COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Potassium propanoate (potassium propionate); $(C_3H_5O_2)K$; [327-62-8] (2) Lithium propanoate (lithium propionate); $(C_3H_5O_2)Li$; [6531-45-9]	Sokolov, N.M.; Tsindrik, N.M. **Zh. Neorg. Khim.** 1969, 14, 584-590 (*); Russ. J. Inorg. Chem. (Engl. Transl.) 1969, 14, 302-306.
VARIABLES:	PREPARED BY:
Temperature.	Baldini, P.

EXPERIMENTAL VALUES:

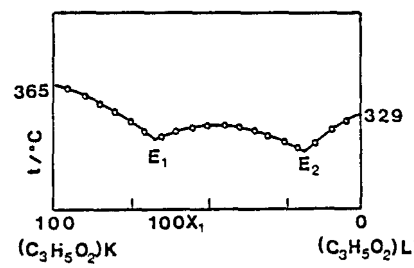
The results are reported only in graphical form (see figure).

Characteristic point(s):

Eutectic, E_1, at 291 °C (authors) and $100x_1 = 67.5$ (according to Fig. 1 of the original paper; erroneously reported as 19 in the text; compiler).
Eutectic, E_2, at 279 °C (authors) and $100x_1 = 19$ (according to Fig. 1 of the original paper; erroneously reported as 67.5 in the text; compiler).

Intermediate compound(s):

$(C_3H_5O_2)_2KLi$ (probable composition), congruently melting (authors).



AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Visual polythermal analysis.

NOTE:

The fusion temperature of component 2 is about 5 K lower than that listed in Preface, Table 1 (606.8±0.5 K), whereas $T_{fus}(1)$ meets satisfactorily the value (638.3±0.5 K) given in the table. The general features of the diagram should be considered with some confidence.

SOURCE AND PURITY OF MATERIALS:

Materials prepared by reacting "chemically pure" carbonates with propanoic acid of analytical purity (Ref. 1).
Component 1 undergoes a phase transition at $t_{trs}(1)/^oC = 68$ (Ref. 2) and melts at $t_{fus}(1)/^oC = 365$.
Component 2 undergoes a phase transition at $t_{trs}(2)/^oC = 265$ and melts at $t_{fus}(2)/^oC = 329$.

ESTIMATED ERROR:

Temperature: accuracy probably ±2 K (compiler).

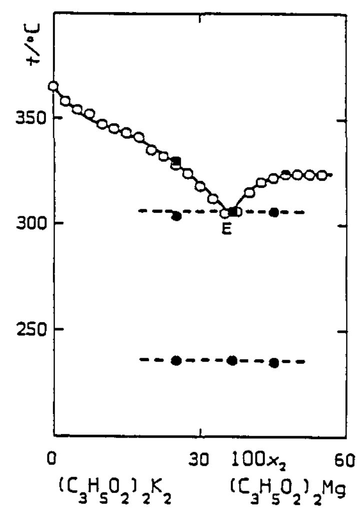
REFERENCES:

(1) Sokolov, N.M.
Zh. Obshch. Khim. 1954, 24, 1581-1593 (this is Ref. 2 in the original paper, not Ref.3 as quoted by the authors).
(2) Sokolov, N.M.
Tezisy Dokl. X Nauch. Konf. S.M.I. 1956.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Potassium propanoate (potassium propionate); $(C_3H_5O_2)_2K_2$; [327-62-8] (2) Magnesium propanoate (magnesium propionate); $(C_3H_5O_2)_2Mg$; [557-27-7]	Pochtakova, E.I. **Zh. Obshch. Khim.** 1974, 44, 241-248.
VARIABLES:	PREPARED BY:
Temperature.	Baldini, P.

EXPERIMENTAL VALUES:

t/°C	T/K[a]	$100x_2$	t/°C	T/K[a]	$100x_2$
365	638	0	312	585	32.5
358	631	2.5	305	578	35
354	627	5	306[bc]	579	36.5
352	625	7.5	306[bd]	579	36.5
347	620	10	236[be]	509	36.5
345	618	12.5	306	579	37.5
343	616	15	315	588	40
341	614	17.5	320	593	42.5
335	608	20	322	595	45
332	605	22.5	322[bc]	595	45
328	601	25	306[bd]	579	45
330[bc]	603	25	235[be]	508	45
304[bd]	577	25	324	597	47.5
236[be]	509	25	324	597	50
324	597	27.5	324	597	52.5
318	591	30	324	597	55



[a] T/K values calculated by the compiler.
[b] Differential thermal analysis (DTA).
[c] Initial crystallization.
[d] Eutectic stop.
[e] First transition of the system.

Characteristic point(s): Eutectic, E, at 306 °C (DTA), and $100x_2$= 36.5 (author).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Visual polythermal analysis, supplemented with differential thermal analysis.

REFERENCES:

(1) Sokolov, N.M. **Zh. Obshch. Khim.** 1954, 24, 1581-1593.
(2) Sokolov, N.M. **Tezisy Dokl. X Nauch. Konf. S.M.I.** 1956.
(3) Sanesi, M.; Cingolani, A.; Tonelli, P.L.; Franzosini, P.; **Thermal Properties**, in Thermodynamic and Transport Properties of Organic Salts, IUPAC Chemical Data Series No.28 (Franzosini, P.; Sanesi, M.; Editors), Pergamon Press, Oxford, 1980, 29-115.

ESTIMATED ERROR:

Temperature: accuracy probably ±2 K (compiler).

SOURCE AND PURITY OF MATERIALS:

Materials prepared (Ref. 1) by reacting the proper ("chemically pure") carbonate with a slight excess of propanoic acid of analytical purity. Component 1 undergoes phase transitions at $t_{trs}(1)$/°C= 68, 330 (Ref. 2). Component 2 undergoes phase transitions at $t_{trs}(2)$/°C= 185, 200, 217, 246.

NOTES:

The system was investigated at $0 \le 100x_2 \le 55$ due to thermal instability of component 2.
The fusion temperature of component 1 is in fair agreement with that listed in Preface, Table 1, whereas discrepancies exist for the solid state transition temperatures of the same component. Moreover, it is worth mentioning that Pochtakova's paper is the only source of information (see Ref. 3) for what concerns the solid state transitions of magnesium propanoate.

COMPONENTS:	EVALUATOR:
(1) Potassium propanoate (potassium propionate); $(C_3H_5O_2)K$; [327-62-8] (2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)Na$; [137-40-6]	Franzosini, P., Dipartimento di Chimica Fisica, Universita' di Pavia (ITALY).

CRITICAL EVALUATION:

This binary was studied by visual polythermal analysis in Sokolov's laboratory as a side system of two reciprocal ternaries [i.e., K, $Na/C_2H_3O_2$, $C_3H_5O_2$ (Ref. 1), and K, $Na/C_3H_5O_2$, NO_3 (Ref. 2)] with almost identical results.

The occurrence of eutectics at 583-585 K (310-312 ^oC) and $100x_1$= 66, and at 560-561 K (287-288 ^oC) and $100x_1$= 8 is to be held for certain, as well as the existence of a congruently melting intermediate compound. However, the composition of the latter as claimed by the authors [i.e., $(C_3H_5O_2)_5K_3Na_2$], although possible, does not seem fully proved due to the fluctuation of the experimental points, and the lack of data other than the visual polythermal ones.

The fusion temperature of component 1 (638 K) is in fair agreement with that (638.3±0.5 K) listed in Table 1 of the Preface, whereas the fusion temperature of component 2 (571 K) has to be considered as too high, inasmuch as the DSC value given in Table 1 of the Preface, (562.4±0.2 K) was subsequently confirmed by that obtained with adiabatic calorimetry (561.88±0.03 K; Table 3).

Rather puzzlingly, for the solid state transition temperature of component 1 far different values are quoted [from the same source (Ref. 3)] in Ref. 1 and Ref. 2, i.e., 603 and 341 K, respectively. Both figures are in turn different from that reported in Table 1 of the Preface (352.5±0.5 K).

Again from Ref. 3, solid state transitions are quoted in both Ref. 1 and Ref. 2 as occurring in component 2 at $T_{trs}(2)/K$= 350, 468, 490, and 560. Doubts, however, are to be cast about the existence of the lowest transition as well as of the highest one, inasmuch as DSC provided evidence for the occurrence of only two solid state transformations (at 470.2±0.5 and 494±1 K, respectively; Preface, Table 1) which was subsequently confirmed with adiabatic calorimetry (Preface, Table 3).

REFERENCES:

(1) Sokolov, N.M.; Pochtakova, E.I.
Zh. Obshch. Khim. 1958, 28, 1397-1404.

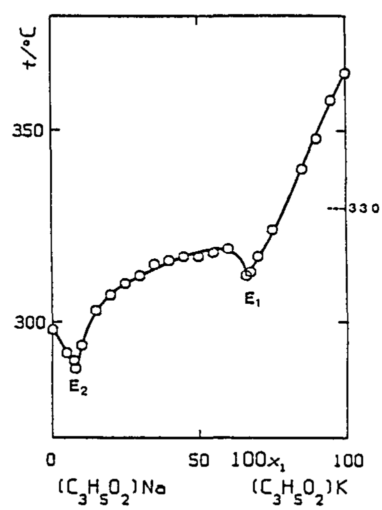
(2) Dmitrevskaya, O.I.; Sokolov, N.M.
Zh. Obshch. Khim. 1958, 28, 2920-2926 (*); **Russ. J. Gen. Chem.(Engl. Transl.)** 1958, 28, 2949-2954.

(3) Sokolov, N.M.; **Tezisy Dokl. X Nauch. Konf. S.M.I.** 1956.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Potassium propanoate (potassium propionate); $(C_3H_5O_2)K$; [327-62-8] (2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)Na$; [137-40-6]	Sokolov, N.M.; Pochtakova, E.I, **Zh. Obshch. Khim.** 1958, 28, 1397-1404.
VARIABLES:	PREPARED BY:
Temperature.	Baldini, P.

EXPERIMENTAL VALUES:

t/°C	T/K[a]	$100x_1$	t/°C	T/K[a]	$100x_1$
298	571	0	317	590	50
292	565	5	318	591	55
290	563	7.5	319	592	60
288	561	8	312	585	66
294	567	10	313	586	67.5
303	576	15	317	590	70
307	580	20	324	597	75
310	583	25	340	613	85
312	585	30	348	621	90
315	588	35	358	631	95
316	589	40	365	638	100
317	590	45			



[a] T/K values calculated by the compiler.

Characteristic point(s):

Eutectic, E_1, at 312 °C and $100x_1$= 66 (authors).
Eutectic, E_2, at 288 °C and $100x_1$= 8 (authors).

Intermediate compound(s):

$(C_3H_5O_2)_5K_3Na_2$, congruently melting at 319 °C.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Visual polythermal analysis.	Both components were prepared from commercial propanoic acid (distilled before use) and the proper "chemically pure" carbonate; the solids recovered were recrystallized from butanol. Component 1 undergoes a phase transition at $t_{trs}(1)$/°C= 330 (Ref. 1). Component 2 undergoes phase transitions at $t_{trs}(2)$/°C= 77, 195, 217, 287 (Ref. 1).
	ESTIMATED ERROR:
	Temperature: accuracy probably ±2 K (compiler).
	REFERENCES:
	(1) Sokolov, N.M.; **Tezisy Dokl. X Nauch. Konf. S.M.I.** 1956.

COMPONENTS:

(1) Potassium propanoate (potassium propionate); $(C_3H_5O_2)K$; [327-62-8]
(2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)Na$; [137-40-6]

ORIGINAL MEASUREMENTS:

Dmitrevskaya, O.I.; Sokolov, N.M.
Zh. Obshch. Khim. 1958, 28, 2920-2926 (*);
Russ. J. Gen. Chem. (Engl. Transl.) 1958, 28, 2949-2954.

VARIABLES:

Temperature.

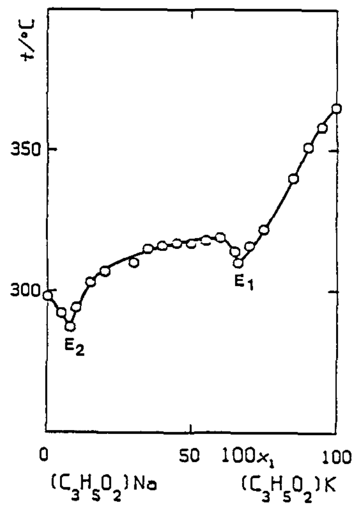
PREPARED BY:

Baldini, P.

EXPERIMENTAL VALUES:

$t/^{o}C$	T/K^{a}	$100x_1$	$t/^{o}C$	T/K^{a}	$100x_1$
298	571	0	318	591	55
292	565	5	319	592	60
287	560	8	314	587	65
294	567	10	310	583	66
303	576	15	316	589	70
307	580	20	322	595	75
310	583	30	340	613	85
315	588	35	351	624	90
316	589	40	358	631	95
317	590	45	365	638	100
317	590	50			

[a] T/K values calculated by the compiler.



Characteristic point(s):

Eutectic, E_1, at 310 °C and $100x_1$= 66 (authors).
Eutectic, E_2, at 287 °C and $100x_1$= 8 (authors).

Intermediate compound(s):

$(C_3H_5O_2)_5K_3Na_2$ (probable composition), congruently melting at 319 °C (authors).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Visual polythermal analysis. Temperature of initial crystallization measured with a Nichrome-Constantane thermocouple checked at the boiling point of water, and at the fusion points of benzoic acid, mannitol, succinic acid, silver nitrate, tin, potassium nitrate, and potassium dichromate. Mixtures melted in a glass tube inserted into a wider tube to ensure uniform heating. Glass fiber stirrer used.

SOURCE AND PURITY OF MATERIALS:

Components prepared by adding a small excess of distilled commercial propanoic acid to a solution of the proper "chemically pure" hydrogen carbonate; the solids recovered after evaporation of the solvent were recrystallized from butanol. Component 1 undergoes a phase transition at $t_{trs}(1)/^{o}C$= 68 (Ref. 1).
Component 2 undergoes phase transitions at $t_{trs}(2)/^{o}C$= 77, 195, 217, 287 (Ref. 1).

ESTIMATED ERROR:

Temperature: accuracy probably ±2 K (compiler).

REFERENCES:

(1) Sokolov, N.M.; **Tezisy Dokl. X Nauch. Konf. S.M.I.** 1956.

COMPONENTS:

(1) Lithium propanoate (lithium propionate); $(C_3H_5O_2)Li$; [6531-45-9]
(2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)Na$; [137-40-6]

ORIGINAL MEASUREMENTS:

Tsindrik, N.M.; Sokolov, N.M.
Zh. Obshch. Khim., 1958, **28**, 1404-1410 (*); **Russ. J. Gen. Chem. (Engl. Transl.)** 1958, **28**, 1462-1467.

VARIABLES:

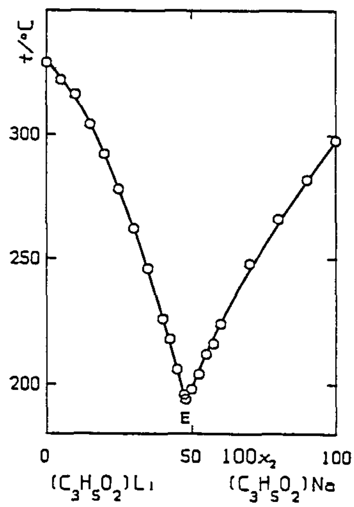
Temperature.

PREPARED BY:

Baldini, P.

EXPERIMENTAL VALUES:

t/°C	T/K[a]	$100x_2$
329	602	0
322	595	5
316	589	10
304	577	15
292	565	20
278	551	25
262	535	30
246	519	35
226	499	40
218	491	42.5
206	479	45
196	469	47.5
194	467	48
198	471	50
204	477	52.5
212	485	55
216	489	57.5
224	497	60
248	521	70
266	539	80
282	555	90
298	571	100



[a] T/K values calculated by the compiler.

Characteristic point(s): Eutectic, E, at 194 °C and $100x_2$= 48 (authors).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Visual polythermal analysis.

NOTE:

The fusion temperature of component 2 (571 K) is to be considered as too high, inasmuch as the DSC value (562.4±0.2 K) given in Preface, Table 1 was subsequently confirmed by that obtained with adiabatic calorimetry (561.88±0.03 K; Preface, Table 3). For the same component, both DSC and adiabatic calorimetry proved (Preface, Table 1 and Table 3, respectively) the occurrence of only two (instead of four, as quoted by the authors from Ref. 2) solid state transitions. Nevertheless, the main features of the diagram are to be looked at with sufficient confidence.

SOURCE AND PURITY OF MATERIALS:

Components prepared from propanoic acid and the proper hydrogen carbonate (Ref. 1), and recrystallized from n-butanol. Component 2 undergoes phase transitions at $t_{trs}(2)$/°C= 77, 195, 217, 287 (Ref. 2).

ESTIMATED ERROR:

Temperature: accuracy probably ±2 K (compiler).

REFERENCES:

(1) Sokolov, N.M. **Zh. Obshch. Khim.** 1954, **24**, 1150-1156.
(2) Sokolov, N.M. **Tezisy Dokl. X Nauch. Konf. S.M.I.** 1956.

COMPONENTS:	EVALUATOR:
(1) Magnesium propanoate (magnesium propionate); $(C_3H_5O_2)_2Mg$; [557-27-7] (2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)_2Na_2$; [137-40-6]	Franzosini, P., Dipartimento di Chimica Fisica, Universita' di Pavia (ITALY).

CRITICAL EVALUATION:

This binary was studied by Pochtakova (Ref. 1) both with visual polythermal and DTA investigation. In order to evaluate the trustworthiness of her results, the following points have to be considered.

(i) The fusion temperature of component 1 (577 K) coincides with the DSC value by Ferloni et al. (Ref. 2).

(ii) Pochtakova's solid state transition temperatures of the same component (i.e., 458, 473, 490, and 519 K) represent the only source of information on this subject.

(iii) The fusion temperature of component 2 (571 K) has to be considered as too high, inasmuch as the DSC value (562.4±0.2 K) given in Preface, Table 1 was subsequently confirmed by that obtained with adiabatic calorimetry (561.88±0.03 K; Preface, Table 3).

(iv) As for the solid state transitions of the same component quoted by Pochtakova from Ref. 3 as occurring at $T_{trs}(2)/K$= 350, 468, 490, and 560, heavy doubts are to be cast about the existence of the lowest and highest ones inasmuch as DSC provided evidence for only two solid state transformations (at 470.2±0.5, and 494±1 K, respectively; Preface, Table 1) which was subsequently confirmed with adiabatic calorimetry (Preface, Table 3).

(v) Indeed, the DTA traces recorded at $100x_1$= 2.5, 4, 25, and 42.5 seem to be consistent with the existence of only two solid state transitions of component 2; moreover, they support the occurrence of eutectic E_2, and tend to prove the absence of solid solutions between component 2 and the intermediate compound.

(vi) The DTA traces recorded at $100x_1$= 60, 65, and 75 are somewhat embarrassing because all of them support the occurrence of eutectic E_1, but evidence for solid state transitions of component 1 is offered only by the trace taken at $100x_1$= 60 for what concerns the transition at 473 K, and by that taken at $100x_1$= 65 for what concerns the transition at 458 K.

(vii) No explanation is given by the author for the discontinuities exhibited at temperatures far above the liquidus by the DTA traces taken at $100x_1$= 60, and 65.

In conclusion, the evaluator is inclined to consider as satisfactorily supported by the experimental evidence:

(i) the occurrence of the congruently melting intermediate compound $(C_3H_5O_2)_4MgNa_2$;

(ii) the occurrence of eutectics E_1 and E_2, located as suggested by Pochtakova; and

(iii) the phase relations relevant to solidus and subsolidus at $0 \leq 100x_1 \leq 50$ as suggested by Pochtakova.

On the contrary, the knees occurring in the liquidus branch richest in component 1 as well as in that richest in component 2, the nature of possible transformations occurring in the melt, and the phase relations relevant to solidus and subsolidus at $50 \leq 100x_1 \leq 100$ seem to need further investigation.

REFERENCES:

(1) Pochtakova, E.I.
Zh. Obshch. Khim. 1974, 44, 241-248.

(2) Ferloni, P.; Sanesi, M.; Franzosini, P.
Z. Naturforsch. 1976, 31a, 679-682.

(3) Sokolov, N.M.
Tezisy Dokl. X Nauch. Konf. S.M.I. 1956.

COMPONENTS:

(1) Magnesium propanoate (magnesium propionate); $(C_3H_5O_2)_2Mg$; [557-27-7]
(2) Sodium propanoate (sodium propionate); $(C_3H_5O_2)_2Na_2$; [137-40-6]

ORIGINAL MEASUREMENTS:

Pochtakova, E.I.
Zh. Obshch. Khim. 1974, 44, 241-248.

VARIABLES:

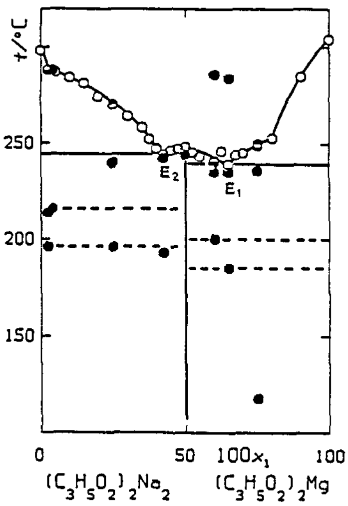
Temperature.

PREPARED BY:

Baldini, P.

EXPERIMENTAL VALUES:

t/°C	T/K[a]	$100x_1$	t/°C	T/K[a]	$100x_1$
298	571	0	247	520	47.5
288	561	2.5	248	521	50
288[bc]	561	2.5	244[bc]	517	50
196[bh]	469	2.5	245	518	52.5
214[bj]	487	2.5	243	516	55
288[bk]	561	2.5	241	514	60
288[bc]	561	4	240[bc]	513	60
216[bj]	489	4	235[be]	508	60
287	560	5	200[bi]	473	60
284	557	10	286[bl]	559	60
281	554	15	246	519	62.5
274	547	20	239	512	65
270	543	25	235[bc]	508	65
270[bc]	543	25	235[be]	508	65
240[bd]	513	25	185[bg]	458	65
196[bh]	469	25	284[bl]	557	65
264	537	30	244	517	67.5
258	531	35	245	518	70
252	525	37.5	249	522	75
247	520	40	250[bc]	523	75
244	517	42.5	236[be]	509	75
242[bc]	515	42.5	118[bf]	391	75
242[bd]	515	42.5	253	526	80
193[bh]	466	42.5	285	558	90
246	519	45	304	577	100



[a] T/K values calculated by the compiler.
[b] Differential thermal analysis.
[c] Initial crystallization.
[d] First eutectic stop.
[e] Second eutectic stop.
[f] First transition of the system.
[g] Second transition of the system.
[h] Third transition of the system.
[i] Fourth transition of the system.
[j] Fifth transition of the system.
[k] Sixth transition of the system.
[l] Seventh transition of the system (no explanation is offered by the author for the occurrence of this point above the liquidus, compiler).

Characteristic point(s):
Eutectic, E_1, at 239 °C (235 °C by D.T.A.), and $100x_1$ = 65 (author).
Eutectic, E_2, at 244 °C (242 °C by D.T.A.), and $100x_1$ = 42.5 (author).

Intermediate compound: $(C_3H_5O_2)_4MgNa_2$, congruently melting at 248 °C (244 °C by D.T.A.).

METHOD/APPARATUS/PROCEDURE:

Visual polythermal analysis, supplemented with differential thermal analysis.

SOURCE AND PURITY OF MATERIALS:

Materials prepared (Ref. 1) by reacting the proper ("chemically pure") carbonate with a slight excess of propanoic acid of analytical purity.
Component 1 undergoes phase transitions at $t_{trs}(1)$/°C = 185, 200, 217, 246.
Component 2 undergoes phase transitions at $t_{trs}(2)$/°C = 77, 195, 217, 287 (Ref. 2).

ESTIMATED ERROR:

Temperature: precision probably ±2 K (compiler).

REFERENCES:

(1) Sokolov, N.M.
Zh. Obshch. Khim. 1954, 24, 1581-1593.
(2) Sokolov, N.M.
Tezisy Dokl. X Nauch. Konf.S.M.I. 1956.