

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Ethanol; C_2H_6O ; [64-17-5] (3) Water; H_2O ; [7732-18-5]		ORIGINAL MEASUREMENTS: Sakharova, Yu.G.; Ezhova, T.A. <i>Zh. Neorg. Khim.</i> 1976, 21, 551-4; <i>Russ. J. Inorg. Chem. (Engl. Transl.)</i> 1976, 21, 296-8.				
VARIABLES: Temperature		PREPARED BY: T. Mioduski and M. Salomon				
EXPERIMENTAL VALUES: solubility of $TbCl_3 \cdot 6H_2O$ in 96.8 % $C_2H_5OH^a$						
	sample 1	sample 2	sample 3	sample 4	mean solubilities	
t/°C	g/100 g ^b	g/100 g	g/100 g	g/100 g	g/100 g	mol kg ^{-1c}
20	30.75	30.68	30.50	30.61	30.63	1.183
30	29.94	30.03	30.32	30.06	30.08	1.152
40	30.31	30.49	30.33	29.94	30.27	1.163
50	30.84	30.81	30.77	30.92	30.83	1.194
60	32.92	33.03	32.65	32.63	32.80	1.307
^a It is not clearly stated whether the mixture is 96.8 mass % or 96.8 volume % ethanol.						
^b Solubilities reported as grams of hexahydrate in 100 g of solvent.						
^c Molalities calculated by the compilers.						
AUXILIARY INFORMATION						
METHOD/APPARATUS/PROCEDURE: Isothermal method used. Equilibrium was reached after 3-4 h. Identical results obtained by approaching equilibrium from above and below. Two of the data points in the table obtained after 3 hours of equilibration, and the remaining two data points obtained after 4 h of equilibration. The metal content in each aliquot taken for analysis was determined by complexometric titration with Trilon B. Analyses of the solids withdrawn at 20°C, 40°C and 60°C showed the solid phase to be the hexahydrate: i.e. ethanol was not found in any of the solid phases.			SOURCE AND PURITY OF MATERIALS: $TbCl_3 \cdot 6H_2O$ prep'd by dissolving c.p. grade oxide in dil (1:3) HCl followed by evapn and crystn. The crystals were dried in a desiccator over $CaCl_2$, P_2O_5 and NaOH. The crystals analyzed for the metal by titrn with Trilon B, and for Cl by the Volhard method. The hexahydrate melted at 158.0 - 158.8°C. 96.8% ethanol prep'd by prolonged boiling of c.p. grade 93.5% ethanol with anhydr $CuSO_4$ followed by distn. Ethanol concn det'd refractometrically and pycnometrically.			
			ESTIMATED ERROR: Soly: results apparently precise to within $\pm 0.9\%$ (compilers). Temp: nothing specified.			
			REFERENCES:			

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Alkoxy-ethanols	ORIGINAL MEASUREMENTS: Kirmse, E.M. <i>Tr. II Vses. Konf. po Teor. Rastvorov</i> 1971, 200-6.																		
VARIABLES: T/K = 298	PREPARED BY: T. Mioduski and M. Salomon																		
EXPERIMENTAL VALUES: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">solvent</th> <th colspan="3">TbCl₃ solubility^a</th> <th rowspan="2">nature of the solid phase</th> </tr> <tr> <th>mass %</th> <th>mol kg⁻¹</th> <th></th> </tr> </thead> <tbody> <tr> <td>2-methoxyethanol; C₃H₈O; [109-86-4]</td> <td>3.8</td> <td>0.15</td> <td></td> <td>TbCl₃.nC₃H₈O₂ (n = 2-3)</td> </tr> <tr> <td>2-ethoxyethanol; C₄H₁₀O₂; [110-80-5]</td> <td>11.9</td> <td>0.509</td> <td></td> <td>TbCl₃.2C₄H₁₀O₂</td> </tr> </tbody> </table> <p>^aMolalities calculated by the compilers.</p>		solvent	TbCl ₃ solubility ^a			nature of the solid phase	mass %	mol kg ⁻¹		2-methoxyethanol; C ₃ H ₈ O; [109-86-4]	3.8	0.15		TbCl ₃ .nC ₃ H ₈ O ₂ (n = 2-3)	2-ethoxyethanol; C ₄ H ₁₀ O ₂ ; [110-80-5]	11.9	0.509		TbCl ₃ .2C ₄ H ₁₀ O ₂
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METHOD/APPARATUS/PROCEDURE: Experimental details not given, but were probably similar to previous works of the author which are compiled throughout this volume.	SOURCE AND PURITY OF MATERIALS: Nothing specified, but based on previous work by the authors the anhydrous salt was probably prepared by the method of Taylor and Carter (1). ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Taylor, M.D.; Carter, C.P. <i>J. Inorg. Nucl. Chem.</i> <u>1962</u> , 24, 387.																		

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) 1,2-Diethoxyethane; $C_6H_{14}O_2$; [629-14-1]	ORIGINAL MEASUREMENTS: Kirmse, E.M.; Zwietasch, K.J. Z. Chem. <u>1967</u> , 7, 281.
VARIABLES: T/K = 298	PREPARED BY: T. Mioduski
EXPERIMENTAL VALUES: <p>The solubility of $TbCl_3$ in 1,2-diethoxyethane at 25°C was reported to be</p> <p style="text-align: center;">0.22 mass %</p> <p>The corresponding molality calculated by the compiler is</p> <p style="text-align: center;">0.0083 mol kg⁻¹</p> <p>The composition of the solid phase was given in terms of the Tb:Cl:ether ratio as</p> <p style="text-align: center;">1:2.93:1.37</p>	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Isothermal method used. The anhydrous mixtures were equilibrated at 25°C for several days with frequent shaking. The solid phase was dried in a vacuum desiccator over P_2O_5 . Tb was determined by complexometric titration using Xylenol Orange indicator. Chloride was determined by the Volhard titration method.	SOURCE AND PURITY OF MATERIALS: Sources and purities of materials not given. The anhydrous chloride was obtained by the method of Taylor and Carter (1). The solvent was prepared by the Williamson synthesis: i.e. by reaction of C_2H_5I with the monoethylether of ethylene glycol. ESTIMATED ERROR: No estimates possible. REFERENCES: 1. Taylor, M.D.; Carter, C.P. J. Inorg. Nucl. Chem. <u>1962</u> , 24, 387.

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Ethers	ORIGINAL MEASUREMENTS: Kirmse, E.M.; Zwietasch, K.J.; Tirschmann, J. Oelsner, L.; Niedergesaess, U. <i>Z. Chem.</i> <u>1968</u> , <i>8</i> , 472-3. Kirmse, E.M. <i>Tr. II Vses. Konf. po Teor. Rastvorov.</i> <u>1971</u> , 200-6.																				
VARIABLES: Room temperature: T/K around 298	PREPARED BY: T. Mioduski and M. Salomon																				
EXPERIMENTAL VALUES: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3"></th> <th colspan="2" style="text-align: right;">TbCl₃ solubility^{a,b}</th> </tr> <tr> <th style="text-align: left;">solvent</th> <th></th> <th></th> <th style="text-align: center;">mass %</th> <th style="text-align: center;">mol kg⁻¹</th> </tr> </thead> <tbody> <tr> <td>1-ethoxy-2-methoxyethane;</td> <td>$C_5H_{12}O_2$;</td> <td>[5137-45-1]</td> <td style="text-align: center;">0.6</td> <td style="text-align: center;">0.023</td> </tr> <tr> <td>1,4-dioxane;</td> <td>$C_4H_8O_2$;</td> <td>[123-91-1]</td> <td style="text-align: center;">0.3</td> <td style="text-align: center;">0.011</td> </tr> </tbody> </table> <p>^aMolalities calculated by the compilers.</p> <p>^bNature of solid phases not specified.</p>					TbCl ₃ solubility ^{a,b}		solvent			mass %	mol kg ⁻¹	1-ethoxy-2-methoxyethane;	$C_5H_{12}O_2$;	[5137-45-1]	0.6	0.023	1,4-dioxane;	$C_4H_8O_2$;	[123-91-1]	0.3	0.011
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METHOD/APPARATUS/PROCEDURE: The solute-solvent mixtures were isothermally agitated at 25°C or at room temperature. Authors state that the difference found for the solubility was within experimental error limits. Tb was determined by complexometric titration. No other details given.	SOURCE AND PURITY OF MATERIALS: The anhydrous salt was prepared by the method of Taylor and Carter (1). No other information given. ESTIMATED ERROR: Nothing specified. REFERENCES: 1. Taylor, M.D.; Carter, C.P. <i>J. Inorg. Nucl. Chem.</i> <u>1962</u> , <i>24</i> , 387.																				

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Alkyl ethers	ORIGINAL MEASUREMENTS: Kirmse, E.M.; Dressler, H. Z. Chem. <u>1975</u> , 15, 239-40.																																							
VARIABLES: Room Temperature (293-298 K)	PREPARED BY: T. Mioduski and M. Salomon																																							
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METHOD/APPARATUS/PROCEDURE: The solute-solvent mixtures were isothermally agitated (at room temperature) until equilibrium was attained. The anhydrous reagents were handled in a dry box containing P_4O_{10} . Tb was determined by complexometric titration using Xylenol Orange indicator. The reported solubilities are mean values based on four determinations.	SOURCE AND PURITY OF MATERIALS: Nothing specified. ESTIMATED ERROR: Nothing specified. REFERENCES:																																							

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Tributylphosphate; $C_{12}H_{27}O_4P$; [126-73-8]	ORIGINAL MEASUREMENTS: Korovin. S.S.; Galaktionova, O.V.; Lebedeva, E.N.; Voronskaya, G.N. Zh. Neorg. Khim. 1975, 20, 908-14; Russ. J. Inorg. Chem. (Engl. Transl.) 1975, 20, 508-11.												
VARIABLES: T/K = 298	PREPARED BY: T. Mioduski and M. Salomon												
EXPERIMENTAL VALUES: <p style="text-align: center;">Composition of saturated solutions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">mass %</th> <th style="text-align: left;">mol/kg sln</th> <th style="text-align: left;">g dm⁻³</th> <th style="text-align: left;">mol dm⁻³</th> <th style="text-align: left;">mol kg⁻¹ (compiler)</th> <th style="text-align: left;">density/g cm⁻³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">38.5</td> <td style="text-align: center;">1.45</td> <td style="text-align: center;">525.0</td> <td style="text-align: center;">1.98</td> <td style="text-align: center;">2.36</td> <td style="text-align: center;">1.36</td> </tr> </tbody> </table> <p style="text-align: center;">The solid phase is $TbCl_3$</p>		mass %	mol/kg sln	g dm ⁻³	mol dm ⁻³	mol kg ⁻¹ (compiler)	density/g cm ⁻³	38.5	1.45	525.0	1.98	2.36	1.36
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38.5	1.45	525.0	1.98	2.36	1.36								
AUXILIARY INFORMATION													
METHOD/APPARATUS/PROCEDURE: Saturated solutions prepared isothermally with magnetic stirring. Equilibrium was attained after 25-30 d. The solution was centrifuged and an aliquot for analysis taken and added to methanol and precipitated with aq NH_3 . The pptd $Tb(OH)_3$ was washed repeatedly and heated to the oxide for gravimetric analysis. The solid phase was analyzed (no details given) for phosphorous, and only the anhydrous $TbCl_3$ was found. All operations were performed in a dry box through which a stream of argon was passed. The major objective of this work was to establish the nature of complexation between TBP and $TbCl_3$ in solution.	SOURCE AND PURITY OF MATERIALS: Anhydrous $TbCl_3$ prepared by chlorination of the oxide with CCl_4 vapor (1,2). Source and purity of materials not given. Tb was analyzed gravimetrically, and Cl by Volhard's method. Tributylphosphate (TBP) was purified "by the standard method." No additional details given. ESTIMATED ERROR: No estimates possible. REFERENCES: 1. Korshunov, B.G.; Drobot, D.V.; Bukhtiyarov, V.V.; Shevtsova, Z.N. Zh. Neorg. Khim. 1964, 9, 1427. 2. Novikov, G.I.; Tolmacheva, V.D. Zh. Prikl. Khim. 1965, 38, 1160.												

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Alkyl amines	ORIGINAL MEASUREMENTS: Kirmse, E. M. <i>Tr. II Vses. Konf. po Teor. Rastvorov</i> 1971, 200-6.																				
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COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (3) Hexamethylphosphorotriamide; $C_6H_{18}N_3OP$; [680-31-9]	ORIGINAL MEASUREMENTS: Mikheev, N.B.; Kamenskaya, A.N.; Konovalova, N.A.; Zhilina, T.A. <i>Zh. Neorg. Khim.</i> <u>1977</u> , <i>22</i> , 1761-6; <i>Russ. J.</i> <i>Inorg. Chem. (Engl. Transl.)</i> <u>1977</u> , <i>22</i> , 955-8.
VARIABLES: Room temperature: $T/K = 298 \pm 3$	PREPARED BY: T. Mioduski and M. Salomon
EXPERIMENTAL VALUES: Starting with the solvate $TbCl_3 \cdot 3((CH_3)_2N)_3PO$, the solubility at $25 \pm 3^\circ C^a$ was given as $0.128 \text{ mol dm}^{-3}$ ^a Table 3 in the English translation of the source paper states the temperature to be $23 \pm 3^\circ C$. This is probably a typographical error as the text clearly states that all measurements were carried out at $25 \pm 3^\circ C$.	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: Isothermal method. Salt and solvent were placed in a test-tube in a dry box, and the tube agitated at room temperature until equilibrium was reached. Aliquots were withdrawn periodically and analyzed for the metal content. Rare earth concentration was determined by complexometric titration, and by the radiometric method using the isotope $Tm-170$ ($t_{1/2} = 169$ d). Authors state that results for both methods agreed. Although not clearly stated, it appears that equilibrium was reached in several weeks to several months. Solid phase samples washed three times with benzene or ether and dried on a steam bath in an argon atmosphere. The solid phase was analyzed and found to be $TbCl_3 \cdot 3C_6H_{18}N_3OP$. The solvate was analyzed for metal content by complexometric titration, for chloride by the Volhard method, and the solvent was obtained by difference. IR spectra confirmed the absence of water. Structural studies of the solvate were also carried out by X-ray analysis.	SOURCE AND PURITY OF MATERIALS: $TbCl_3 \cdot 3C_6H_{18}N_3OP$ prepared by dissolving the hydrate in the solvent and heating to $140-145^\circ C$ for 5 m. The solvate was pptd by addition of abs ether, washed 7 times with ether, and dried over P_2O_5 in a stream of dry nitrogen. Yield was about 90%. The solvent was purified as described in (1). ESTIMATED ERROR: Soly: precision $\pm 0.007 \text{ mol dm}^{-3}$ at a 95% level of confidence (authors). Temp: precision $\pm 3K$. REFERENCES: 1. Fomicheva, M.G.; Kessler, Yu.M.; Zabusova, S.E.; Alpatova, N.M. <i>Elektrokhimiya</i> <u>1975</u> , <i>11</i> , 163.

COMPONENTS: (1) Terbium chloride; $TbCl_3$; [10042-88-3] (2) Tetrachlorostannate; $SnCl_4$; [7646-78-8] (3) Phosphorus oxychloride; $POCl_3$; [10025-87-3]	ORIGINAL MEASUREMENTS: Lyubimov, E.I.; Batyaev, I.M. <i>Zh. Prikl. Khim.</i> <u>1972</u> , <i>45</i> , 1176-8.																														
VARIABLES: T/K = 293 Concentration of $SnCl_4$	PREPARED BY: T. Mioduski																														
EXPERIMENTAL VALUES: <table border="1" data-bbox="221 467 1243 844"> <thead> <tr> <th rowspan="2">SnCl₄:POCl₃ ratio (by volume)</th> <th rowspan="2">SnCl₄ concentration mol dm⁻³</th> <th colspan="2">solubility/moles Tb dm⁻³ ^{a,b}</th> </tr> <tr> <th>Tb₂O₃</th> <th>Tb₄O₇</th> </tr> </thead> <tbody> <tr> <td>1:250</td> <td>0.035</td> <td>0.069</td> <td>----</td> </tr> <tr> <td>1:100</td> <td>0.085</td> <td>0.30</td> <td>0.056</td> </tr> <tr> <td>1:50</td> <td>0.17</td> <td>0.15 (0.13)</td> <td>0.18 (0.015)</td> </tr> <tr> <td>1:25</td> <td>0.33</td> <td>0.067</td> <td>0.059</td> </tr> <tr> <td>1:15</td> <td>0.59</td> <td>0.051</td> <td>0.040</td> </tr> <tr> <td>1:10</td> <td>0.78</td> <td>0.018</td> <td>0.047</td> </tr> </tbody> </table> <p>^aSolutions preheated to 220°C. Values in parenthesis correspond to preheating at 120°C.</p> <p>^bThis is also the solubility of $TbCl_3$ in the $SnCl_4$-$POCl_3$ mixture because the oxide is quantitatively converted to the chloride according to</p> $Tb_2O_3 + 6POCl_3 = 2TbCl_3 + 3P_2O_3Cl_4$ <p>Authors state that the solubility of $TbCl_3$ is enhanced by complex formation according to</p> $2TbCl_3 + 3SnCl_4 = Tb_2(SnCl_6)_3$		SnCl ₄ :POCl ₃ ratio (by volume)	SnCl ₄ concentration mol dm ⁻³	solubility/moles Tb dm ⁻³ ^{a,b}		Tb ₂ O ₃	Tb ₄ O ₇	1:250	0.035	0.069	----	1:100	0.085	0.30	0.056	1:50	0.17	0.15 (0.13)	0.18 (0.015)	1:25	0.33	0.067	0.059	1:15	0.59	0.051	0.040	1:10	0.78	0.018	0.047
SnCl ₄ :POCl ₃ ratio (by volume)	SnCl ₄ concentration mol dm ⁻³			solubility/moles Tb dm ⁻³ ^{a,b}																											
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1:100	0.085	0.30	0.056																												
1:50	0.17	0.15 (0.13)	0.18 (0.015)																												
1:25	0.33	0.067	0.059																												
1:15	0.59	0.051	0.040																												
1:10	0.78	0.018	0.047																												
AUXILIARY INFORMATION																															
METHOD/APPARATUS/PROCEDURE: Isothermal method used. $POCl_3 + SnCl_4$ solutions were prepared by volume in a dry box. The $SnCl_4$ content was verified by chemical analysis for Sn. This solution and Tb_2O_3 were placed in sealed ampoules, heated to 20-250°C to increase the rate of solution, and then rotated in an air thermostat at 20°C for 2-200 hours. Without preheating, equilibrium was established after 200 hours. Preheating to 220°C lowered the equilibration time at 20°C to 2 hours. Tb was determined by colorimetric analysis or the oxalate method. The reported solubilities are mean values based on 3-5 parallel determinations.	SOURCE AND PURITY OF MATERIALS: Tb_4O_7 of "the first sort" was reduced to Tb_2O_3 with hydrogen at 950°C. "Pure" grade $SnCl_4$ and $POCl_3$ were dehydrated with P_2O_5 and distilled under vacuum. ESTIMATED ERROR: Soly: authors state the "coefficient of variance" to be less than 7%. Temp: precision presumably ± 0.2 K (compiler). REFERENCES:																														