ORTJ0961

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Excess enthalpies of 14 binary liquid mixtures of trichloromethane + methyl n-alkanoates (C3 - C16) at 298.15 K

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

1. INTRODUCTION

In continuation of our experimental studies on the excess molar enthalpies H^E of 1,1,2,2-tetrachloroethane + methyl-, ethyl-, or propyl-n-alkanoates [ORTJ0915; ORTJ0951], we have determined H^E of trichloromethane + methyl n-alkanoates (ethanoate through pentadecanoate) at 298.15 K. These data, along with our previous data, 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 except for trichloromethane + methyl ethanoate at 308.15 K [OHTT0800] and for equimolar mixtures of trichloromethane + methyl ethanoate or + methyl propanoate [SEAS1531] at 298.15 K.

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

$CHCl_3$, Trichloromethane (Chloroform). 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) = 1.4429 (1.44293 [RIDJ0860]); ρ(298.15 K)/kg m^{-3} = 1480.03 (1479.70 [RIDJ0860]).

$C_3H_6O_2$, Methyl ethanoate (Methyl acetate). Fluka AG (Buchs, Switzerland) 'puriss' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 298.15 K) = 1.3589 (1.3589 [RIDJ0860]); ρ(298.15 K)/kg m^{-3} = 927.03 (927.9 [RIDJ0860]).

$C_4H_8O_2$, Methyl propanoate (Methyl propionate). Fluka AG (Buchs, Switzerland) 'purum' grade material of stated GLC purity > 99.0 mole %, purified as above; n(D, 298.15 K) = 1.3745; ρ(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, 298.15 K) = 1.3849; ρ(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, 298.15 K) = 1.3947; ρ(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, 298.15 K) = 1.4035; ρ(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, 298.15 K) = 1.4095; ρ(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, 298.15 K) = 1.4148; ρ(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, 298.15 K) = 1.4208; ρ(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, 298.15 K) = 1.4235; ρ(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, 298.15 K) = 1.4270; ρ(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, 298.15 K) = 1.4298; ρ(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, 298.15 K) = 1.4329; ρ(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, 298.15 K) = 1.4345; ρ(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, 298.15 K) = 1.4370; ρ(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 **ORTJ0961.001** through **ORTJ0961.014**.

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.* 0.5 % at x_1 = 0.5).

4. DISCUSSION AND CONCLUSIONS

Comparison with literature values is possible only for trichloromethane + methyl ethanoate or + methyl propanoate. The equimolar H^E values at 298.15 K reported by [SEAS1531] are by 200-300 J mol^{-1} less negative than our measurements. However, the same discrepancies exist between the measurements of [SEAS1531] and other authors. For example, the data of [SEAS1531] are also by 200-300 J mol^{-1} less negative than the data reported by [BEAL0690] and [HALF0720] for trichloromethane + diethyl ether or the data reported by [HANY0750] and [HALF0720] for trichloromethane + propan-2-one.

The excess enthalpies of all the systems studied are strongly negative, between -1700 and -2300 J mol^{-1} at the minimum situated at a mole fraction of trichloromethane of *ca.* x_1 = 0.55. This suggests that in trichloromethane + methyl n-alkanoate mixtures there exist specific interactions between the unlike molecules (mainly due to hydrogen bonding) with formation of 1:1 and 2:1 complexes. The ideal association model of [MCGM0580], based on the assumption of this type of complex formation, has already been used to describe the properties of trichloromethane + ethyl methanoate, + methyl ethanoate, or + ethyl ethanoate [OHTT0800].

As expected, because of the decrease of the association constant with temperature, the H^E value of trichloromethane + methyl ethanoate at 308.15 K, obtained by [OHTT0800], is less negative than we obtained at 298.15 K.

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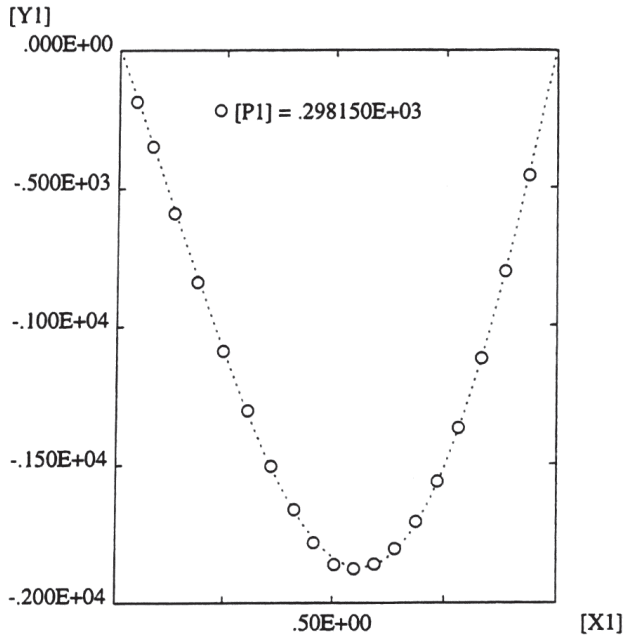
Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.001**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_3H_6O_2$, Methyl ethanoate

[P1] = .298150E+03

[X1]	[Y1]
.409000E–01	–.185300E+03
.806000E–01	–.349200E+03
.132300E+00	–.588100E+03
.187400E+00	–.837600E+03
.247300E+00	–.108970E+04
.305500E+00	–.130310E+04
.360900E+00	–.150440E+04
.413200E+00	–.166090E+04
.458700E+00	–.178100E+04
.505600E+00	–.186020E+04
.549600E+00	–.187690E+04
.594100E+00	–.185920E+04
.639800E+00	–.180480E+04
.686800E+00	–.170590E+04
.734400E+00	–.156030E+04
.782300E+00	–.136840E+04
.832200E+00	–.111960E+04
.885300E+00	–.802900E+03
.938700E+00	–.456500E+03



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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/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_4H_8O_2$, Methyl propanoate

[P1] = .298150E+03

[X1]	[Y1]
.626000E–01	–.317500E+03
.129200E+00	–.651000E+03
.194500E+00	–.989700E+03
.258700E+00	–.129680E+04
.319800E+00	–.156090E+04
.379400E+00	–.178120E+04
.431600E+00	–.194080E+04
.477400E+00	–.204660E+04
.510300E+00	–.210520E+04
.584400E+00	–.213440E+04
.621900E+00	–.210690E+04
.659200E+00	–.203630E+04
.694100E+00	–.192430E+04
.729900E+00	–.179500E+04
.763300E+00	–.165010E+04
.799700E+00	–.146640E+04
.836500E+00	–.125340E+04
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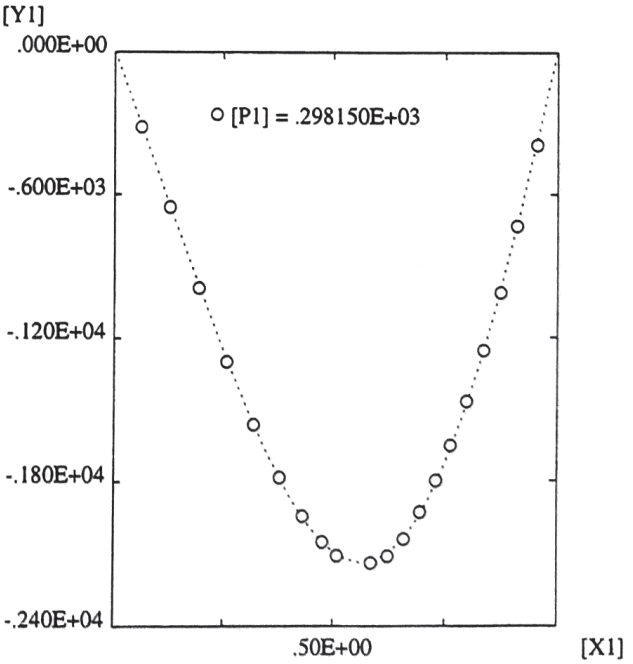

Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.003**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_5H_{10}O_2$, Methyl butanoate

[P1] = .298150E+03

[X1]	[Y1]
.679000E-01	-.408300E+03
.145900E+00	-.811700E+03
.218400E+00	-.119130E+04
.293500E+00	-.153620E+04
.362300E+00	-.181130E+04
.425900E+00	-.201410E+04
.480800E+00	-.214070E+04
.532200E+00	-.221400E+04
.577200E+00	-.223390E+04
.607300E+00	-.222040E+04
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.749900E+00	-.185010E+04
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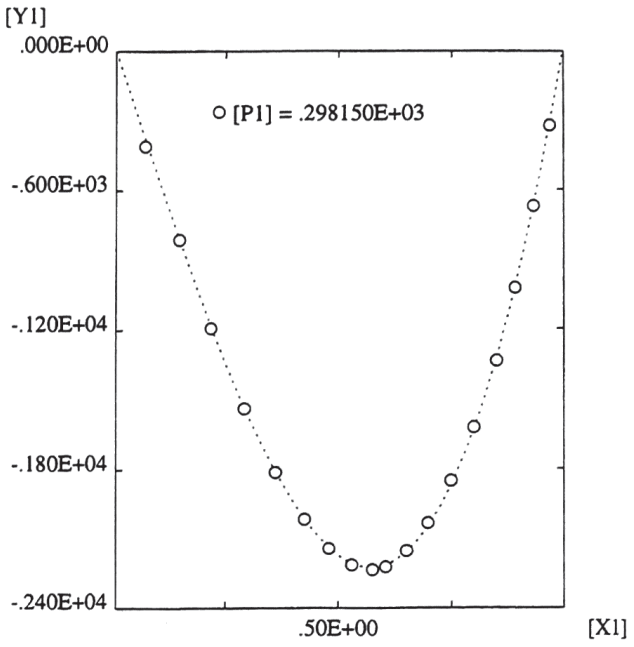

Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.004**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_6H_{12}O_2$, Methyl pentanoate

[P1] = .298150E+03

[X1]	[Y1]
.860000E-01	-.514500E+03
.173900E+00	-.957300E+03
.259800E+00	-.138750E+04
.340200E+00	-.173840E+04
.413100E+00	-.199650E+04
.476600E+00	-.216020E+04
.532100E+00	-.224630E+04
.581800E+00	-.227340E+04
.593200E+00	-.226490E+04
.624100E+00	-.223820E+04
.665600E+00	-.214940E+04
.709600E+00	-.199930E+04
.754300E+00	-.180300E+04
.799000E+00	-.156140E+04
.842300E+00	-.127740E+04
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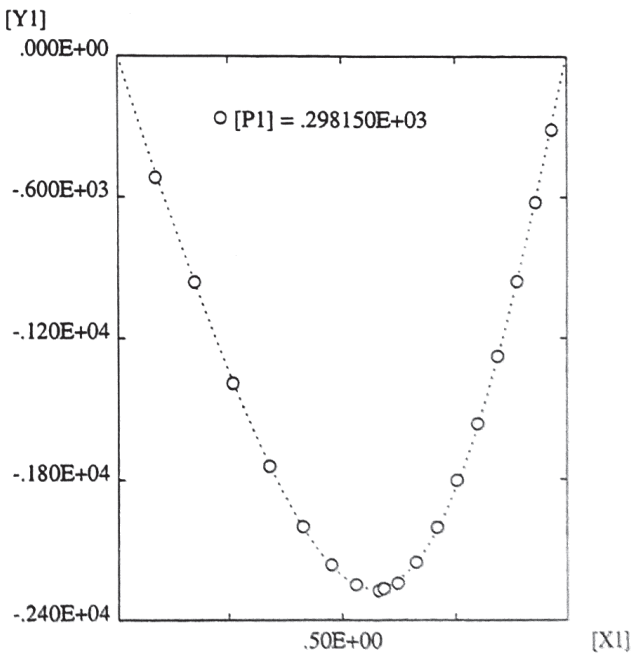

Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.005**
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Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_7H_{14}O_2$, Methyl hexanoate

[P1] = .298150E+03

[X1]	[Y1]
.948000E-01	-.560200E+03
.190300E+00	-.102810E+04
.281300E+00	-.147270E+04
.364600E+00	-.181590E+04
.438500E+00	-.205560E+04
.503300E+00	-.220090E+04
.559700E+00	-.226280E+04
.608700E+00	-.225970E+04
.651400E+00	-.219080E+04
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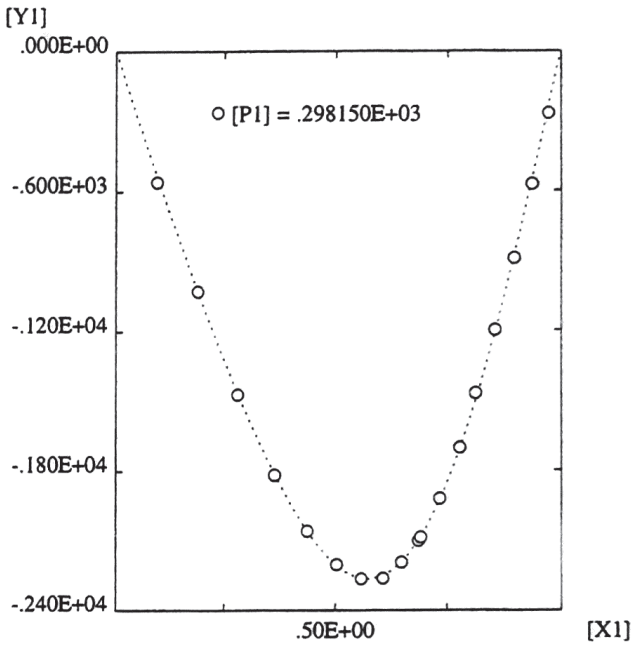

Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.006**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_8H_{16}O_2$, Methyl heptanoate

[P1] = .298150E+03

[X1]	[Y1]
.102600E+00	-.585600E+03
.206700E+00	-.107660E+04
.303000E+00	-.153400E+04
.386800E+00	-.186650E+04
.461100E+00	-.208570E+04
.526500E+00	-.220570E+04
.580800E+00	-.224040E+04
.628600E+00	-.220990E+04
.636400E+00	-.219990E+04
.673400E+00	-.211720E+04
.712300E+00	-.198310E+04
.751200E+00	-.181270E+04
.791500E+00	-.160140E+04
.828900E+00	-.136540E+04
.868400E+00	-.109510E+04
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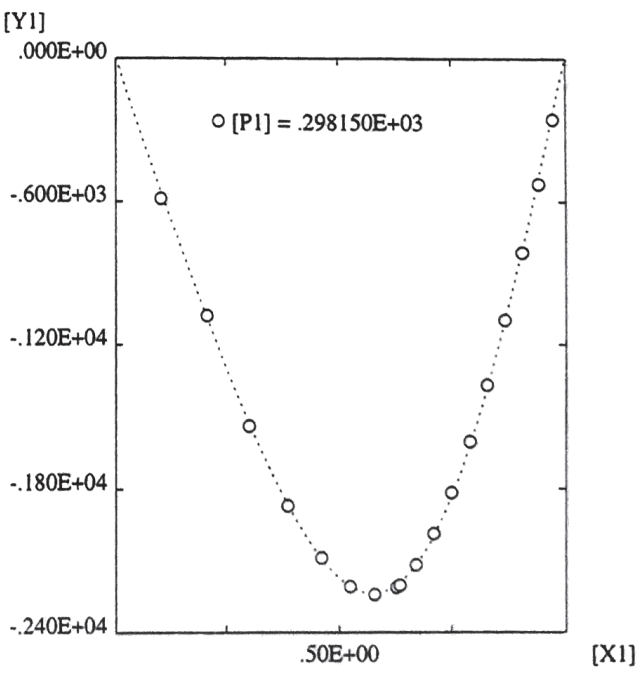
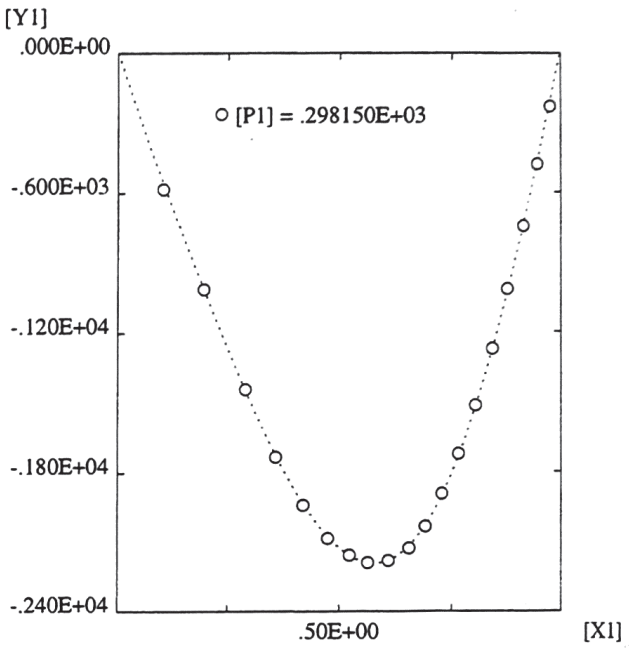


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.007**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_9H_{18}O_2$, Methyl octanoate

[P1] = .298150E+03

[X1]	[Y1]
.104300E+00	−.583300E+03
.195700E+00	−.101260E+04
.291300E+00	−.144160E+04
.360000E+00	−.173120E+04
.421100E+00	−.193870E+04
.476100E+00	−.208450E+04
.523600E+00	−.215410E+04
.565500E+00	−.218970E+04
.610300E+00	−.217980E+04
.654800E+00	−.212610E+04
.691200E+00	−.203180E+04
.728600E+00	−.189290E+04
.766600E+00	−.171950E+04
.804900E+00	−.151230E+04
.843200E+00	−.127160E+04
.878100E+00	−.101700E+04
.913800E+00	−.744700E+03
.946500E+00	−.477300E+03
.975200E+00	−.228300E+03

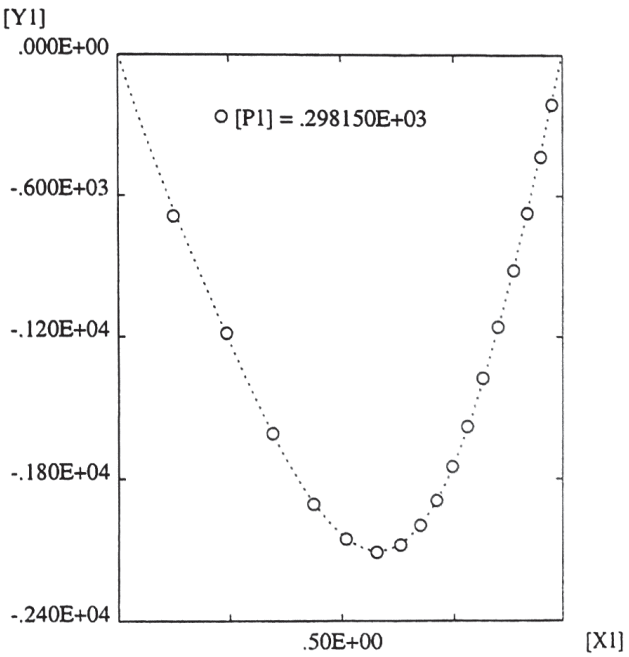


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.008**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{10}H_{20}O_2$, Methyl nonanoate

[P1] = .298150E+03

[X1]	[Y1]
.126500E+00	−.684400E+03
.245000E+00	−.118220E+04
.347400E+00	−.160790E+04
.438300E+00	−.190470E+04
.510900E+00	−.204940E+04
.576600E+00	−.210670E+04
.630900E+00	−.207890E+04
.674500E+00	−.199230E+04
.710000E+00	−.188890E+04
.746000E+00	−.174350E+04
.779800E+00	−.157550E+04
.816200E+00	−.137380E+04
.851300E+00	−.115510E+04
.886000E+00	−.915700E+03
.918700E+00	−.670900E+03
.949100E+00	−.429300E+03
.976200E+00	−.207600E+03

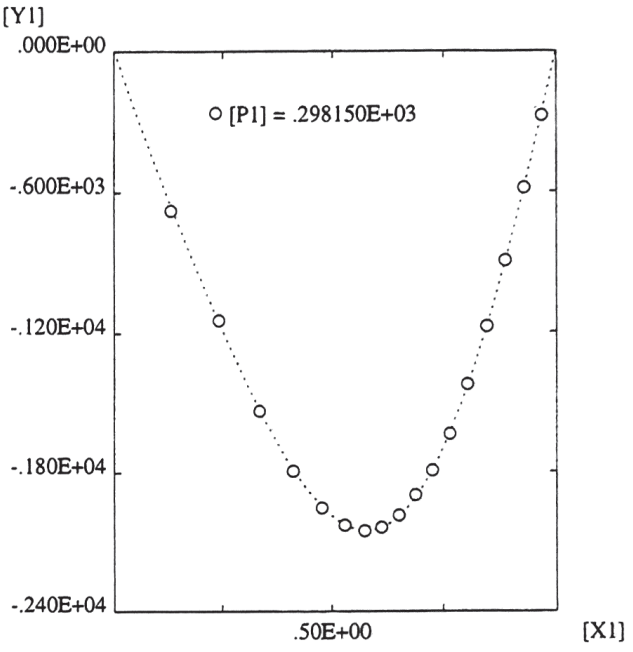


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.009**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{11}H_{22}O_2$, Methyl decanoate

[P1] = .298150E+03

[X1]	[Y1]
.131900E+00	-.675100E+03
.243700E+00	-.114600E+04
.336300E+00	-.153330E+04
.413100E+00	-.179240E+04
.478900E+00	-.195120E+04
.530600E+00	-.202620E+04
.575700E+00	-.205160E+04
.612600E+00	-.203520E+04
.652400E+00	-.198440E+04
.689600E+00	-.189850E+04
.726700E+00	-.179240E+04
.765800E+00	-.163780E+04
.806200E+00	-.142500E+04
.847400E+00	-.117410E+04
.888700E+00	-.891500E+03
.929300E+00	-.583500E+03
.968700E+00	-.273400E+03

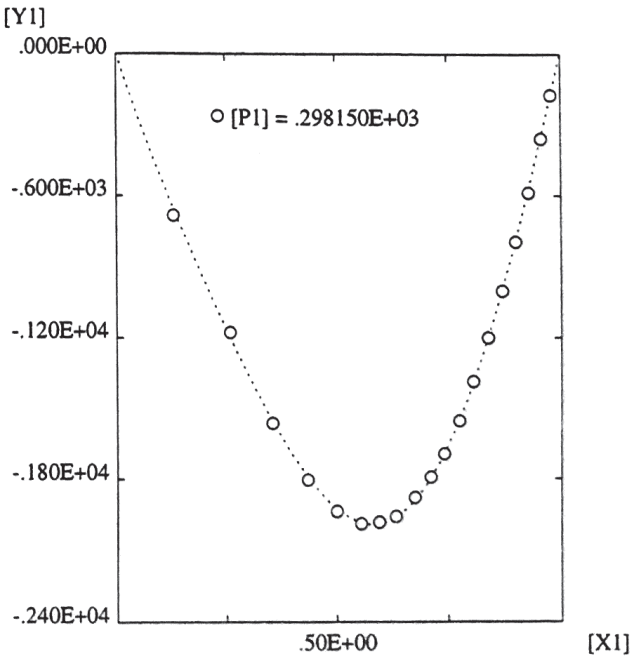


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.010**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{12}H_{24}O_2$, Methyl undecanoate

[P1] = .298150E+03

[X1]	[Y1]
.132800E+00	-.682400E+03
.259600E+00	-.117330E+04
.354800E+00	-.156120E+04
.435700E+00	-.180070E+04
.501500E+00	-.193250E+04
.555800E+00	-.198560E+04
.596000E+00	-.197830E+04
.634300E+00	-.195410E+04
.675200E+00	-.187590E+04
.712200E+00	-.179030E+04
.742100E+00	-.169110E+04
.775200E+00	-.155140E+04
.807500E+00	-.138600E+04
.839600E+00	-.119910E+04
.870500E+00	-.100010E+04
.900500E+00	-.793700E+03
.928300E+00	-.585400E+03
.956600E+00	-.355400E+03
.979400E+00	-.173800E+03

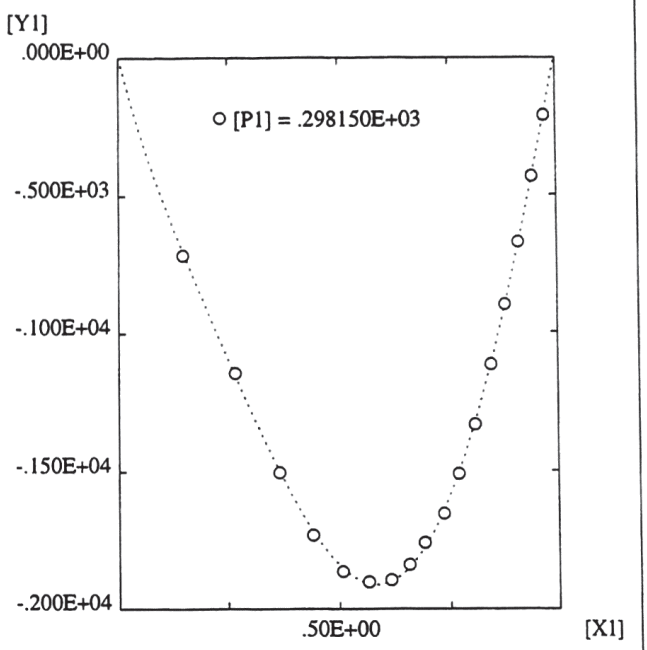


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.011**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{13}H_{26}O_2$, Methyl dodecanoate

[P1] = .298150E+03

[X1]	[Y1]
.147000E+00	−.715100E+03
.268500E+00	−.114490E+04
.366400E+00	−.150260E+04
.441200E+00	−.173130E+04
.508300E+00	−.186370E+04
.566900E+00	−.190120E+04
.617100E+00	−.189320E+04
.658000E+00	−.183810E+04
.692700E+00	−.175930E+04
.736100E+00	−.165320E+04
.771800E+00	−.150770E+04
.808700E+00	−.133190E+04
.846500E+00	−.111520E+04
.878800E+00	−.899700E+03
.912100E+00	−.670200E+03
.944100E+00	−.432000E+03
.973800E+00	−.209400E+03

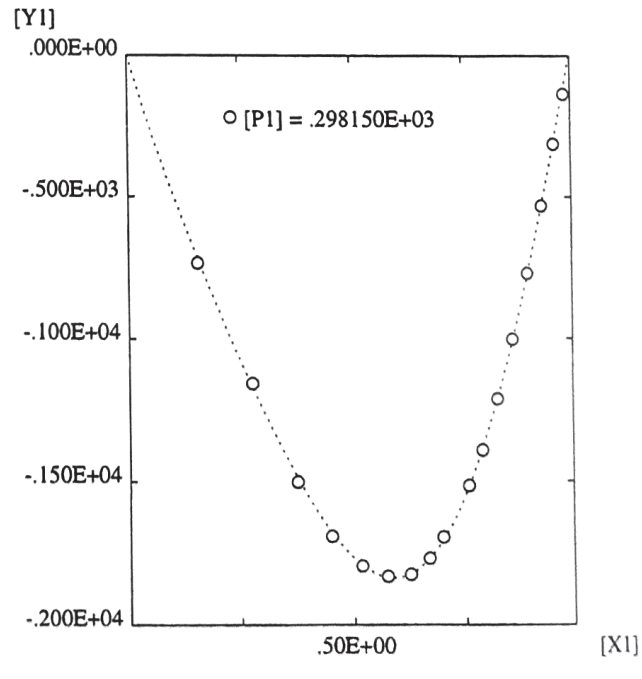


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.012**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{14}H_{28}O_2$, Methyl tridecanoate

[P1] = .298150E+03

[X1]	[Y1]
.155200E+00	−.730100E+03
.277700E+00	−.115260E+04
.376300E+00	−.149970E+04
.451400E+00	−.168840E+04
.518100E+00	−.179020E+04
.573500E+00	−.182790E+04
.625700E+00	−.182060E+04
.667500E+00	−.176550E+04
.699700E+00	−.169060E+04
.759300E+00	−.151420E+04
.789400E+00	−.139060E+04
.824900E+00	−.121180E+04
.860700E+00	−.100030E+04
.896100E+00	−.769100E+03
.930100E+00	−.531000E+03
.960600E+00	−.310400E+03
.984600E+00	−.133700E+03

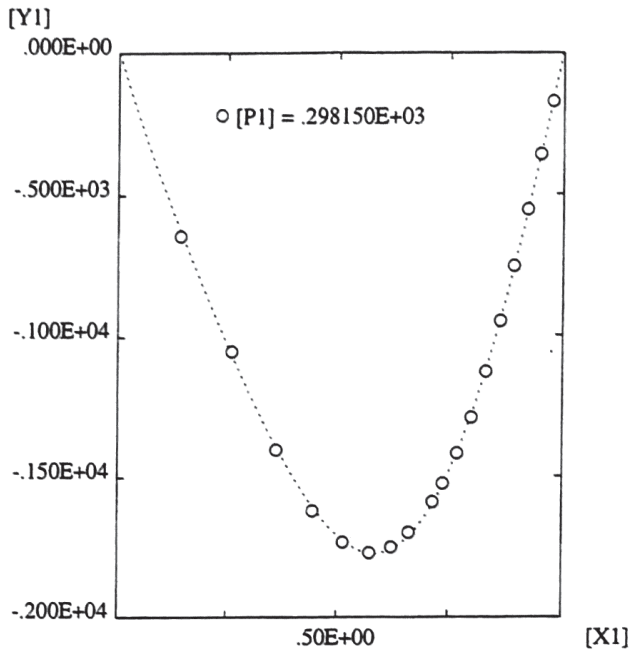


Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.013**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
Pure component 1, liquid
Pure component 2, liquid
Parameters: [P1] T/K, Temperature
Variables: [X1] x_1/-, Mole fraction of component 1
[Y1] H^E/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{15}H_{30}O_2$, Methyl tetradecanoate

[P1] = .298150E+03

[X1]	[Y1]
.143100E+00	−.643700E+03
.262300E+00	−.105060E+04
.363600E+00	−.140030E+04
.446800E+00	−.161990E+04
.515500E+00	−.173180E+04
.576400E+00	−.176990E+04
.623800E+00	−.174770E+04
.663600E+00	−.169740E+04
.717000E+00	−.158960E+04
.739000E+00	−.152460E+04
.769900E+00	−.141640E+04
.801500E+00	−.128850E+04
.831800E+00	−.112690E+04
.863200E+00	−.946900E+03
.893500E+00	−.754300E+03
.923100E+00	−.554700E+03
.950900E+00	−.358300E+03
.977100E+00	−.171200E+03



Property Code: [HMSD1000] HEAT OF MIXING AND SOLUTION **ORTJ0961.014**
State: Two-component system, single-phase liquid or two-phase liquid-liquid (LL)
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/J mol^{-1}, Molar excess enthalpy
Method: Direct low-pressure calorimetric measurement of H^E at variable x_1 and constant T

Components: **1. $CHCl_3$, Trichloromethane**
2. $C_{16}H_{32}O_2$, Methyl pentadecanoate

[P1] = .298150E+03

[X1]	[Y1]
.169200E+00	−.714500E+03
.298400E+00	−.111640E+04
.409600E+00	−.145850E+04
.487200E+00	−.162990E+04
.542300E+00	−.168380E+04
.592500E+00	−.169370E+04
.633100E+00	−.166730E+04
.667300E+00	−.162340E+04
.694100E+00	−.157510E+04
.729500E+00	−.148720E+04
.774900E+00	−.135650E+04
.807700E+00	−.121970E+04
.839200E+00	−.105720E+04
.872600E+00	−.862000E+03
.905000E+00	−.667500E+03
.936900E+00	−.459400E+03
.964900E+00	−.263400E+03
.985500E+00	−.113500E+03