[illegible], 2013, [illegible] 8, [illegible] 1

[illegible] 544.344.016:544.344.2

[illegible]

[illegible]
[illegible]
[illegible] 119571 [illegible]
e-mail: raevalentina1@gmail.com

[illegible]

[illegible] $L(x)$ [illegible] [1]. [illegible] [2–4]. [illegible] (1).

[illegible] $L(x,T)$ [illegible] [8, 9]. [illegible] [8, 10]. [illegible]:

$$L = \bar{L}_1 x_1 + \bar{L}_2 x_2 , \qquad (1)$$

[illegible] $\bar{L}_i = L_i^0 + \bar{L}_i^E = L_i^0 - \bar{h}_i^E$.

[illegible] L_i^0 [illegible] $\Delta h^E(x)$:

$$L = (L_1^0 x_1 + L_2^0 x_2) - \Delta h^E = L^{aH} - \Delta h^E , \qquad (2)$$

[illegible] $\Delta h^E = \bar{h}_1^E x_1 + \bar{h}_2^E x_2$ [illegible].

[illegible] $\Delta h^E(x,T)$ [illegible] $L(x,T)$ [illegible].

[illegible] $\Delta h^E(x,T)$ [illegible] $L_i^0(T)$. [illegible] $\Delta h^E(x,T)$ [illegible] [11–14]. [illegible]:

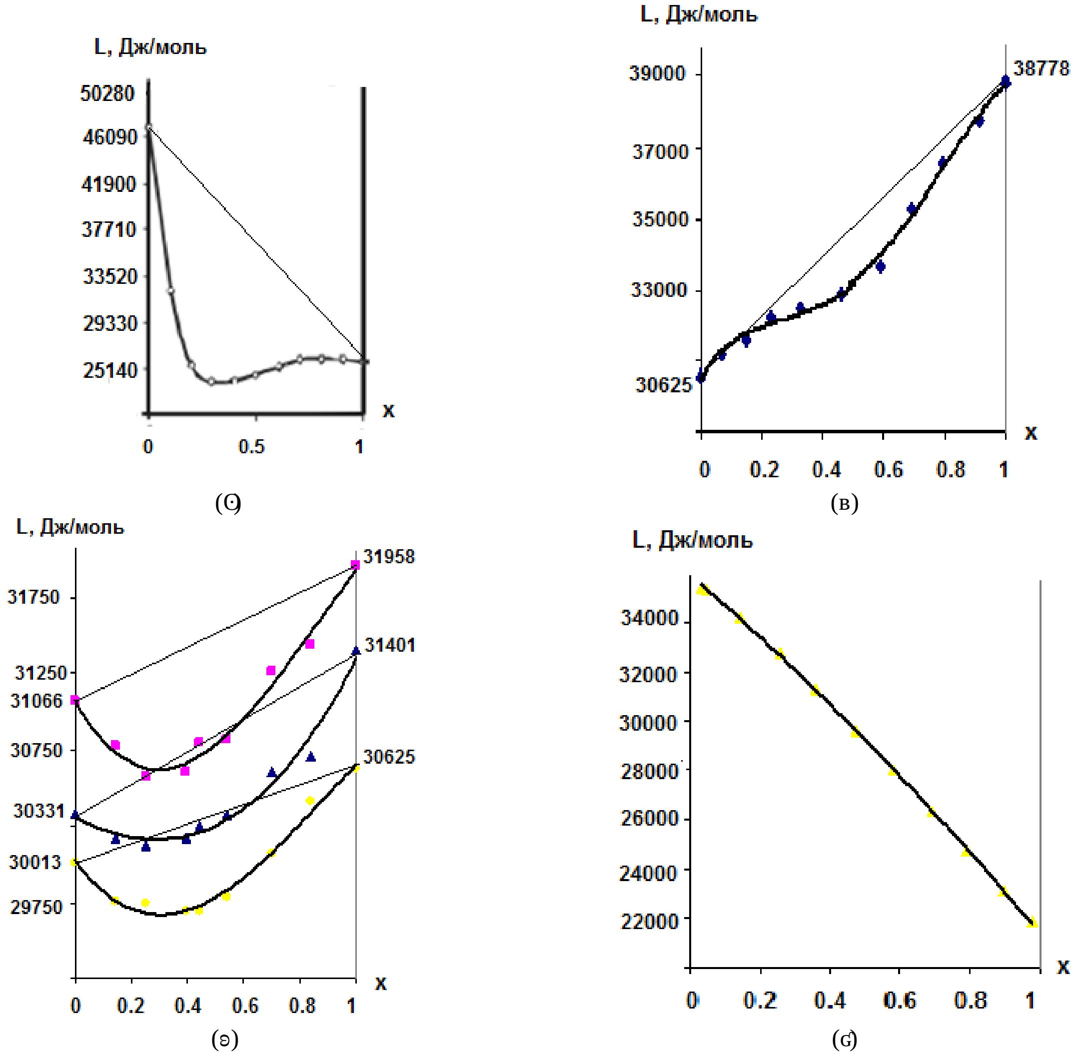
$$1)\ \left(\partial \Delta h^E(x) / \partial T\right)_P > 0 ;$$

$$2)\ \left(\partial \Delta h^E(x) / \partial T\right)_P < 0 ;$$

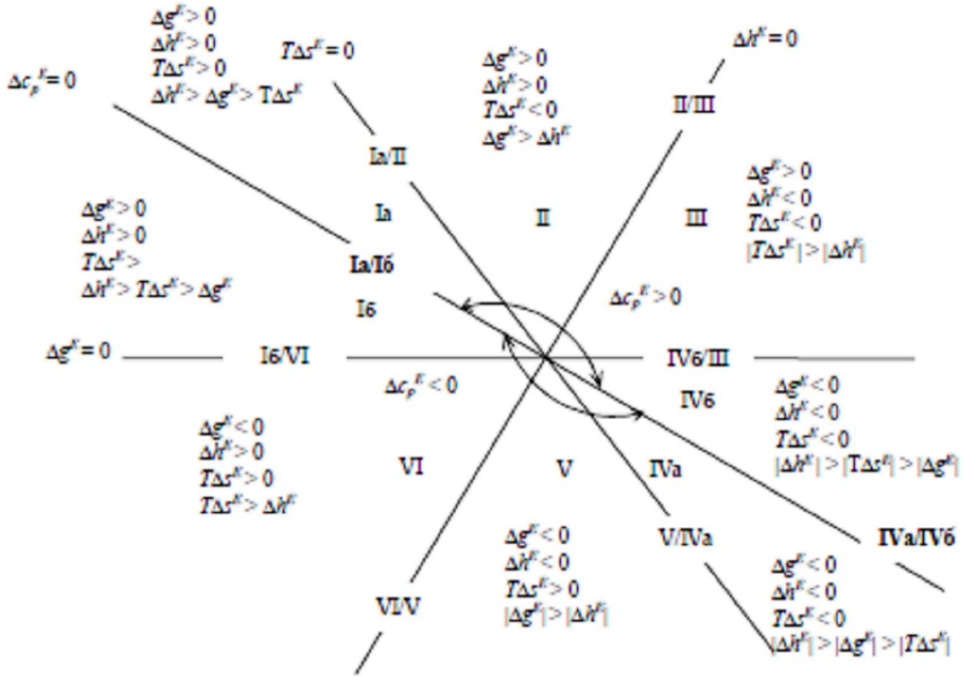
$$3)\ \left(\partial \Delta h^E(x) / \partial T\right)_P = 0 .$$

[illegible] $\left(\partial \Delta h^E / \partial T\right)_{P,x} = \Delta c_P^E$. [illegible] 0 [illegible] 1 [illegible] $\Delta c_P^E(x) > = < 0$ [illegible] $\Delta c_P^E(x) < = > 0$, [illegible] $\Delta c_P^E(x)$ [14, 15]. [illegible] 1) [illegible] 2).

[illegible] [14], [illegible] $\Delta h^E(x)$ [illegible] $\Delta c_P^E(x)$ ([illegible] 2)

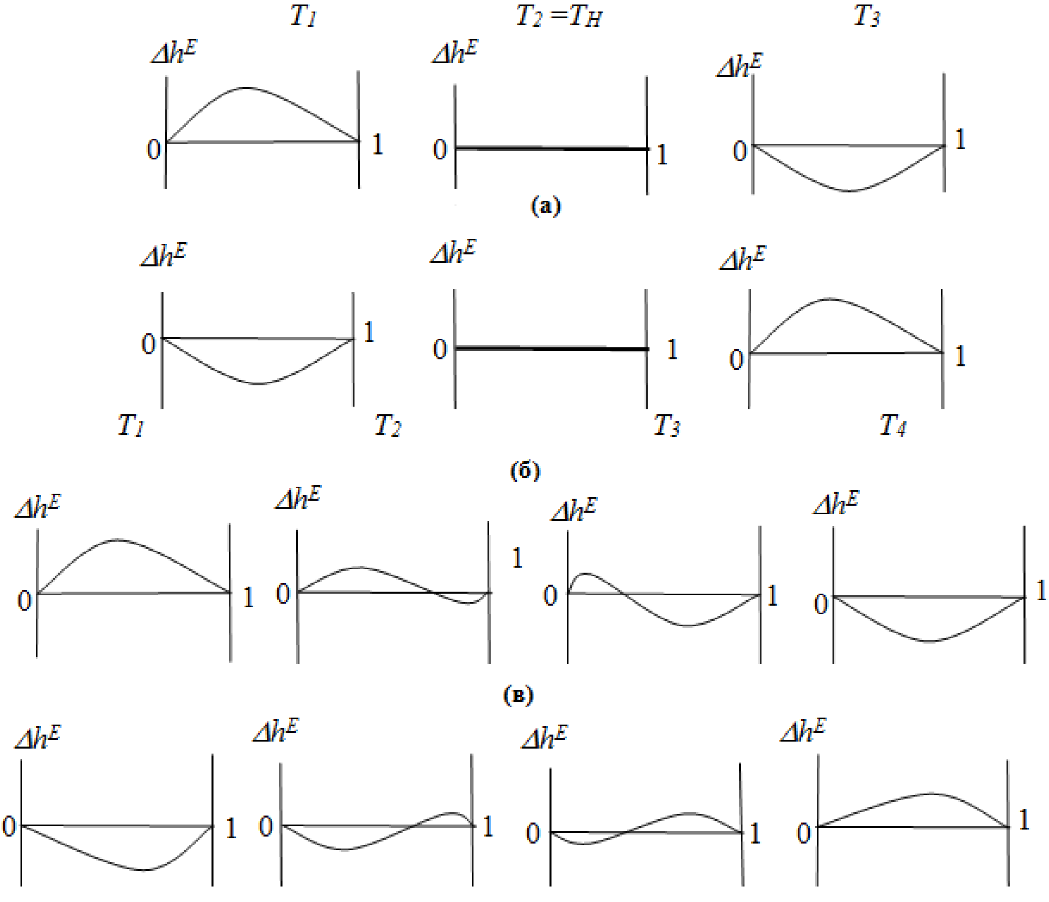


ţ ɕfiŋ 1. ʢ ʢfiʃj teʃdʒ daʘdz dʑ j ʟʘɕfiŋdʒ fiĥʃ ŀsj ʃdas ɕfiʃʘɕj dʑʃ ʷ вʃdʘdz (x) fiŋj fiɉ:
ʘ) HF (x) ï BrF₃ (1-x) [5]; в) ⁴ ŀsʘdsdz(x) ï вj dʑsdz(1-x), 760 dʒdʒtds. fiŀs. [6];
ɘ) вj dʑsdz(x) ï ɥʃʢdsɕj ʢfiʘdz(1-x) ʃteʃ ï ï ï 380, ʑ ʑ ʑ 570 ɕʃ ♦♦♦ 760 dʒdʒtds. fiŀs. [6];
ɞ) ʘɥj ŀsdsʃŀseʃdz(x) ï вj dʑsdz(1-x) ʃteʃ 298.15 ş [7].



ţ ɕfiŋ 2. ʉ tstsŀsdsʰ j dʑʃʷ ʟdʑʃtsɘ ɕʃ ɘj dʑʃɥʃdʑʃʟʙʳ ŀsʉɥdʑ x ŀsj tedʒsнʃdʘdʒʃɥj fiʃɕʃ ʬ ŀzdʑɥʃɉ.
вʃdʘdz x teʘfiʃstsetsɘ ʃteʃ ʃtsfiŀsʷdzds ŀsj dʒʃj teʘŀsdzteʃ [14ï16].

[illegible] $\Delta h^E(x)$, [illegible] ([illegible] 3[illegible]), [illegible] «[illegible]» [illegible] [illegible] ([illegible] 3 [illegible]). [illegible] $\Delta h^E(x) = 0$ (T_H) [illegible].



[illegible] 3. [illegible] : [illegible], в) [illegible] а), г) [illegible]. $T_1 < T_2 < T_3 < T_4$

[illegible] [3]. [illegible] $\Delta L_i^0(T) = L_1^0(T) - L_2^0(T)$ [illegible]:

1) $\left(\partial \Delta L_i^0 / \partial T\right)_P > 0$;

2) $\left(\partial \Delta L_i^0 / \partial T\right)_P < 0$; [illegible] ([illegible]):

3) $\left(\partial \Delta L_i^0 / \partial T\right)_P < 0; = 0; > 0$;

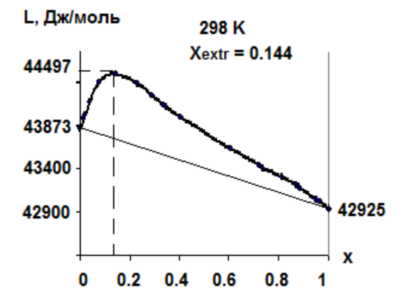
4) $\left(\partial \Delta L_i^0 / \partial T\right)_P > 0; = 0; < 0$. [illegible] $\left(\partial \Delta L_i^0 / \partial T\right)_P = 0$ [illegible] $L_i^0 = const$ [2]. [illegible] $L_1^0(T) = L_2^0(T)$ [illegible].

[illegible] ΔL_i^0 [illegible] $\Delta h^E(x)$. [illegible] T_H (№ 3, 7, 15, 27, 31) [illegible] T_L (№ 37-48). [illegible] (№ 39, 43).

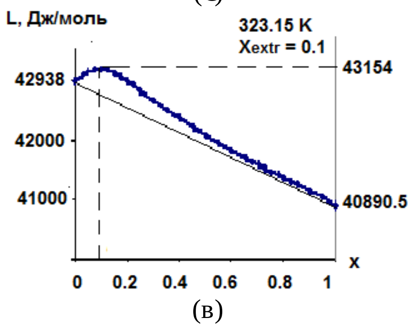
Ȿ tsʟdʒsʏ dƶ ј ƒɿsʉј lsʘdƶʕʷ ɘј dƶʕʉʕdƶ ΔL_i^0 ʕ $\Delta h^E(x)$ ʙʕdƶʘdƶ ͞ ƒɋʕƒɦј dʒ ʕʃtɕʕ ʕʃtsƒɦs ʷ dƶdƶsdʒʜʘdɉ dƶʕʕ

¯	$\Delta L_i^o(T)$	$\Delta h^E(x)$	$\Delta C_p^E(x)$	ʂ dʘƒɦ tɕʘƒɦsɘtstɕʘ	¯	$\Delta L_i^o(T)$	$\Delta h^E(x)$	$\Delta C_p^E(x)$	ʂ dʘƒɦtɕʘƒɦsɘtstɕʘ
1	const	>0	>0	Ia, II	25	< 0	> 0	>0	Ia, II
2		< 0		III, IVв	26		< 0		III, IVв
3		=0		II/III	27		=0		II/III
4		< = > 0		II ї III	28		< = > 0		II ї III
5	const	>0	<0	Iв, VI	29	<0	> 0	<0	Iв, VI
6		< 0		V, IVa	30		< 0		V, IVa
7		=0		V/VI	31		=0		V/VI
8		> = < 0		V ї VI	32		> = < 0		V ї VI
9	const	>0	0	Ia /Iв	33	<0	>0	0	Ia /Iв
10		<0	0	IVa ї IVв	34		<0	0	IVa /IVв
11		>0	< = > 0	Ia ї Iв	35		>0	< = > 0	Ia ї Iв
12		<0	< = > 0	IVa ї IVв	36		<0	< = > 0	IVa ї IVв
13	> 0	> 0	>0	Ia, II	37	< = > 0	> 0	>0	Ia, II
14		< 0		III, IVв	38		<0		III, IVв
15		=0		II/III	39		=0		II/III
16		< = > 0		II ї III	40		< = > 0		II ї III
17	> 0	>0	<0	Iв, VI	41	< = > 0	>0	<0	Iв, VI
18		< 0		V, IVa	42		< 0		V, IVa
19		=0		V/VI	43		=0		V/VI
20		> = < 0		V ї VI	44		> = < 0		V ї VI
21	>0	>0	0	Ia /Iв	45	< = > 0	>0	0	Ia /Iв
22		<0	0	IVa ї IVв	46		< 0	0	IVa /IVв
23		>0	< = > 0	Ia ї Iв	47		>0	< = > 0	Ia ї Iв
24		<0	< = > 0	IVa ї IVв	48		< 0	< = > 0	IVa ї IVв

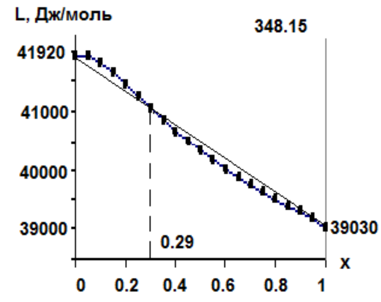
Ȿ ƒɋƶʉɵ «ɢʕʙtɕʕʜdƶ ͞» ʟɵʕƒɋʕdʒsƒɦј ʔ $\Delta h^E(x)$ (¯ 4, 8, 16, 20, 28, 32, 40, 44) ƶƒɋsɘʕј ʘsј tɕdʒʕʉј ƒɦʂtsɢʦs tɕʘƒɦsɘtstɕʘ $\Delta h^E = 0$ tɕј ʘdƶʕʟƶј lsƒɿ ʕʃtɕʕ ј ʜʕdƶƒɦsɘј dƶdƶsdʒ ƒɿsƒɦʘɵј, ʜdƶ ʕtslststɕsɢʦs, ƒɿsɕdʘƒɋƶs (2), $L = L^{ан}$ (tɕʕƒɦ 4ɘ-ʜ).



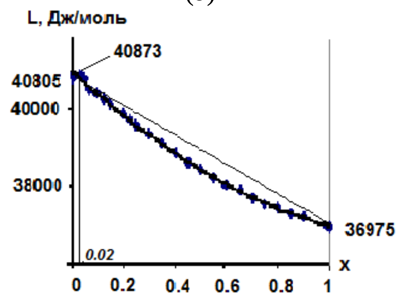
(ʘ)

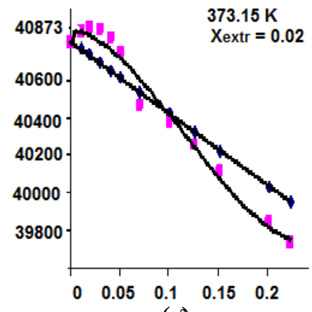


(ʙ)



(ɘ)





(ɢ)

ʈ ʕƒɦ 4. ʀ dƶј ɢtɕʘdƶ dƶ ј lsј ʕʃdƶsʟ ʕƒɦʃʘј dƶʕʷ ƒɋʒј ƒɋʕ ʵlsʘdƶsdƶ(͞) ї ɘtsʜʘ(1-͞):

ʘ) 298 ʂ ; ʙ) 323.15 ʂ ; ɘ) 348.15 ʂ ; ɢ) 373.15 ʂ .

ɼ ʘdƶʕ ј $\Delta h^E(x)$ ʕʟ ʙʘʟʳ ʜʘdƶʕ ͞ Aspen Tech.

[illegible] $L(x)$ [illegible] $L(x,T)$ [illegible] $\Delta h^{E}(x)$ [illegible] (2). [illegible] Microsoft Exsel, [illegible] $L_i^0(T)$ [illegible] $t = const$ [illegible] ChemCad.

[illegible] $L(x,T)$ [illegible] ΔL_i^0 [illegible] $\Delta h^E(x)$. [illegible] $L(x,T)$ [illegible] (рис. 5). [illegible] $L(x,T)$ [illegible] (рис. 4).

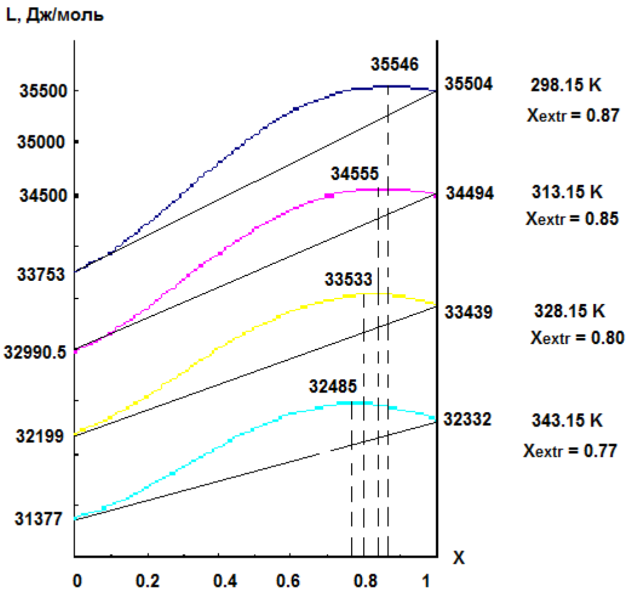


Рис. 5. [illegible] (1) [illegible] (1-2).

[illegible] $\Delta h^E(x)$ [illegible] [12].

[illegible] [8]:

$$\frac{dx_1^{Az}}{dT} = \frac{x_1 x_2}{1-\frac{\partial y_1}{\partial x_1}}\left[\frac{\bar{L}_1 - \bar{L}_2}{RT^2}\right]. \qquad (3)$$

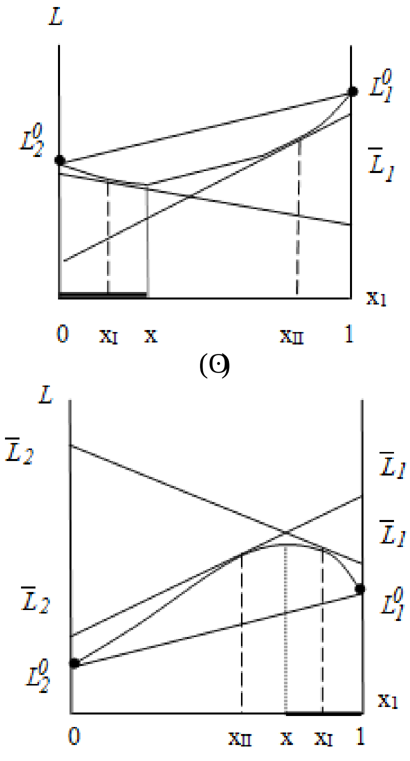
[illegible] (1) [illegible]

[illegible] (3) [illegible]

[illegible] $\bar{L}_1 - \bar{L}_2$ [illegible] ΔL_i^0 [illegible] ($L = L^{ан}$) [illegible] [16]. [illegible]

$$\frac{dx_1^{Az}}{dT} = x_1 x_2 \frac{L_1^0 - L_2^0}{RT^2}. \qquad (4)$$

[illegible] $L(x)$ [illegible] (рис. 6: [illegible] $0 < x_I < x$ (рис. 6а) [illegible] $x < x_I < 1$ (рис. 6в), [illegible] $\Delta \bar{L}_i$ [illegible] ΔL_i^0 [illegible] x_{II} [illegible] (3) [illegible]



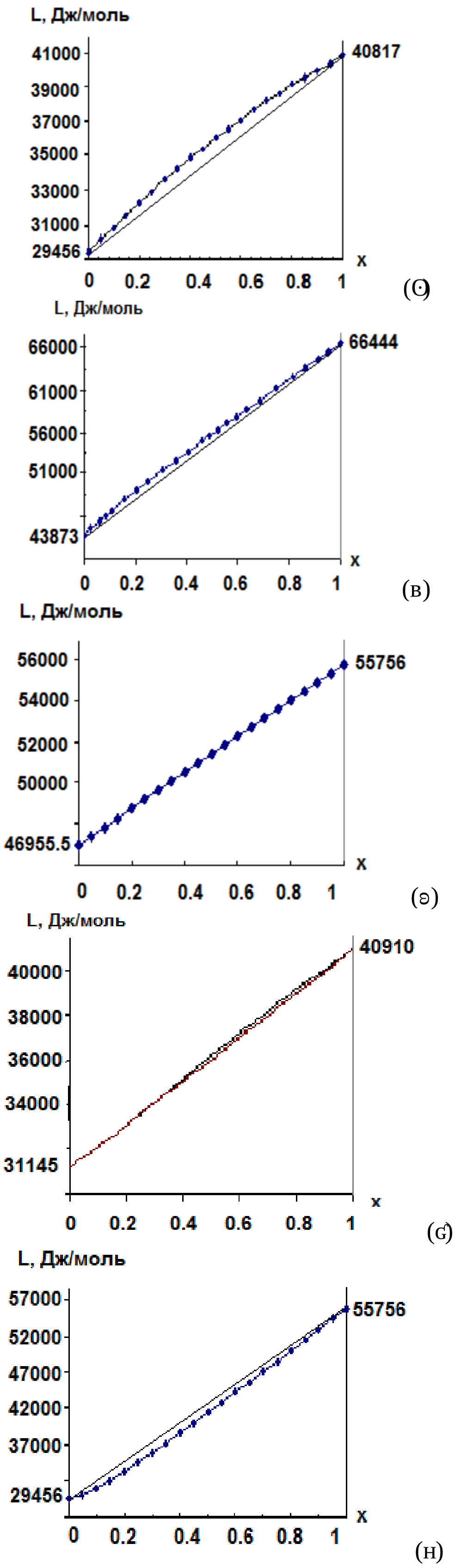
(в)

Рис. 6. [illegible] $\Delta h^E(x) > 0$; в) [illegible] $\Delta h^E(x) < 0$.

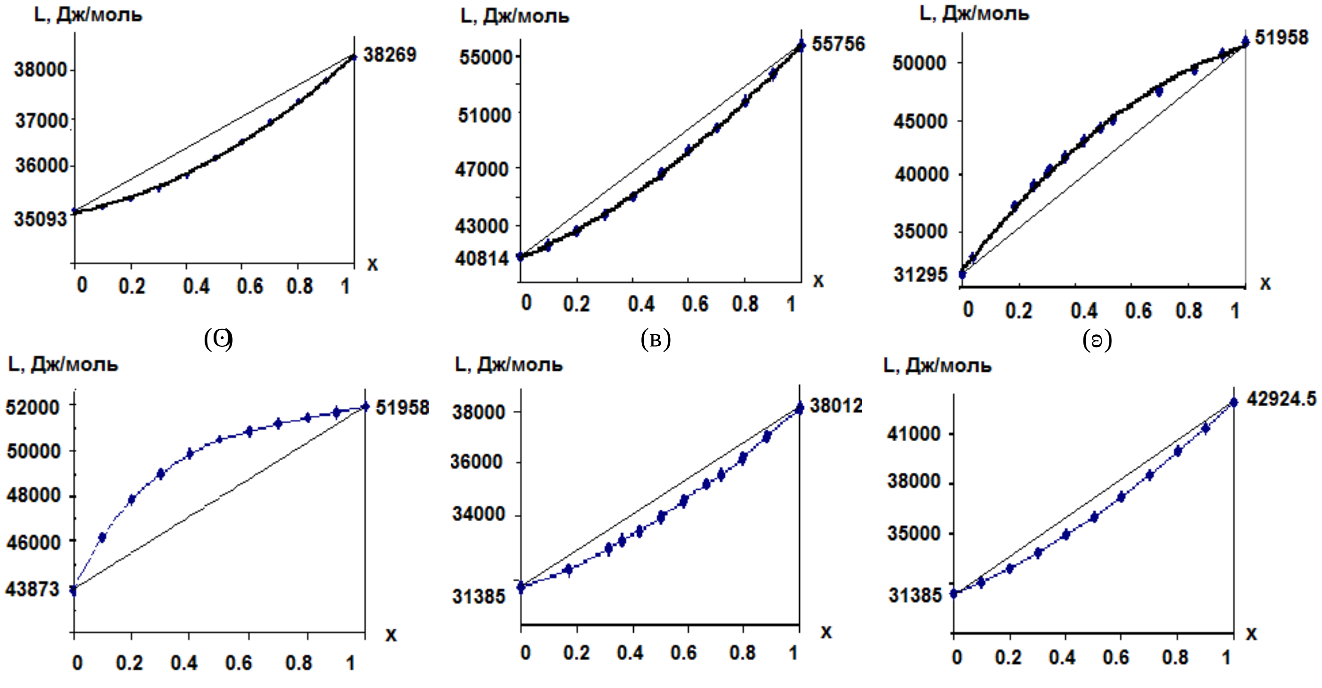
$L = L^{aH}$ ... $x^{Az}(T)$ ... $\Delta h^E(x) \neq 0$ ... [9, 16] ... $L = L^{aH}$ ... (3) ... L_D ... $L(x)$ ... P=const ... T_D =const.

$$Q = D(R+1)L_D, \qquad (5)$$

D ... R ... L_D ... T_D. ... $L_D \approx L_i^0$ ... Q ... Δh^E ... (2), $L \approx L^{ad}$ ... 7. ... Δh^E ... L ... 8. ... [4] ... $\Delta h^E(x,T)$ ... $L(x,T)$ ...



7. ... 298.15 ... :
a) ... (1-...) [17]; ... (1-...) [12]; ... (1-...) [18]; ... (1-...) [12]; ... 2-... (1-...) [17].



[illegible] 8. [illegible] $L(x)$ [illegible] 298.15 [illegible]:
[illegible] (1) – [illegible] (1-[illegible]) [19]; [illegible] 2-[illegible] (1) – [illegible] (1-[illegible]) [17];
[illegible] (1) – [illegible] (1-[illegible]) [12]; [illegible] (1) – [illegible] (1-[illegible]) [12];
[illegible] (1) – [illegible] (1-[illegible]) [12]; [illegible] (1) – [illegible] (1-[illegible]) [12].

[illegible] $L(x)$ [illegible]

[illegible] (11-03-00295).

[illegible]

L – [illegible]; T – [illegible], [illegible]; T_H – [illegible]; T_L – [illegible]; [illegible]; Δh^E – [illegible]; $\bar{h}_i^E$ – [illegible]; $\bar{L}_i^E$ – [illegible].

[illegible]

[illegible] – [illegible] *Az* – [illegible]; *D* – [illegible]; *i, 1, 2* – [illegible]; *0* – [illegible]

[illegible]:

1. [illegible] // [illegible]. 2011. [illegible]. 45. № 6. [illegible]. 634–640.

2. [illegible]: [illegible], 1982. 592 [illegible]

3. [illegible]: [illegible], 1975. 583 [illegible]

4. [illegible], 2011. 28 [illegible]

5. [illegible] UF6, BrF$_3$, IF$_5$ [illegible] HF // [illegible] 2003. [illegible] 306. [illegible] 6. [illegible] 8–11.

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8. [illegible], 1989. 344 [illegible]

9. [illegible] 1996. [illegible] 30. [illegible] 1. [illegible] 27–33.

10. [illegible], 1953. 336 [illegible]

11. [illegible], 1970. 320 [illegible]

12. [illegible], 1981. 264 [illegible]

13. [illegible], 1983. 266 [illegible]

14. [illegible] 1996. [illegible] 30. [illegible] 6. [illegible] 611–617.

15. [illegible] 2009. [illegible] 4. [illegible] 4. [illegible] 31–39.

16. [illegible], 1998. 168 [illegible]

17. Acevedo In. L., Pedrosa G. C., Katz M. Excess molar enthalpies for the propan-2-ol + methylacetate + dichloromethane system at 298.15 K // Physics & Chemistry of Liquids. 1996. V. 32. [illegible] 1. [illegible] 29–36.

18. Bhuiyan M.M.H., Tamura K. Excess molar enthalpies of ternary mixtures of (methanol, ethanol + 2-propanol + 1,4-dioxane) at T = 298.15 K // J. Chem. Thermodynamics. 2004. V. 36. [illegible] 7. [illegible] 549–554.

19. Cardelli C., Conti G., Gianni P. Excess molar enthalpies of the ternary systems (acetonitrile + methyl isobutyrate + toluene) and (propionitrile + methyl isobutyrate + ethylbenzene) at 298.15 [illegible] // J. Thermal Analysis & Calorimetry. 2000. V. 61. [illegible] 2. [illegible] 377–388.

VAPORIZATION HEAT OF BINARY MIXTURES

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The concentration dependences of integral vaporization heats of binary mixtures were calculated for atmospheric pressure with the use of experimental data. The character of changes of these dependencies under the influence of varying temperature was analyzed.

***Key words:** binary mixture, azeotrope, heat of mixing, heat of vaporization of a substance, integral molar latent heat of vaporization, energy consumption for separation.*