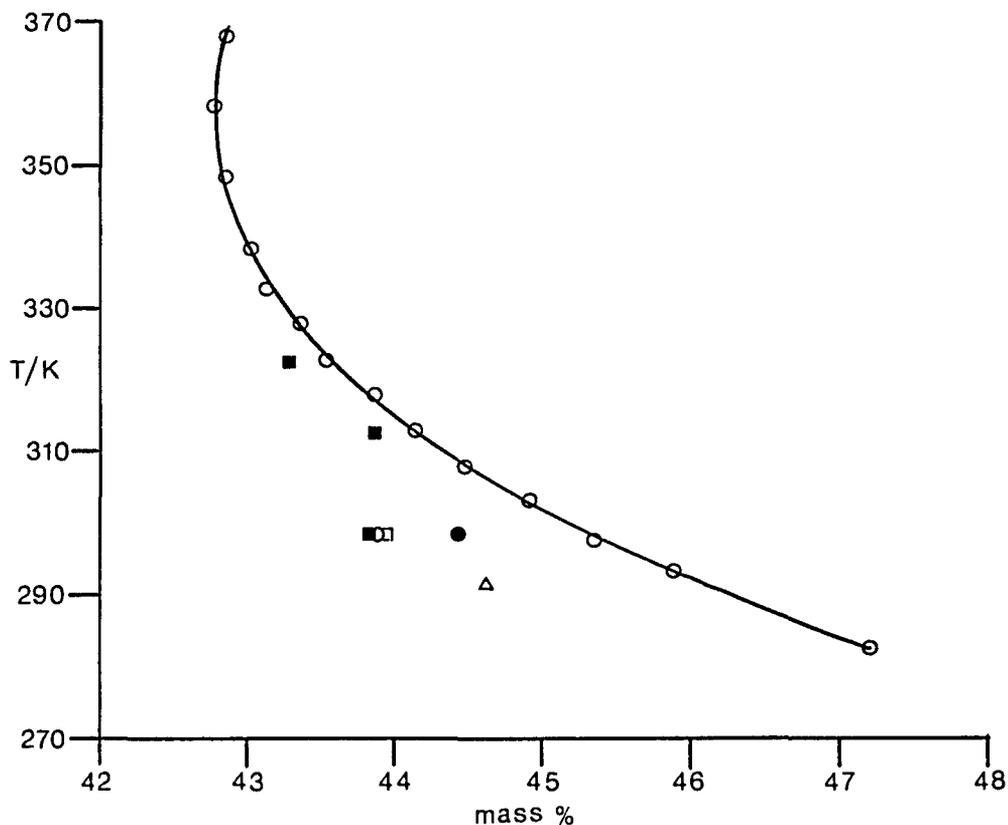


<p>COMPONENTS:</p> <p>(1) Lithium Iodate; <math>\text{LiIO}_3</math>; [13765-03-2]</p> <p>(2) Water; <math>\text{H}_2\text{O}</math>; [7732-18-5]</p>	<p>EVALUATOR:</p> <p>H. Miyamoto Niigata University Niigata, Japan and M. Salomon US Army ET &amp; DL Fort Monmouth, NJ, USA</p> <p>February, 1986</p>
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## CRITICAL EVALUATION:

## THE BINARY SYSTEM

Solubility data for  $\text{LiIO}_3$  in water have been reported in 37 publications (1-34, 44-46). At 298.2 K Shklovskaya et al. (5,7,8,11,14-20,22,23,25,27,28,44) reported the identical solubility of 43.82 mass %, and although the work spans a period of 10 years (1974-1983), it is not possible to determine the number of independent measurements in these 18 publications. The solubility of 43.30 mass % at 298.2 K reported in (24) is distinctly lower than all other findings and is therefore rejected. Unezawa et al. (33) reported the solubility to be about 76 g/100 g  $\text{H}_2\text{O}$  (43.2 mass %) over the temperature range of 278-343 K, and although this is an interesting result its qualitative nature led us to conclude that it should not be compiled. However the importance of this paper is that the authors identified the stable solid phase at room temperature as hexagonal  $\text{LiIO}_3$  (i.e. the  $\alpha$ -phase) which is consistent with other quantitative data as discussed below. A graphical summary of the solubility of  $\text{LiIO}_3$  in water is given in the polytherm figure below. In all cases the equilibrated solid phase is the anhydrous salt.

Figure 1. Solubility of  $\text{LiIO}_3$ 

- |              |  |
|--------------|--|
| ○ Ref (2)    | ● Ref (34)                                     |
| □ Ref (9,12) | ■ Ref (3-8, 11, 14-20, 22, 23, 25, 27, 28, 44) |
| △ Ref (1)    | ● Ref (33)                                     |

<p>COMPONENTS:</p> <p>(1) Lithium Iodate; <math>\text{LiIO}_3</math>; [13765-03-2]</p> <p>(2) Water; <math>\text{H}_2\text{O}</math>; [7732-18-5]</p>	<p>EVALUATOR:</p> <p>H. Miyamoto Niigata University Niigata, Japan and M. Salomon US Army ET &amp; DL Fort Monmouth, NJ, USA</p> <p style="text-align: right;">February 1986</p>
<p>CRITICAL EVALUATION:</p> <p>There are a number of problems in critically evaluating the data in the figure, and this is undoubtedly due to the uncertainties in the form of the solid phase. <math>\text{LiIO}_3</math> is polymorphic, and according to (35,36) the stable structure is hexagonal with 2 molecules per unit cell with lithium and iodine both lying within oxygen octahedra. By growing crystals from saturated solutions at 343 K, Unezawa et al. (33) were able to identify the less stable tetragonal form of <math>\text{LiIO}_3</math> (the <math>\beta</math>-phase), and solubilities for the <math>\alpha</math>-phase and <math>\beta</math>-phase were published in graphical form in (34). In (34) the solubility of stable <math>\alpha</math>-<math>\text{LiIO}_3</math> appears to be constant at 80 g/100 g <math>\text{H}_2\text{O}</math> (44.4 mass %) between 298-353 K (see the compilation for this figure). According to (34) the transition between <math>\alpha</math>-<math>\text{LiIO}_3</math> and <math>\beta</math>-<math>\text{LiIO}_3</math> occurs at 343 K. The Lithium Iodate Crystal Research Group in The Peoples Republic of China (37) investigated saturated and supersaturated solutions of <math>\alpha</math>-<math>\text{LiIO}_3</math> (hexagonal) and <math>\beta</math>-<math>\text{LiIO}_3</math> (tetragonal) as a function of temperature, and reported that when crystals co-exist, <math>\alpha</math>-<math>\text{LiIO}_3</math> is more stable below 333 K. This paper contains only graphical data and therefore was not compiled.</p> <p>Desvignes and Romissent (38) used X-ray diffraction to demonstrate that the stable solid at room temperature is <math>\alpha</math>-<math>\text{LiIO}_3</math> and that there is an irreversible change to <math>\beta</math>-<math>\text{LiIO}_3</math> when the crystals are heated to 528 K: this is similar to the irreversible transformation temperature of 533 K reported in (33). Liminga and Abrahams (39) also reported that the stable solid at room temperature is <math>\alpha</math>-<math>\text{LiIO}_3</math>.</p> <p>To complicate matters, Ricci and Amron (2) reported a third phase, an octahedral form, stable at higher temperatures, metastable down to 283 K, and the transition between stable and metastable solutions for this new solid occurs at around 328 K. This solid phase was identified by microscopic analysis, but X-ray confirmation has not been reported. Since the polytherm for Ricci and Amron's octahedral phase lies fairly close to that for the tetragonal form reported by Unezawa and Tatuoka (34), it would appear to the evaluators that both are identical: i.e. that the quantitative solubilities of the octahedral form are in fact the solubilities for the less stable tetragonal form: i.e. for <math>\beta</math>-<math>\text{LiIO}_3</math>. It should be noted that Ricci and Amron used (after purification) a commercial salt and a product prepared by metathesis, and both salts were dried at 383-456 K before use.</p> <p>In view of the above uncertainties in the nature of the solid phases and the scatter in the reported solubilities (see figure), we are only able to make limited recommendations on the solubility of <math>\text{LiIO}_3</math> as a function of temperature. There is no doubt that at room temperature the stable solid phase is <math>\alpha</math>-<math>\text{LiIO}_3</math> and that its solubility at 298.2 K is probably close to 43.82 mass % (i.e. <math>\chi = 0.0717</math> and <math>m = 4.29 \text{ mol kg}^{-1}</math>). Transition to the <math>\beta</math>-phase probably occurs between 313-328 K, and the solubility of <math>\beta</math>-<math>\text{LiIO}_3</math> as a function of temperature is probably the same as those reported by Ricci and Amron for the so-called octahedral phase. The reported solubilities at 313 K (13) and 323 K (3,4,6,10) appear imprecise and probably can be attributed to mixed (<math>\alpha</math>- and <math>\beta</math>-) solid phases. We cannot offer either <i>tentative</i> or <i>recommended</i> solubilities at this time.</p> <p style="text-align: center;">TERNARY SYSTEMS</p> <p>1. One Saturating Component.</p> <p>1.1. The solubility of lithium iodate in aqueous iodic acid solution.</p> <p>Shklovskaya et al. (13) determined the solubility of lithium iodate in 10 mass % iodic acid solution over a wide temperature range. The solubility was found to exhibit a minimum near 363 K.</p>	

<p>COMPONENTS:</p> <p>(1) Lithium iodate; <math>\text{LiIO}_3</math>; [13765-03-2]</p> <p>(2) Water; <math>\text{H}_2\text{O}</math>; [7732-18-5]</p>	<p>EVALUATOR: H. Miyamoto Niigata University Niigata, Japan</p> <p style="text-align: right;">February, 1986</p>																																
<p>CRITICAL EVALUATION:</p> <p>1.2. The solubility of lithium iodate in ethanol-water mixtures.</p> <p>Arkhipov, Pruntsev and Kidyarov (40) have measured the solubility of lithium iodate in mixtures of ethanol and water, but reported only graphical data. The figure with some comments is included in the compilation section of this chapter.</p> <p>2. Two Saturating Components.</p> <p>Solubility data for the ternary aqueous systems have reported in a number of publications which are summarized in Tables 1-4.</p> <p><u>The System With Iodic Acid.</u> The system has been reported in 3 publications (2,3,13) at the three temperatures 298, 313 and 323 K, and phase diagrams at each temperature were also included. The dominant feature in this system is the formation of solid solutions <math>m\text{LiIO}_3 \cdot n\text{HIO}_3</math> where m and n were not specified.</p> <p>Lukasiewicz, Pietaszemska and Zmija (41) measured solubilities in the ternary <math>\text{LiIO}_3 - \text{HIO}_3 - \text{H}_2\text{O}</math> system at 313, 323, and 328 K. The pH range of the saturated solutions was 1.9 to 3.5. The composition in the solid phase was not reported.</p> <p><u>The System With Lithium Hydroxide.</u> Solubilities in the <math>\text{LiIO}_3 - \text{LiOH} - \text{H}_2\text{O}</math> system were studied by the isothermal method at 298 K (9). Lithium hydroxide and iodate exists in a restricted series of solid solutions.</p> <p><u>Systems With Alkali Metal Iodates.</u> Solubility studies for ternary aqueous systems with alkali metal iodates have been reported in 4 publications (4-7). The summary of these studies is given in Table 1.</p> <p>The ternary systems with <math>\text{NaIO}_3</math> and <math>\text{CsIO}_3</math> are simple eutonic, and no double salts were found. The dominant feature of the ternary systems with <math>\text{KIO}_3</math> and <math>\text{RbIO}_3</math> is the existence of double salts, <math>\text{KIO}_3 \cdot 2\text{LiIO}_3</math> and <math>\text{RbIO}_3 \cdot 2\text{LiIO}_3</math>, respectively.</p> <p style="text-align: center;">Table 1. Summary for Solubility Studies of the Ternary Systems with Alkali Metal Iodates</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Ternary System</th> <th style="text-align: center;">T/K</th> <th style="text-align: left;">Solid Phase</th> <th style="text-align: center;">Reference</th> </tr> </thead> <tbody> <tr> <td><math>\text{LiIO}_3 + \text{NaIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\text{LiIO}_3</math>; <math>\text{NaIO}_3 \cdot \text{H}_2\text{O}</math></td> <td style="text-align: center;">5</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\text{LiIO}_3</math>; <math>\text{KIO}_3</math>; <math>\text{KIO}_3 \cdot 2\text{LiIO}_3</math></td> <td style="text-align: center;">7</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">323</td> <td><math>\text{LiIO}_3</math>; <math>\text{KIO}_3</math>; <math>\text{KIO}_3 \cdot 2\text{LiIO}_3</math></td> <td style="text-align: center;">4</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\text{LiIO}_3</math>; <math>\text{RbIO}_3</math>; <math>\text{RbIO}_3 \cdot 2\text{LiIO}_3</math></td> <td style="text-align: center;">7</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">323</td> <td><math>\text{LiIO}_3</math>; <math>\text{RbIO}_3</math>; <math>\text{RbIO}_3 \cdot 2\text{LiIO}_3</math></td> <td style="text-align: center;">6</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{CsIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\text{LiIO}_3</math>; <math>\text{CsIO}_3</math></td> <td style="text-align: center;">5</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{CsIO}_3 + \text{H}_2\text{O}</math></td> <td style="text-align: center;">323</td> <td><math>\text{LiIO}_3</math>; <math>\text{CsIO}_3</math></td> <td style="text-align: center;">6</td> </tr> </tbody> </table> <p><u>Systems With Alkaline Earth Metal Iodates.</u> Solubility studies for these systems have been reported in 4 publications (29-32), and are summarized in Table 2.</p> <p>The ternary system with <math>\text{Mg}(\text{IO}_3)_2</math> was studied at 298 and 323 K. No double salts were formed at 298 K, and the system is one of the eutonic type. In the study at 323 K, lithium and magnesium iodates form a restricted series of solid solutions. The dominant feature of the ternary systems containing calcium iodate is the absence of double salts: the phase diagrams are of the eutonic type.</p>		Ternary System	T/K	Solid Phase	Reference	$\text{LiIO}_3 + \text{NaIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{NaIO}_3 \cdot \text{H}_2\text{O}$	5	$\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{KIO}_3$ ; $\text{KIO}_3 \cdot 2\text{LiIO}_3$	7	$\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{KIO}_3$ ; $\text{KIO}_3 \cdot 2\text{LiIO}_3$	4	$\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{RbIO}_3$ ; $\text{RbIO}_3 \cdot 2\text{LiIO}_3$	7	$\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{RbIO}_3$ ; $\text{RbIO}_3 \cdot 2\text{LiIO}_3$	6	$\text{LiIO}_3 + \text{CsIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{CsIO}_3$	5	$\text{LiIO}_3 + \text{CsIO}_3 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{CsIO}_3$	6
Ternary System	T/K	Solid Phase	Reference																														
$\text{LiIO}_3 + \text{NaIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{NaIO}_3 \cdot \text{H}_2\text{O}$	5																														
$\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{KIO}_3$ ; $\text{KIO}_3 \cdot 2\text{LiIO}_3$	7																														
$\text{LiIO}_3 + \text{KIO}_3 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{KIO}_3$ ; $\text{KIO}_3 \cdot 2\text{LiIO}_3$	4																														
$\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{RbIO}_3$ ; $\text{RbIO}_3 \cdot 2\text{LiIO}_3$	7																														
$\text{LiIO}_3 + \text{RbIO}_3 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{RbIO}_3$ ; $\text{RbIO}_3 \cdot 2\text{LiIO}_3$	6																														
$\text{LiIO}_3 + \text{CsIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{CsIO}_3$	5																														
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COMPONENTS:		EVALUATOR:	
(1) Lithium iodate; $\text{LiIO}_3$ ; [13765-03-2]		H. Miyamoto	
(2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]		Department of Chemistry	
		Niigata University	
		Niigata, Japan	
		February, 1986	
CRITICAL EVALUATION:			
Table 2. Summary for Solubility Studies of the Ternary Systems with Alkaline earth metal iodates			
Ternary System	T/K	Solid Phase	Reference
$\text{LiIO}_3 + \text{Mg}(\text{IO}_3)_2 + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{Mg}(\text{IO}_3)_2 \cdot 4\text{H}_2\text{O}$	30
$\text{LiIO}_3 + \text{Mg}(\text{IO}_3)_2 + \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{Mg}(\text{IO}_3)_2 \cdot 4\text{H}_2\text{O}$ ; $n\text{Mg}(\text{IO}_3)_2 \cdot 4\text{H}_2\text{O} \cdot n\text{LiIO}_3$	29
$\text{LiIO}_3 + \text{Ca}(\text{IO}_3)_2 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{Ca}(\text{IO}_3)_2 \cdot 6\text{H}_2\text{O}$	32
$\text{LiIO}_3 + \text{Ca}(\text{IO}_3)_2 - \text{H}_2\text{O}$	323	$\text{LiIO}_3$ ; $\text{Ca}(\text{IO}_3)_2 \cdot \text{H}_2\text{O}$	31
<u>Systems With Rare Earth Iodates:</u> Recently, two ternary systems (14,24) were studied by the isothermal method at 298 K. The systems $\text{LiIO}_3\text{-Sm}(\text{IO}_3)_3\text{-H}_2\text{O}$ (14) and $\text{LiIO}_3\text{-Nd}(\text{IO}_3)_3\text{-H}_2\text{O}$ (24) were of the eutonic type, and no double salts were reported.			
<u>Systems With The Other Iodates.</u> Solubility studies of the ternary aqueous systems containing lithium iodate and other iodates (with the exception of the above systems) have been reported in 9 publications (11,12,19-23,25,44), and summary of these studies is given in Table 3.			
Table 3. Summary for Solubility Studies of the Ternary Systems With the Other Iodates.			
Ternary Systems	T/K	Solid Phase	Reference
$\text{LiIO}_3 + \text{Al}(\text{IO}_3)_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{Al}(\text{IO}_3)_3 \cdot 6\text{H}_2\text{O}$	11
$\text{LiIO}_3 + \text{NH}_4\text{IO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{NH}_4\text{IO}_3$ ; $\text{NH}_4\text{IO}_3 \cdot 2\text{LiIO}_3$	12
$\text{LiIO}_3 + \text{Ga}(\text{IO}_3)_3 + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{Ga}(\text{IO}_3)_3 \cdot 2\text{H}_2\text{O}$ ; $2\text{Ga}(\text{IO}_3)_3 \cdot \text{LiIO}_3 \cdot 4\text{H}_2\text{O}$ ; $\text{Ga}(\text{IO}_3)_3 \cdot \text{LiIO}_3 \cdot 2\text{H}_2\text{O}$ ; Solid solution based on $\text{Ga}(\text{IO}_3)_3 \cdot 2\text{H}_2\text{O}$	19
$\text{LiIO}_3 + \text{In}(\text{IO}_3)_2 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{In}(\text{IO}_3)_3 \cdot \text{H}_2\text{O}$ ; $\text{LiIO}_3 \cdot \text{In}(\text{IO}_3)_3 \cdot \text{H}_2\text{O}$ ; $2\text{LiIO}_3 \cdot \text{In}(\text{IO}_3)_3 \cdot \text{H}_2\text{O}$	20
$\text{LiIO}_3 + \text{TlIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{TlIO}_3$ ; $\text{LiIO}_3 \cdot \text{TlIO}_3$	21
$\text{LiIO}_3 + \text{Hf}(\text{IO}_3)_4 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{Hf}(\text{IO}_3)_4$ ; Solid Solution	22
$\text{LiIO}_3 + \text{Zr}(\text{IO}_3)_4 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{Zr}(\text{IO}_3)_4$	23
$\text{LiIO}_3 + \text{Ti}(\text{IO}_3)_4 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{Ti}(\text{IO}_3)_4 \cdot 2\text{H}_2\text{O}$  Solid solution	25
$\text{LiIO}_3 + \text{AgIO}_3 + \text{H}_2\text{O}$	298	$\text{LiIO}_3$ ; $\text{AgIO}_3$ ; Solid Solution	44

<b>COMPONENTS:</b> (1) Lithium iodate; $\text{LiIO}_3$ ; [13765-03-2] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>EVALUATOR:</b> Hiroshi Miyamoto Department of Chemistry Niigata University Niigata, Japan  February, 1986																				
<b>CRITICAL EVALUATION:</b>  <p>The ternary systems with <math>\text{Al}(\text{IO}_3)_3</math> (11) and <math>\text{Zr}(\text{IO}_3)_4</math> (23) are of the simple eutonic type, and no double salts form. The dominant feature of the ternary systems with <math>\text{NH}_4\text{IO}_3</math> (12) and <math>\text{TlIO}_3</math> (21) is the existence of the double salts <math>\text{NH}_4\text{IO}_3 \cdot 2\text{LiIO}_3</math> and <math>\text{LiIO}_3 \cdot \text{TlIO}_3</math>. In the ternary <math>\text{LiIO}_3</math>-<math>\text{In}(\text{IO}_3)_3</math>-<math>\text{H}_2\text{O}</math> system, two double salts <math>\text{LiIO}_3 \cdot \text{In}(\text{IO}_3)_3 \cdot \text{H}_2\text{O}</math> and <math>2\text{LiIO}_3 \cdot \text{In}(\text{IO}_3)_3 \cdot \text{H}_2\text{O}</math> are formed.</p> <p>The solubilities in the ternary systems <math>\text{LiIO}_3</math>-<math>\text{Hf}(\text{IO}_3)_4</math>-<math>\text{H}_2\text{O}</math> (22), <math>\text{LiIO}_3</math>-<math>\text{Ti}(\text{IO}_3)_4</math>-<math>\text{H}_2\text{O}</math> and <math>\text{LiIO}_3</math>-<math>\text{AgIO}_3</math>-<math>\text{H}_2\text{O}</math> (44) have been studied by the isothermal method and are characterized by the formation of solid solutions. A continuous series of solid solutions based on hafnium iodate in the <math>\text{LiIO}_3</math>-<math>\text{Hf}(\text{IO}_3)_4</math>-<math>\text{H}_2\text{O}</math> system and titanium iodate in the <math>\text{LiIO}_3</math>-<math>\text{Ti}(\text{IO}_3)_4</math>-<math>\text{H}_2\text{O}</math> system are formed.</p> <p><u>Systems With Lithium Halides.</u> Solubility studies for these systems have been reported in 3 publications (18,45,46), and are summarized in Table 4.</p> <p>Solubilities in these systems were studied by the isothermal method at 298 K. Incongruently soluble compounds are formed.</p> <p style="text-align: center;">Table 4. Summary for Solubility Studies of the Ternary Systems With Lithium Halides</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Ternary System</th> <th style="text-align: center;">T/K</th> <th style="text-align: left;">Solid Phase</th> <th style="text-align: right;">Reference</th> </tr> </thead> <tbody> <tr> <td><math>\text{LiIO}_3 + \text{LiCl} + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\alpha\text{-LiIO}_3</math>; <math>\text{LiCl}</math>; <math>\text{LiIO}_3 \cdot \text{LiCl} \cdot \text{H}_2\text{O}</math> <math>3\text{LiIO}_3 \cdot 3\text{LiCl} \cdot 3\text{H}_2\text{O}</math></td> <td style="text-align: right;">17</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{LiBr} + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\alpha\text{-LiIO}_3</math>; <math>\text{LiBr} \cdot 2\text{H}_2\text{O}</math>; <math>\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}</math>; <math>\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}</math></td> <td style="text-align: right;">45</td> </tr> <tr> <td><math>\text{LiIO}_3 + \text{LiI} + \text{H}_2\text{O}</math></td> <td style="text-align: center;">298</td> <td><math>\alpha\text{-LiIO}_3</math>; <math>\text{LiI} \cdot 3\text{H}_2\text{O}</math>; <math>3\text{LiIO}_3 \cdot 2\text{LiI} \cdot 6\text{H}_2\text{O}</math></td> <td style="text-align: right;">46</td> </tr> </tbody> </table> <p><u>Systems With Lithium Salts.</u> The solubility in the ternary <math>\text{LiIO}_3</math>-<math>\text{LiNO}_3</math>-<math>\text{H}_2\text{O}</math> system was studied by the isothermal method at 298 K (8) and 323 K (10). This system at each temperature is of the simple eutonic type, and no double salts were formed.</p> <p>Solubilities in ternary systems with lithium sulfate (15), perchlorate (18), carbonate (26) and phosphate (27,28) were studied by the isothermal method at 298 K only. These systems are of the simple eutonic type, and no double salts were formed.</p> <p style="text-align: center;"><b>OTHER MULTI-COMPONENT SYSTEMS</b></p> <p><u>Quaternary Systems With Iodic Acid And The Other Iodates.</u> Solubility data for the quaternary system <math>\text{LiIO}_3</math>-<math>\text{HIO}_3</math>-<math>\text{KIO}_3</math>-<math>\text{H}_2\text{O}</math> at 323 K and <math>\text{LiIO}_3</math>-<math>\text{HIO}_3</math>-<math>\text{Al}(\text{IO}_3)_3</math>-<math>\text{H}_2\text{O}</math> at 298 K have been reported by Azarova, Vinogradov and Lepeshkov (42) and Shklovskaya, Arkhipov, Kidyarov and Tsibulevskaya (43), respectively. The systems were studied by the isothermal method. The double salts found experimentally are:</p> <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><math>\text{KIO}_3 \cdot \text{HIO}_3</math>; <math>\text{KIO}_3 \cdot 2\text{LiIO}_3</math>; <math>\text{KIO}_3 \cdot 2\text{H}_2\text{O}</math></td> <td style="text-align: right;">(41)</td> </tr> <tr> <td style="text-align: center;"><math>\text{Al}(\text{IO}_3)_3 \cdot 2\text{HIO}_3 \cdot 6\text{H}_2\text{O}</math></td> <td style="text-align: right;">(42)</td> </tr> </table> <p>Solid solutions of <math>\text{LiIO}_3</math> and <math>\text{HIO}_3</math> (41,42) were found in both systems.</p>		Ternary System	T/K	Solid Phase	Reference	$\text{LiIO}_3 + \text{LiCl} + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{LiCl}$ ; $\text{LiIO}_3 \cdot \text{LiCl} \cdot \text{H}_2\text{O}$ $3\text{LiIO}_3 \cdot 3\text{LiCl} \cdot 3\text{H}_2\text{O}$	17	$\text{LiIO}_3 + \text{LiBr} + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{LiBr} \cdot 2\text{H}_2\text{O}$ ; $\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}$ ; $\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}$	45	$\text{LiIO}_3 + \text{LiI} + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{LiI} \cdot 3\text{H}_2\text{O}$ ; $3\text{LiIO}_3 \cdot 2\text{LiI} \cdot 6\text{H}_2\text{O}$	46	$\text{KIO}_3 \cdot \text{HIO}_3$ ; $\text{KIO}_3 \cdot 2\text{LiIO}_3$ ; $\text{KIO}_3 \cdot 2\text{H}_2\text{O}$	(41)	$\text{Al}(\text{IO}_3)_3 \cdot 2\text{HIO}_3 \cdot 6\text{H}_2\text{O}$	(42)
Ternary System	T/K	Solid Phase	Reference																		
$\text{LiIO}_3 + \text{LiCl} + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{LiCl}$ ; $\text{LiIO}_3 \cdot \text{LiCl} \cdot \text{H}_2\text{O}$ $3\text{LiIO}_3 \cdot 3\text{LiCl} \cdot 3\text{H}_2\text{O}$	17																		
$\text{LiIO}_3 + \text{LiBr} + \text{H}_2\text{O}$	298	$\alpha\text{-LiIO}_3$ ; $\text{LiBr} \cdot 2\text{H}_2\text{O}$ ; $\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}$ ; $\text{LiIO}_3 \cdot 2\text{LiBr} \cdot 4\text{H}_2\text{O}$	45																		
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<p>COMPONENTS:</p> <p>(1) Lithium iodate; <math>\text{LiIO}_3</math>; [13765-03-2]</p> <p>(2) Water; <math>\text{H}_2\text{O}</math>; [7732-18-5]</p>	<p>EVALUATOR:</p> <p>Hiroshi Miyamoto Department of Chemistry Niigata University Niigata, Japan</p> <p style="text-align: right;">February, 1986</p>
<p>CRITICAL EVALUATION:</p> <p><u>Five Components System.</u> Although the five component system <math>\text{LiIO}_3\text{-KIO}_3\text{-LiOH-KOH-H}_2\text{O}</math> has been studied by Vinogradov, Lepeshkov and Tarasova (16), numerical solubility data were reported only for two quaternary systems, <math>\text{LiIO}_3\text{-KIO}_3\text{-LiOH-H}_2\text{O}</math> and <math>\text{KIO}_3\text{-LiOH-KOH-H}_2\text{O}</math>. In the quaternary <math>\text{LiIO}_3\text{-KIO}_3\text{-LiOH-H}_2\text{O}</math> system, the double salt <math>\text{KIO}_3 \cdot 2\text{LiIO}_3</math> was formed and a solid solution of lithium iodate and hydroxide was also found.</p> <p style="text-align: center;">REFERENCES</p> <ol style="list-style-type: none"> <li>1. Mylius, F.; Funk, R. <i>Ber. Dtsch. Chem. Ges.</i> <u>1897</u>, <i>30</i>, 1716.</li> <li>2. Ricci, J. E.; Amron, I. <i>J. Am. Chem. Soc.</i> <u>1951</u>, <i>73</i>, 3613.</li> <li>3. Azarova, L. A.; Vinogradov, E. E.; Mikhailova, E. M.; Pakhomov, V. I. <i>Zh. Neorg. Khim.</i> <u>1973</u>, <i>18</i>, 239; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1973</u>, <i>18</i>, 124.</li> <li>4. Azarova, L. A.; Vinogradov, E. E.; Mikhailova, E. M.; Pakhomov, V. I. <i>Zh. Neorg. Khim.</i> <u>1973</u>, <i>18</i>, 2559; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1973</u>, <i>18</i>, 1357.</li> <li>5. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, E. I.; Mitnitskii, P. L. <i>Zh. Neorg. Khim.</i> <u>1974</u>, <i>19</i>, 1975; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1974</u>, <i>19</i>, 1082.</li> <li>6. Karataeva, I. M.; Vinogradov, E. E. <i>Zh. Neorg. Khim.</i> <u>1974</u>, <i>19</i>, 3156; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1974</u>, <i>19</i>, 1726.</li> <li>7. Shklovskaya, R. M.; Kashina, N. I.; Arkhipov, S. M.; Kuzina, V. A.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1975</u>, <i>20</i>, 783; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1975</u>, <i>20</i>, 441.</li> <li>8. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1975</u>, <i>20</i>, 1442; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1975</u>, <i>20</i>, 811.</li> <li>9. Tarasova, G. N.; Vinogradov, E. E.; Lepeshkov, I. N. <i>Zh. Neorg. Khim.</i> <u>1976</u>, <i>21</i>, 874; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1976</u>, <i>21</i>, 478.</li> <li>10. Vinogradov, E. E.; Karataeva, I. M. <i>Zh. Neorg. Khim.</i> <u>1976</u>, <i>21</i>, 1664; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1976</u>, <i>21</i>, 910.</li> <li>11. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Kuzina, V. A.; Poleva, G. V. <i>Zh. Neorg. Khim.</i> <u>1976</u>, <i>21</i>, 3116; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1976</u>, <i>21</i>, 1718.</li> <li>12. Tarasova, G. N.; Vinogradov, E. E.; Lepeshkov, I. N. <i>Zh. Neorg. Khim.</i> <u>1976</u>, <i>21</i>, 3373; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1976</u>, <i>21</i>, 1858.</li> <li>13. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Mitnitskii, P. L. <i>Izv. Sib. Otd. Akad. Nauk SSSR Ser. Khim. Nauk</i> <u>1976</u>, (6), 89.</li> <li>14. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Zherdienko, L. P. <i>Zh. Neorg. Khim.</i> <u>1977</u>, <i>22</i>, 1139; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1977</u>, <i>22</i>, 624.</li> <li>15. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Tsubulevskaya, K. A. <i>Zh. Neorg. Khim.</i> <u>1978</u>, <i>23</i>, 2565; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1978</u>, <i>23</i>, 1421.</li> <li>16. Vinogradov, E. E.; Lepeshkov, I. N.; Tarasova, G. N. <i>Zh. Neorg. Khim.</i> <u>1978</u>, <i>23</i>, 3360; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1978</u>, <i>23</i>, 1865.</li> <li>17. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Kuzina, V. A. <i>Zh. Neorg. Khim.</i> <u>1979</u>, <i>24</i>, 203; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1979</u>, <i>24</i>, 113.</li> </ol>	

<p>COMPONENTS:</p> <p>(1) Lithium iodate; <math>\text{LiIO}_3</math>; [13765-3-2]</p> <p>(2) Water; <math>\text{H}_2\text{O}</math>; [7732-18-5]</p>	<p>EVALUATOR:</p> <p>Hiroshi Miyamoto Department of Chemistry Niigata University Niigata, Japan</p> <p style="text-align: right;">February, 1986</p>
<p>CRITICAL EVALUATION:</p> <p>REFERENCES: (Continued)</p> <ol style="list-style-type: none"> <li>18. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1979</u>, <i>24</i>, 2287; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1979</u>, <i>24</i>, 1269.</li> <li>19. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Tokareva, A. G.; Kuzina, V. A. <i>Zh. Neorg. Khim.</i> <u>1980</u>, <i>25</i>, 1122; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1980</u>, <i>25</i>, 618.</li> <li>20. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Poleva, G. A.; Kuzina, V. A. <i>Zh. Neorg. Khim.</i> <u>1981</u>, <i>26</i>, 791; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1981</u>, <i>26</i>, 425.</li> <li>21. Arkhipov, S. M.; Kashina, N. I.; Kidyarov, B. I.; Kuzina, V. A. <i>Zh. Neorg. Khim.</i> <u>1981</u>, <i>26</i>, 1447; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1981</u>, <i>26</i>, 779.</li> <li>22. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Tokareva, A. G. <i>Zh. Neorg. Khim.</i> <u>1981</u>, <i>26</i>, 1701; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1981</u>, <i>26</i>, 919.</li> <li>23. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Poleva, G. V.; Troitskaya, N. I. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 257; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 145.</li> <li>24. Vinogradov, E. E.; Tarasova, G. N. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 269; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 153.</li> <li>25. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Kuzina, V. A.; Vdovkina, T. E. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 513; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 292.</li> <li>26. Arkhipov, S. M.; Kashina, N. I.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 539; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 306.</li> <li>27. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Vdovkina, T. E. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 1597; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 902.</li> <li>28. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Vdovkina, T. E. <i>Zh. Neorg. Khim.</i> <u>1982</u>, <i>27</i>, 2985; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1982</u>, <i>27</i>, 1692.</li> <li>29. Azarova, L. A.; Vinogradov, E. E.; Pakhomov, V. I. <i>Zh. Neorg. Khim.</i> <u>1976</u>, <i>21</i>, 2801; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1976</u>, <i>21</i>, 1545.</li> <li>30. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I. <i>Izv. Sib. Otd. Akad. Nauk SSSR Ser. Khim. Nauk</i> <u>1979</u>, (9), 75.</li> <li>31. Azarova, L. A.; Vinogradov, E. E. <i>Zh. Neorg. Khim.</i> <u>1977</u>, <i>22</i>, 273; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1977</u>, <i>22</i>, 153.</li> <li>32. Arkhipov, S. M.; Kashina, N. I.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1978</u>, <i>23</i>, 1422; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1978</u>, <i>23</i>, 784.</li> <li>33. Umezawa, T.; Ninomiya, Y.; Tatuoka, S. <i>J. Appl. Crystallogr.</i> <u>1970</u>, <i>3</i>, 417.</li> <li>34. Umezawa, T.; Tatuoka, S. <i>Jpn. J. Appl. Phys.</i> <u>1972</u>, <i>11</i>, 408.</li> <li>35. Zachariasen, W. H.; Barta, F. A. <i>Phys. Rev.</i> <u>1931</u>, <i>37</i>, 1626.</li> <li>36. Barta, F. A.; Zachariasen, W. H. <i>Phys. Rev.</i> <u>1931</u>, <i>37</i>, 1693.</li> <li>37. Lithium Iodate Crystal Research Group, Institute of Physics Wu Li Hsueh Pao <u>1975</u>, <i>24</i>, 91; <i>C. A.</i> <u>1976</u>, <i>83</i>, 106309m.</li> <li>38. Desvignes, J. M.; Remoissent, M. <i>Mater. Res. Bull.</i> <u>1971</u>, <i>6</i>, 705.</li> </ol>	

<b>COMPONENTS:</b> (1) Lithium iodate; $\text{LiIO}_3$ ; [13765-03-2] (2) Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>EVALUATOR:</b> Hiroshi Miyamoto Department of Chemistry Niigata University Niigata, Japan  February, 1986
<b>CRITICAL EVALUATION:</b>  <b>REFERENCES: (Continued)</b>  39. Liminga, R.; Abrahams, S. C. <i>J. Appl. Crystallogr.</i> <u>1976</u> , 9, 42. 40. Arkhipov, S. M.; Pruntsev, A. E.; Kidyarov, B. I. <i>Zh. Neorg. Khim.</i> <u>1977</u> , 22, 3394; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1977</u> , 22, 1855. 41. Lukasiewicz, T.; Pietaszewska, J.; Smija, J. <i>Biul. Wojak, Acad. Teck.</i> <u>1979</u> , 28, 85. 42. Azarova, L. A.; Vinogradov, E. E.; Lepeshkov, I. M. <i>Zh. Neorg. Khim.</i> <u>1978</u> , 23, 1952; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1978</u> , 23, 1072. 43. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Tsibulevskaya, K. A. <i>Zh. Neorg. Khim.</i> <u>1979</u> , 24, 253; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1979</u> , 24, 141. 44. Shklovskaya, R. M.; Arkhipov, S. M.; Kidyarov, B. I.; Vdovkina, T. E.; Poleva, G. V. <i>Zh. Neorg. Khim.</i> <u>1983</u> , 28, 2431; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> <u>1983</u> , 28, 1382.	