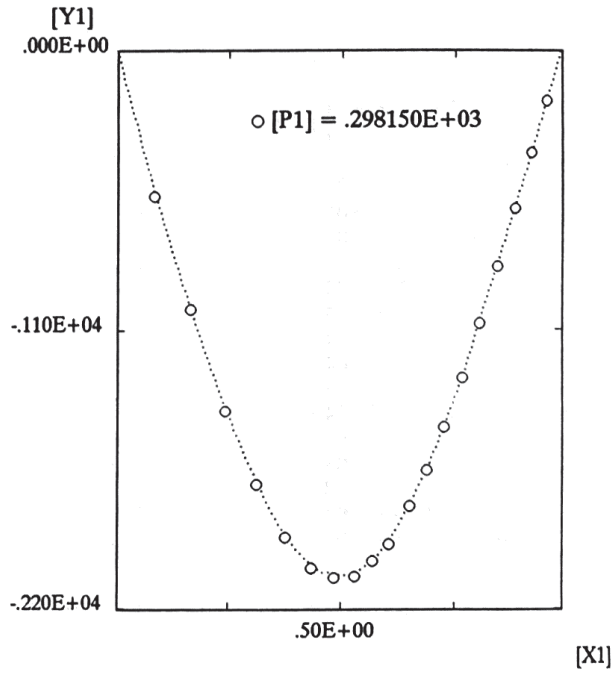


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.011**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{13}H_{26}O_2$, Methyl dodecanoate

[P1] = .298150E+03

[X1]	[Y1]
.849000E−01	−.569300E+03
.168200E+00	−.101990E+04
.246200E+00	−.142040E+04
.316700E+00	−.171180E+04
.380500E+00	−.191730E+04
.437500E+00	−.204000E+04
.487700E+00	−.207880E+04
.532900E+00	−.207300E+04
.573100E+00	−.201160E+04
.609000E+00	−.194630E+04
.653900E+00	−.179780E+04
.691500E+00	−.165720E+04
.729600E+00	−.148510E+04
.768800E+00	−.129080E+04
.809100E+00	−.107660E+04
.849300E+00	−.853400E+03
.889600E+00	−.623900E+03
.928600E+00	−.399800E+03
.965900E+00	−.196100E+03

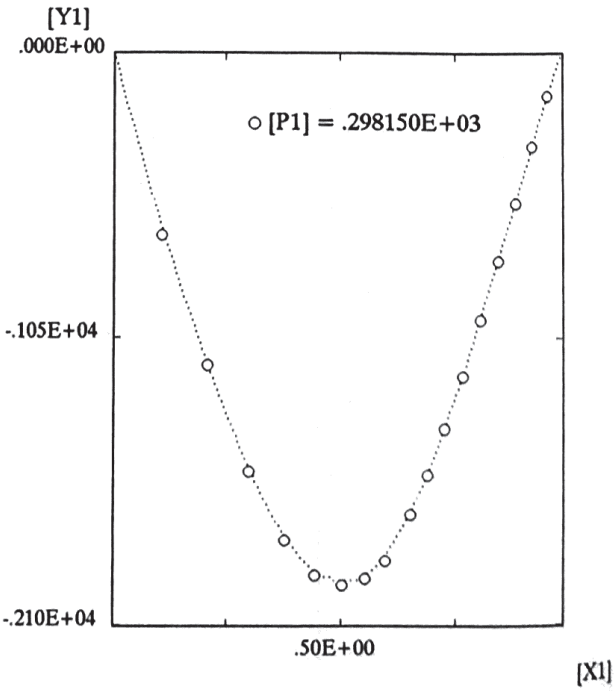


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.012**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{14}H_{28}O_2$, Methyl tridecanoate

[P1] = .298150E+03

[X1]	[Y1]
.110100E+00	−.676500E+03
.212100E+00	−.114860E+04
.301600E+00	−.153670E+04
.380200E+00	−.178990E+04
.446200E+00	−.191760E+04
.504700E+00	−.195550E+04
.555600E+00	−.193090E+04
.599600E+00	−.186430E+04
.654500E+00	−.169450E+04
.691000E+00	−.155130E+04
.729600E+00	−.137940E+04
.769000E+00	−.118830E+04
.809200E+00	−.982200E+03
.849600E+00	−.767800E+03
.889700E+00	−.554400E+03
.929200E+00	−.345000E+03
.966500E+00	−.158600E+03

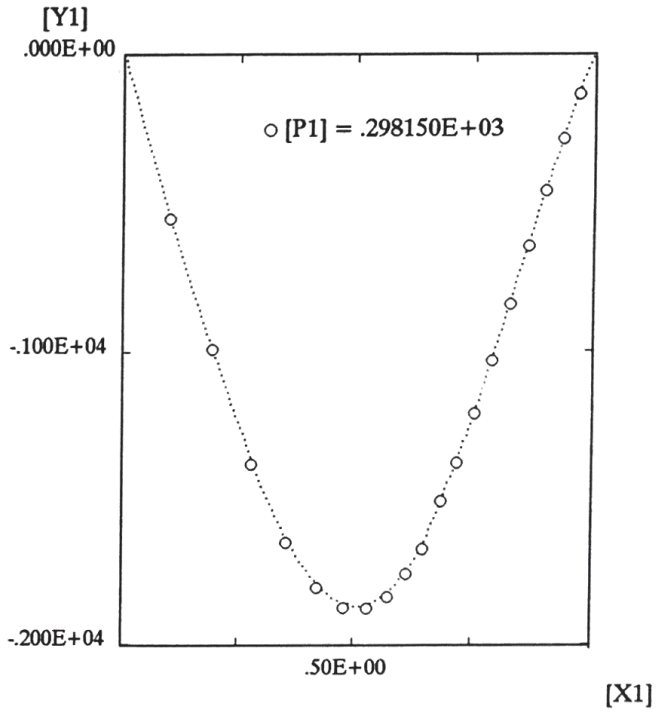


Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.013**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{15}H_{30}O_2$, Methyl tetradecanoate

[P1] = .298150E+03

[X1]	[Y1]
.101600E+00	−.551000E+03
.195600E+00	−.992100E+03
.282600E+00	−.138480E+04
.358700E+00	−.164930E+04
.425400E+00	−.180500E+04
.483500E+00	−.187390E+04
.533600E+00	−.187590E+04
.578100E+00	−.183540E+04
.616600E+00	−.175590E+04
.651300E+00	−.167160E+04
.688700E+00	−.151230E+04
.721600E+00	−.138140E+04
.757500E+00	−.121310E+04
.793500E+00	−.103260E+04
.830600E+00	−.841600E+03
.867300E+00	−.647200E+03
.903100E+00	−.458200E+03
.937700E+00	−.282100E+03
.970400E+00	−.130900E+03



Property Code: [HMSD0001] HEAT OF MIXING AND SOLUTION **ORTJ0951.014**
State: Two-component system, single-phase liquid
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/Jmol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $C_2H_2Cl_4$, 1,1,2,2-Tetrachloroethane**
2. $C_{16}H_{32}O_2$, Methyl pentadecanoate

[P1] = .298150E+03

[X1]	[Y1]
.116800E+00	−.683000E+03
.222000E+00	−.111200E+04
.316900E+00	−.148170E+04
.397000E+00	−.170790E+04
.464300E+00	−.180410E+04
.519400E+00	−.181200E+04
.567600E+00	−.177520E+04
.612300E+00	−.170620E+04
.650800E+00	−.159810E+04
.699200E+00	−.140380E+04
.737700E+00	−.123360E+04
.776400E+00	−.105310E+04
.815500E+00	−.859900E+03
.854700E+00	−.661500E+03
.893900E+00	−.463900E+03
.931900E+00	−.283000E+03
.968000E+00	−.127700E+03