COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Ethanol; C_2H_6O; [64-17-5] (3) Water; H_2O; [7732-18-5]	Sakharova, Yu.G; Ezhova, T.A. *Zh. Neorg. Khim.* 1976, *21*, 551-4; *Russ. J. Inorg. Chem.* (*Engl. Transl.*) 1976, *21*, 296-8.
VARIABLES: Temperature	PREPARED BY: T. Mioduski and M. Salomon

EXPERIMENTAL VALUES:

solubility of $HoCl_3.6H_2O$ 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^{-1}[c]
20	34.62	34.81	34.86	34.87	34.79	1.406
30	33.72	33.85	34.04	33.89	33.87	1.350
40	33.88	34.02	33.83	34.16	33.97	1.356
50	34.25	34.68	34.47	34.56	34.49	1.388
60	36.02	36.11	35.77	35.83	35.93	1.478

[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Analyses of the solids withdrawn at 20°C, 40°C and 60°C showed the solid phase to be the hexahydrate: i.e. ethanol was not found in any of the solid phases.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:
$HoCl_3.6H_2O$ prepd 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 163.4 - 164.5°C. 96.8% ethanol prepd by prolonged boiling of c.p. grade 93.5% ethanol with anhydr $CuSO_4$ followed by distn. Ethanol concn detd refractometrically and pycnometrically.

ESTIMATED ERROR:
Soly: results apparently precise to within ± 0.9% (compilers).

Temp: nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Alkoxy-ethanols	Kirmse, E.M. *Tr. II Vses. Konf. po Teor. Rastvorov* 1971, 200-6.
VARIABLES:	**PREPARED BY:**
T/K = 298	T. Mioduski and M. Salomon

EXPERIMENTAL VALUES:

solvent			$HoCl_3$ solubility[a] mass %	mol kg^{-1}	nature of the solid phase
2-methoxyethanol;	$C_3H_8O_2$;	[109-86-4]	3.2	0.122	$HoCl_3.nC_3H_8O_2$ (n = 2-3)
2-ethoxyethanol;	$C_4H_{10}O_2$;	[110-80-5]	8.4	0.338	$HoCl_3.2C_4H_{10}O_2$

[a]Molalities calculated by the compilers.

AUXILIARY INFORMATION

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 author, 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. *J. Inorg. Nucl. Chem.* 1962, *24*, 387.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) 1,2-Diethoxyethane; $C_6H_{14}O_2$; [629-14-1]	Kirmse, E.M.; Zwietasch, K.J. Z. *Chem.* 1967, 7, 281.
VARIABLES: T/K = 298	**PREPARED BY:** T. Mioduski

EXPERIMENTAL VALUES:

The solubility of $HoCl_3$ in 1,2-diethoxyethane at 25°C was reported to be

0.37 mass %

The corresponding molality calculated by the compiler is

$0.0137 \text{ mol kg}^{-1}$

The composition of the solid phase was given in terms of the Ho:Cl:ether ratio as

1:2.97:1.82

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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. Ho was determined by complexometric titration using Xylenol Orange indicator. Chloride was determined by the Volhard titration method.	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.* 1962, 24, 387.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Alkyl ethers	Kirmse, E.M.; Dressler, H. *Z. Chem.* 1975, *15*, 239-40.
VARIABLES: Room temperature: T/K = 293-298	**PREPARED BY:** M. Salomon and T. Mioduski

EXPERIMENTAL VALUES:

solvent			$HoCl_3$ solubility[a] mass %	mol kg^{-1}
1-methoxypentane;[b]	$C_6H_{14}O$;	[628-80-8]	2.4[b]	0.091
1-methoxyheptane;	$C_6H_{18}O$;	[629-32-3]	1.0	0.037
1-methoxyoctane;	$C_9H_{20}O$;	[929-56-6]	1.55	0.058
1-methoxynonane;	$C_{10}H_{22}O$;	[7289-51-2]	1.8	0.068
1-methoxydecane;	$C_{11}H_{24}O$;	[7289-52-3]	2.5	0.095

[a]Molalities calculated by the compilers.

[b]Identical result for this system reported in (1)

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The solute-solvent mixtures were agitated at room temperature until the solutions were saturated. The anhydrous reagents were handled in a dry box containing P_2O_5. Holmium was determined by complexometric titration using Xylenol Orange indicator. The reported solubilities are mean values based on four determinations for each system.	No information given.
	ESTIMATED ERROR: No information given.
	REFERENCES: 1. Kirmse, E.M. *Tr. II. Vses. Konf. po Teor. Rastvorov* 1971, 200-6.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Ethers	Kirmse, E.M.; Zwietasch, K.J.; Tirschmann, J.; Oelsner, L.; Niedergeases, U. *Z. Chem.* 1968, *8*, 472-3. Kirmse, E.M. *Tr. II Vses. Konf. po Teor. Rastvorov.* 1971, 200-6.
VARIABLES:	PREPARED BY:
Room temperature: T/K around 298	T. Mioduski and M. Salomon

EXPERIMENTAL VALUES:

solvent			solubility[a,b] mass %	solubility[a,b] mol kg^{-1}
1-ethoxy-2-methoxyethane;	$C_5H_{12}O_2$;	[5137-45-1]	0.6_5	0.024
di-n-propyl ether;	$C_6H_{14}O$;	[111-43-3]	0.1	0.004
1-ethoxybutane;	$C_6H_{14}O$;	[628-81-9]	0.01	0.0004
1-methoxypentane;	$C_6H_{14}O$;	[628-80-8]	2.4	0.091
1,4-dioxane;	$C_4H_8O_2$;	[123-91-1]	0.5_5	0.020

[a]Molalities calculated by the compilers.

[b]Nature of the solid phases not specified.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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. Ho was determined by complexometric titration. No other details given.	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. *J. Inorg. Nucl. Chem.* 1962, *24*, 387.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Tetrahydrofuran; C_4H_8O; [109-99-9]	Rossmanith, K.; Auer-Welsbach, C. *Monatsh. Chem.* 1965, *96*, 602-5.
VARIABLES: Room Temperature: T/K about 293	**PREPARED BY:** T. Mioduski

EXPERIMENTAL VALUES:

The solubility of $HoCl_3$ in tetrahydrofuran at 20°C (room temperature) was reported to be

0.698 g per 100 ml of solution

(0.0257 mol dm^{-3}, compiler).

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Isothermal method employed. The solution was equilibrated in an extractor with agitation for 60-80 hours at room temperature.

Holmium was determined by the oxalate method and by titration with EDTA using Xylenol Orange indicator. The solvent was determined by difference.

Anhydrous materials were handled in a dry box through which was passed a stream of nitrogen free of carbon dioxide.

The solid phase is $HoCl_3.3.33C_4H_8O$.

SOURCE AND PURITY OF MATERIALS:

Sources and purities of initial materials not specified. $HoCl_3$ was prepared by conversion of the oxide by high temperature reaction with an excess of NH_4Cl followed by heating the product in a stream of dry nitrogen, and then in vacuum to remove unreacted NH_4Cl.

Tetrahydrofuran was distilled from $LiAlH_4$.

ESTIMATED ERROR:

Nothing specified.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Tributylphosphate; $C_{12}H_{27}O_4P$; [126-73-8]	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:

Composition of saturated solutions

mass %	mol/kg sln	g dm^{-3}	mol dm^{-3}	mol kg^{-1} (compilers)	density/g cm^{-3}
41.0	1.52	573.1	2.12	2.56	1.39

The solid phase is $HoCl_3$

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 $Ho(OH)_3$ 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 $HoCl_3$ 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 $HoCl_3$ in solution.

SOURCE AND PURITY OF MATERIALS:

Anhydrous $HoCl_3$ prepared by chlorination of the oxide with CCl_4 vapor (1,2). Source and purity of materials not given. Ho was analyzed gravimetrically, and Cl by Volhard's method.

Tributylphosphate (TBP) was purified "by the standard method." No additional details given.

ESTIMATED ERROR:

No estimate 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:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Alkyl amines	Kirmse, E.M. *Tr. II Vses. Konf. po Teor. Rastvorov* 1971, 200-6.
VARIABLES:	**PREPARED BY:**
T/K = 298	T. Mioduski and M. Salomon

EXPERIMENTAL VALUES:

solvent			$HoCl_3$ solubility[a] mass %	mol kg^{-1}
1-propanamine;	$n\text{-}C_3H_9N$;	[107-10-8]	33.4	1.849
di-2-butylamine;	$(sec\text{-}C_3H_9N)_2NH$;	[626-23-3]	1.2	0.045

[a]Molalities calculated by the compilers.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Experimental details not given, but were probably similar to previous works of the author which are compiled throughout this volume.

Nature of solid phases not specified.

SOURCE AND PURITY OF MATERIALS:

Nothing specified, but based on previous work by the author, 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. *J. Inorg. Nucl. Chem.* 1962, 24, 387.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Hexamethylphosphorotriamide; $C_6H_{18}N_3OP$; [680-31-9]	Mikheev, N.B.; Kamenskaya, A.N.; Konovalova, N.A.; Zhilina, T.A. *Zh. Neorg. Khim.* 1977, *22*, 1761-6; *Russ. J. Inorg. Chem. (Engl. Transl.)* 1977, *22*, 955-8.
VARIABLES:	PREPARED BY:
Room temperature: T/K = 298 ± 3	T. Mioduski and M. Salomon

EXPERIMENTAL VALUES:

Starting with the solvate $HoCl_3.3C((CH_3)_2N)_3PO$, the solubility at 25 ± 3°C[a] was given as

$$0.108 \text{ mol dm}^{-3}$$

[a]Table 3 in the English translation of the source paper states the temperature to be 23 ± 3°C. This is probably a typographical error as the text clearly states that all measurements were carried out at 25 ± 3°C.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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 ($t_{\frac{1}{2}}$ = 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 $HoCl_3.3C_6H_{18}N_3OP$. 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.	$HoCl_3.3C_6H_{18}N_3OP$ prepared by dissolving the hydrate in the solvent and heating to 140-145°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 ± 0.001 mol dm^{-3} at a 95% level of confidence (authors). Temp: precision ± 3 K.
	REFERENCES: 1. Fomicheva, M.G.; Kessler, Yu.M.; Zabusova, S.E.; Alpatova, N.M. *Elektrokhimiya* 1975, *11*, 163.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Holmium chloride; $HoCl_3$; [10138-62-2] (2) Tetrachlorostannate; $SnCl_4$; [7646-78-8] (3) Phosphorus oxychloride; $POCl_3$; [10025-87-3]	Lyubimov, E.I.; Batyaev, I.M. *Zh. Prikl. Khim.* 1972, 45, 1176-8.
VARIABLES: T/K = 293 Concentration of $SnCl_4$	**PREPARED BY:** T. Mioduski

EXPERIMENTAL VALUES:

$SnCl_4$:$POCl_3$ ratio (by volume)	$SnCl_4$ concentration mol dm^{-3}	solubility[a,b] moles Ho dm^{-3}
0	0	0.003
1:100	0.085	0.009
1:50	0.17	0.026 (0.015)
1:25	0.33	0.041
1:15	0.59	0.031
1:10	0.78	0.044

[a]Solutions preheated to 220°C. Value in parenthesis corresponds to preheating at 120°C.

[b]This is also the solubility of $HoCl_3$ in the $SnCl_4$-$POCl_3$ mixture because the oxide is quantitatively converted to the chloride according to

$$Ho_2O_3 + 6POCl_3 = 2HoCl_3 + 3P_2O_3Cl_4$$

Authors state that the solubility of $HoCl_3$ is enhanced by complex formation according to

$$2HoCl_3 + 3SnCl_4 = Ho_2(SnCl_6)_3$$

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
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 Ho_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. Prehating to 220°C lowered the equilibration time at 20°C to 2 hours. Ho was determined by colorimetric analysis or by the oxalate method. The reported solubilities are mean values based on 3-5 parallel determinations.	Ho_2O_3 of "the first sort" was ignited at 950°C for 2 hours. "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 ± 0.2K (compiler).
	REFERENCES: