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STUDYING SOLUBILITY PROPERTIES OF MG $(CLO_4)_2$-$HCLO_4$-H_2O SYSTEMS

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Annotation: Studying the analysis of solubility isotherms of three-component systems at different temperatures shows extremely sensitive even micro-processes, for example, complex formation in solutions, hydrolysis and water distribution between components, hydration processes. The most important and scientific aspect is that, looking at the isotherms, it is possible to make a complete statement about what kind of process can be said to take place in the solution. Therefore, the study of solubility at different temperatures is of practical importance for technological processes, economy, medicine, pharmaceuticals and agriculture.

***Keywords*:** different concentrations of magnesium perchlorate and perchloric acid, water, magnesium ion, trilon B indicator.

Currently, in the study of solutions, it is important to analyze not only theoretically, but also from a practical point of view. It is noteworthy to study the solubility of substances, especially in the study of aqueous solutions. When studying solubility problems, it is important to take a comprehensive approach to the properties and features of the solvent and components.

In our work, different concentrations of magnesium perchlorate and perchloric acid are used. Perchloric acid 72% chemically pure acid was used. An anhydrous acid reaction was used: $2KClO_4+H_2SO_4=K_2SO_4+2HClO_4$. As a result of recrystallization of magnesium perchlorate salt several times, chemically pure salt was obtained and used for the experiment.

Magnesium ion was titrated with trilon B indicator and ion concentrations were determined using perchloric acid and concentrations were determined using methyl red indicators. All analyzes were measured using an analytical balance with an accuracy of 0.05%.

The vapor pressure of solutions is directly related to the factors in the analysis:

1) Purity of reagents, 2) Accuracy of samples, 3) Accuracy of analytical analysis, 4) Correct control of temperature in the thermostat. Samples were taken after standing for 40-50 minutes after the system reached equilibrium. Small bags were used for the tests. Perchloric acid was prepared in 57% chemically pure state. The salt was filtered by passing through the filter shot several times.

First, the filter is passed through shot No. 1 and No. 2. After the salt is recrystallized several times, the filter shot is passed through No. 3 and No. 4. It will be analyzed later for verification.

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Solubility of $Mg(ClO_4)_2$-$HClO_4$-H_2O systems

Solid phase						Structure of solid phases
MASS %		Mol/1000г.H_2O		MASS%		
$Mg(ClO_4)_2$	$HClO_4$	$Mg(ClO_4)_2$	$HClO_4$	$Mg(ClO_4)_2$	$HClO_4$	
1	2	3	4	5	6	7
Temperature 0^0C						
48,21	-	4,16	-	-	-	$Mg(ClO_4)_2.6H_2O$
41,19	7,21	3,57	1,39	-	-	-//-
29,37	19,19	2,56	3,71	-	-	-//-
20,74	28,75	1,86	5,66	45,38	13,47	-//-
15,56	34,90	1,41	7,00	-	-	-//-
9,10	42,22	0,84	8,63	38,41	20,66	-//-
4,34	49,05	0,41	10,47	-	-	-//-
1,08	55,90	0,11	12,93	-	-	-//-
0,05	66,36	0,01	19,65	-	-	-//-
0,29	71,24	0,06	24,89	30,22	39,00	-//-
1,45	73,55	0,26	29,24	39,79	30,80	-//-
3,25	72,56	0,60	29,84	-	-	$Mg(ClO_4)_2.6H_2O$+
						$Mg(ClO_4)_2.4H_2O$
3,17	72,62	0,58	29,85	-	-	-//-
3,54	72,79	0,67	20,59	40,82	34,98	$Mg(ClO_4)_2.4H_2O$+
5,00	72,76	11,00	32,48	30,45	50,85	$Mg(ClO_4)_2.4H_2O$+
						$Mg(ClO_4)_2.2H_2O$
3,28	75,01	0,67	34,62	-	-	$Mg(ClO_4)_2.2H_2O$
3,00	75,61	0,63	35,17	1,75	79,54	$Mg(ClO_4)_2.2H_2O$+
						$HClO_4.H_2O$
1,18	76,40	0,24	33,90	1,12	80,05	$HClO_4.H_2O$

1	2	3	4	5	6	7
Temperature 25^0C						
50,00	-	4,47	-	-	-	$Mg(ClO_4)_2.6H_2O$
32,67	17,86	2,94	3,58	-	-	-//-
21,32	29,80	1,95	6,06	-	-	-//-
11,85	41,59	1,14	8,88	-	-	-//-
2,80	55,00	0,29	12,96	-	-	-//-
0,62	63,00	0,07	17,92	44,85	19,30	-//-
0,77	68,71	0,11	22,40	40,96	25,06	-//-
1,70	71,14	0,28	26,06	39,89	28,51	-//-
6,80	68,92	1,08	27,43	-	-	-//-
7,30	68,30	1,27	27,54	41,55	29,87	$Mg(ClO_4)_2.6H_2O$+
						$Mg(ClO_4)_2.4H_2O$
7,03	69,47	1,33	29,41	40,11	35,98	-//-
8,25	69,34	1,65	30,78	19,64	57,22	$Mg(ClO_4)_2.4H_2O$+
						$Mg(ClO_4)_2.2H_2O$
6,80	71,41	1,39	32,61	-	-	-//-
4,34	71,41	1,39	32,61	-	-	$Mg(ClO_4)_2.2H_2O$+

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						$HClO_4 \cdot H_2O$
1,72	78,41	0,38	38,77	0,74	82,08	-//-
-	79,21	-	31,37	-	-	-//-

1	**2**	**3**	**4**	**5**	**6**	**7**
Temperature 50^{0}C						
52,25	-	4,90	-	-	-	$Mg(ClO_4)_2 \cdot 6H_2O$
37,40	15,20	3,57	3,18	-	-	-//-
25,00	28,75	2,42	6,18	-	-	-//-
7,55	50,03	0,75	11,73	-	-	-//-
2,20	60,85	0,27	16,38	-	-	-//-
1,88	66,12	0,26	20,56	41,36	26,76	-//-
3,45	68,19	0,54	23,92	-	-	-//-
5,77	67,31	0,96	24,87	-	-	-//-
8,06	65,91	1,38	25,19	36,00	34,75	-//-
13,12	61,31	2,29	23,92	-	-	-//-
-	-	24,4	23,54	-	-	-//-
14,00	60,78	2,48	23,98	32,48	42,40	-//-
14,18	61,71	2,69	25,46	-	-	-//-
15,67	61,88	3,13	27,43	-	-	-//-
16,11	61,57	3,23	27,45	-	-	-//-
16,42	61,27	3,29	27,32	-	-	-//-
13,93	64,41	2,88	29,68	-	-	-//-
11,27	67,55	2,38	31,73	26,49	53,50	-//-
6,08	74,81	1,42	38,89	33,81	49,5	-//-
2,85	80,50	0,76	48,29	52,39	51,51	-//-

In our work, after the $Mg(ClO_4)_2$ salt has been recrystallized several times as mentioned above, the filter is passed through the shot several times.

Perchloric acid 72% chemically pure acid was used. When using the reaction in anhydrous acid, $2KClO_4+H_2SO_4=K_2SO_4+2HClO_4$, after recrystallization of magnesium perchlorate salt several times, a chemically pure salt was obtained and used for the experiment.

Magnesium ion was titrated with trilon B indicator and ion concentrations were determined using perchloric acid and concentrations were determined using methyl red indicators. All analyzes were measured using an analytical balance with an accuracy of 0.05%.

A high concentration is achieved by diluting a low concentration of perchloric acid to obtain a high concentration.

There are organic dependencies on various parameters with solubility solvent such as the crystal lattice radius, enthalpy and entropy of salts, as well as the hydration of other ions.

In solving the problems of solubility, especially affecting the solubility of two-component systems, their subsequent properties when dissolved in a solvent and the structure of the solution are of great importance. To obtain detailed information about the solubility of two-component systems, it is appropriate to test the solubility of substances at different temperatures.

Any solution consists of at least two individual substances, one of which is called the solvent and the other is called the solution. However, it is necessary to divide the solution components into two groups, so this classification makes no sense for infinitely soluble substances. (For example, water and alcohol, gold and silver dissolve in each other in certain proportions). Until recently, there was an understanding of two groups of colloidal systems. One of them is a lyophobic colloid with a salve shell in the particles or very little dirt, and the second is a lyophilic colloid with highly salved particles. Solutions of high molecular compounds were included in the list of lyophilic colloids, but as a result of careful investigations, it was determined that the solutions of high molecular substances are real solutions.

Regardless of the amount of experimental material devoted to the study of solutions, the theory of solutions is closely related to the solubility of substances, which is one of the most important and difficult problems so far. From a theoretical point of view, the solubility of substances is ultimately a complicated issue and has not been resolved so far. The reason for this is that solubility does not only depend on the properties of soluble substances, but also depends on the interaction of the components that make up the solution and on the external conditions. In addition, the difficulty of solving the problem of solubility is that until now there is no theory that proves the state of liquid substances.

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