Synthesis of Magnesium Hydroxide via Nitric Acid Processing of Dolomite

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Abstract: The aim of the study is to obtain magnesium hydroxide by complex, nitric acid processing of dolomite from the Dekhkanabad deposit. The results of the influence of technological parameters on the degree of decomposition of dolomite with 40, 50 and 57% nitric acid at 100 and 110% norm are given, the kinetic characteristics of the process, the composition of the liquid phase, the degree of transition of the dolomite components into the nitric acid solution, the rate of clarification and filtration of the nitric acid extract, the ammonization process are established of clarified nitric acid solutions on the composition of the liquid phase, the degree of transition of dolomite components into the solution, the rate of clarification and filtration of nitric acid extract, the process of ammonization of clarified nitric acid solutions on the composition of the liquid phase and the degree of magnesium precipitation, the rate of nitric acid on the decomposition of dolomite and pulp temperature on the filtration rate of magnesium hydroxide.

1 INTRODUCTION

With the development of science-intensive and nanotechnologies, the need for various chemical compounds is growing. In this regard, magnesium compounds, in particular magnesium hydroxide, occupies a special position. Magnesium hydroxide is a raw material not only for the production of magnesium oxide, but is also a product that can be processed into various magnesium salts.

In terms of its prevalence in nature, magnesium ranks eighth - it accounts for 2.35% of the weight of the earth's crust. The production of magnesium hydroxide and its compounds is growing every year and their areas of application are expanding. The main consumers of magnesium compounds are the production of refractories, the construction, metallurgical industries, the production of rubber products and other industries [5]. Significant amounts of magnesium compounds are processed into metallic magnesium, which is used to produce alloys with aluminum and other metals.

Magnesium hydroxide $Mg(OH)_2$ is a common and important magnesium compound, which is used as a fire retardant in the production of thermoplastics and polymer compositions, as a flocculant in the treatment of natural and waste water, in the production of detergents, cosmetics and sugar, as well as in chemical, food, pharmaceutical and other industries [15]. Magnesium hydroxide is found in nature as the minerals brucite and nemalite [6]. It is artificially obtained by the action of alkalis on solutions of magnesium salts in the form of a voluminous white gelatinous precipitate; the pH value of the precipitation of 10.5; density of precipitated $Mg(OH)_2$ 2.36-2.40 g/cm^3. Magnesium hydroxide is easily soluble in acids, as well as in a solution of NH_4Cl due to the reaction:

$$Mg(OH)_2 + 2NH_4Cl = MgCl_2 + 2NH_4OH$$

Magnesium hydroxide $Mg(OH)_2$ is colorless or white crystals with a hexagonal structure. Mohs hardness 2.5. It is practically insoluble in water, decomposes with the release of water at 350°C. Magnesium hydroxide is the main intermediate in the production of magnesium oxide and its salts [6], [7], [2], [8], [4], [1].

Chemically precipitated magnesium hydroxide is currently produced by the "wet" method, which consists in the interaction of aqueous solutions of magnesium chloride and sodium hydroxide, followed by precipitation, filtration, washing, drying and grinding of magnesium hydroxide [9].

Magnesium hydroxide obtained by the "wet" method, compared with natural brucite, has the following advantages:

- higher temperature of the beginning of decomposition - >350ºC (for natural - >300°C);
- absence of undesirable (so-called harmful) impurities;
- higher degree of whiteness.

In the USA, the production of magnesium oxide from dolomite containing 20% MgO is combined with the production of soda ash [4]. The gas obtained during the firing of dolomite in shaft furnaces and containing up to 40% CO_2 is used in soda production and for the processing of magnesium hydroxide.

The method for obtaining magnesium hydroxide by the lime method consists in precipitation from solutions of magnesium chloride with lime (milk of lime). As a result of the fact that the solubility of $Mg(OH)_2$ is much less than $Ca(OH)_2$ (1.6 g/l at 25°C), the reaction

$$MgCl_2 + Ca(OH)_2 = CaCl_2 + Mg\,(OH)_2$$

goes towards the formation of $Mg(OH)_2$. Magnesium hydroxide is filtered off, washed thoroughly with water and calcined at low temperatures. Depending on the modes of precipitation and calcination, different grades of magnesia are obtained.

A valuable type of raw material for obtaining magnesia products is sea water and brines [3]. Magnesium compounds obtained from sea water and brines are of high quality and the content of magnesium oxide is 96-99%, powders have a high density and micro-grain composition (40-80 microns), which is important for the quality of refractories.

In the USA, the Netherlands, Japan, Mexico, Israel, Ireland, Jordan, magnesium oxide is obtained from sea water by mixing it with burnt dolomite or limestone [1].

$$CaO\ MgO + MgCl_2 + 2H_2O \rightarrow 2Mg(OH)_2\downarrow + CaCl_2$$

This is one of the most economical ways to produce hydroxide and then magnesium oxide. It receives about 15% of the total volume of magnesium compounds from sea water. Japan, the Netherlands and the US alone account for 56% of the world's seawater production. Other methods for producing hydroxide and magnesium oxide are based on the roasting of magnesite and dolomite, thermal decomposition of sulfate, hydroxide and magnesium chloride [10]-[14].

The main sources of magnesian raw materials are magnesite ($MgCO_3$), brucite ($Mg(OH)_2$), dolomite ($CaCO_3{\bullet}MgCO_3$), carnallite ($MgCl_2{\bullet}KCl{\bullet}6H_2O$), bischofite ($MgCl_2{\bullet}6H_2O$), sea water, brines of inland lakes. The most common type of industrial raw material is magnesite. China, Russia, Slovakia, North Korea, Australia and Turkey have the largest explored magnesite reserves. These countries account for more than 90% of the world's total proven reserves.

The first magnesium compounds and a metal magnet from sea water were obtained by Dow Chemical at the FreePort plant (USA, Texas) in 1948. Now, the only remaining producer of magnesium metal from sea water is Dead Sea Magnezium Ltd (Israel).

2 MATERIALS AND METHODS

To establish and compare the chemical composition of dolomites from various deposits of the Republic, dolomite was selected from the deposits of Dekhkanabad, Chust and Shursu, the chemical composition of which is shown in Table 1.

The table shows that the compositions of dolomites differ greatly in the content of magnesium and calcium oxides, which are 12.83-17.25% and 33.37-39.42%, respectively. For scientific substantiation of the process of decomposition of dolomite of the Dekhkanabad deposit, data of a kinetic nature are needed. To establish kinetic data, the influence of temperature and duration of the decomposition of dolomite from the Dekhkanabad deposit with 40, 50 and 57% nitric acid at 100% of the stoichiometry was studied. The experimental temperatures were maintained at 10, 20, 30, 40 and 50°C in a thermostatically controlled glass reactor equipped with a mechanical stirrer and a sampling outlet. The degree of decomposition of dolomite was determined by the content of calcium and magnesium oxides in the liquid phase. The data obtained are shown in Table 2.

Table 1: Chemical composition of dolomite raw materials of the Republic.

Name of deposit	CaO	MgO	Fe_2O_3	Al_2O_3	SO_3	CO_2	H.o.
Dekhkanabad	37,55	13,57	0,214	0,366	0,80	44,43	0,56
Chust 1	38,90	12,83	0,202	0,15	0,70	43,08	1,73
Chust 2	39,42	13,29	0,055	0,21	0,60	43,06	1,86
Shursu	33,37	17,25	0,133	0,11	1,90	40,65	0,95

Table 2: Influence of concentration, temperature and duration of the process on the degree of decomposition of dolomite with nitric acid at a rate of 100%.

№	Time, min	Degree of decomposition, %				
		10°C	20°C	30°C	40°C	50°C
Acid concentration 40%						
1	1,0	74,54	80,56	86,30	96,06	91,69
2	2,0	82,13	88,23	92,24	94,23	94,68
3	3,0	85,89	90,78	94,19	95,59	95,97
4	5,0	89,67	93,78	96,54	97,14	97,42
5	10	92,80	95,99	97,45	97,81	98,00
6	15	93,96	96,90	97,86	98,20	98,37
7	20	95,05	97,56	98,48	98,83	98,90
8	25	95,63	98,08	98,97	99,05	99,14
9	30	96,26	98,73	99,13	99,15	99,22
Acid concentration 50%						
10	1,0	74,39	80,44	86,19	90,99	91,59
11	2,0	82,01	88,07	91,93	94,17	94,49
12	3,0	85,75	90,66	93,87	95,49	95,87
13	5,0	89,53	93,66	96,36	97,15	97,58
14	10	92,68	95,9	97,33	97,63	98,12
15	15	93,73	96,72	97,89	98,16	98,63
16	20	94,93	97,41	98,33	98,62	98,88
17	25	95,50	97,89	98,88	98,99	99,02
18	30	95,64	98,33	98,92	99,10	99,18
Acid concentration 57%						
19	1,0	71,57	77,57	81,27	81,55	87,06
20	2,0	77,09	84,80	88,71	89,8	90,98
21	3,0	81,03	88,70	91,95	92,8	93,42
22	5,0	84,38	91,49	94,19	95,2	95,36
23	10	86,9	93,55	95,74	96,51	96,8
24	15	89,19	94,35	96,12	96,73	97,6
25	20	90,43	95,8	97,3	97,53	98,14
26	25	91,3	96,35	97,72	98,2	98,57
27	30	91,8	97,50	98,6	98,8	98,93

The table shows that a decrease in the concentration of nitric acid, an increase in temperature and an increase in the duration of the decomposition process contribute to an increase in the degree of decomposition of dolomite.

The bulk of dolomite at a temperature of 20°C decomposes within 5 minutes. When dolomite is decomposed with 40% nitric acid, the degree of decomposition after 2 minutes is 88.23%, after 5 minutes 93.48%, after 30 minutes 98.73%. With the decomposition of dolomite with 50% nitric acid, these figures are 88.07, 93.66 and 98.33%, with an acid concentration of 57% 84.80, 91.49 and 97.50%.

Increasing the process temperature significantly affects the degree of decomposition up to 30°C. At a concentration of nitric acid of 40% after 5 minutes, the degree of decomposition at a temperature of 10°C is 89.67%, at a temperature of 30°C 96.54% and at a temperature of 50°C 97.42%. At a concentration of nitric acid of 50%, these figures are 89.53, 96.36 and 97.58% and at a concentration of 57% 84.38, 94.19 and 95.36%.

In the initial period, the decomposition process is determined by the rate of chemical reaction of nitric acid with dolomite and then the limiting factor is the rate of diffusion of acid to dolomite and decomposition products into the nitric acid solution. From the above data, it can be seen that dolomite is characterized by high reactivity and decomposes rather quickly with abundant release of carbon dioxide into the gas phase.

Based on the data obtained, the reaction rate constants and activation energies of the process of dolomite decomposition by nitric acid were calculated. The rate constant of the decomposition reaction as a function of temperature obeys the Arrhenius equation and is expressed by the following empirical equations:

$$K = 29{,}50 \cdot e\frac{938{,}2}{T},$$

$$K = 32{,}13 \cdot e\frac{1025{,}8}{T},$$

$$K = 33{,}94 \cdot e\frac{1201{,}3}{T}.$$

The temperature dependences of the reaction rate constants are expressed by a straight line and decrease in a straight line with increasing values of $1/T \cdot 10^3$.

The calculated values of the rate constant and activation energy of the decomposition of dolomite from the Dekhkanabad deposit with nitric acid are 0.663 s^{-1} and 2.284 kcal/mol, 0.627 s^{-1} and 2.310 kcal/mol, 0.577 s^{-1} and 2.759 kcal/mol, respectively, for the concentrations of nitric acid 40, 50 and 57%.

3 RESULTS

Table 3 shows the results of the influence of the norm of nitric acid on the chemical composition of the liquid phase during the decomposition of dolomite from the Dekhkanabad deposit with 40% acid, at a temperature of 40°C and a process duration of 30 minutes.

The tabular data indicate that with an increase in the rate of nitric acid, the contents of all dolomite components in the solution decrease, the NO_3 content increases from 33.70% to 35.36% and the T:L reaches 333.60. The maximum magnesium oxide content of 3.595% is observed at a 100% rate of 40% nitric acid. The content of calcium oxide is 9.805%, iron oxide 0.0218%, aluminum oxide 0.073%.

Studies of the influence of temperature and duration of the decomposition process on the chemical composition of the liquid phase during the decomposition of Dekhkanabad dolomite were carried out with 40% nitric acid at its rate of 110% of stoichiometry. The data obtained are shown in Table 4. The table shows that with increasing temperature, the calcium content in the solution slightly increases.

So, at 20°C in a nitric acid solution, the content of calcium oxide is 8.76-9.07% and at a temperature of 60°C these figures are 8.90-9.14%. The contents of magnesium oxide, nitrate nitrogen practically do not change either with an increase in temperature or with an increase in the duration of the decomposition process. The content of iron and aluminum oxides slightly increase both with an increase in temperature from 20°C to 60°C and with an increase in the duration of the leaching process. The duration of the process has a similar effect on the content of calcium oxide in the solution.

Changing the decomposition temperature of dolomite with 40% nitric acid from 20 to 60°C at a rate of 110% and a process duration of 30 minutes does not affect the chemical composition of the liquid phase.

The content of magnesium oxide is 3.31% regardless of the decomposition temperature.

Data on the effect of temperature on the degree of transition of the main components of dolomite into solution during decomposition with 40% nitric acid, a rate of 110% and a process duration of 30 minutes are shown in Table 5.

The table shows that an increase in temperature has practically no effect on the degree of extraction of magnesium and calcium oxides. The degree of extraction of oxides of iron and aluminum with increasing process temperature from 20°C to 60°C increases from 32.57% to 40.21% and from 75.09% to 78.41%, respectively.

Insoluble residues from the decomposition of dolomite with nitric acid are undesirable components and can lead to clogging of pipelines, equipment and granulators. Therefore, the next stage of research was the study of the processes of clarification of the products of nitric acid decomposition of dolomites by settling and filtering. It is known that this stage is the limiting stage in the nitric acid decomposition of phosphorites and other calcium-containing minerals.

Table 3: Influence of the norm of 40% nitric acid on the chemical composition liquid phase.

№	Norm HNO_3, %	Chemical composition of the liquid phase, wt. %					L:S
		CaO	MgO	Fe_2O_3	Al_2O_3	NO_3^-	
1	100	9,805	3,595	0,0218	0,073	33,70	233,55
2	105	9,404	3,449	0,0212	0,071	33,94	243,56
3	110	9,034	3,314	0,0207	0,069	34,16	253,56
4	120	8,375	3,073	0,0195	0,065	34,52	273,57
5	130	7,806	2,864	0,0183	0,061	34,85	293,58
6	140	7,309	2,682	0,0174	0,057	35,13	313,59
7	150	6,872	2,521	0,0185	0,054	35,36	333,60

Table 4: The effect of temperature and duration of the process on the chemical composition of the liquid phase during the decomposition of dolomite with 40% nitric acid, at a rate of 110%.

№	Temperature, °C	Time, min	Chemical composition of the liquid phase, wt. %					
			CaO	MgO	Fe_2O_3	Al_2O_3	NO_3	L:S
1	20	10	8,76	3,31	0,011	0,069	34,16	253,56
2	20	20	8,87	3,31	0,014	0,071	34,16	253,56
3	20	30	8,96	3,31	0,017	0,075	34,16	253,56
4	20	40	9,02	3,31	0,021	0,081	34,16	253,56
5	20	60	9,07	3,31	0,028	0,092	34,16	253,56
6	40	10	8,86	3,31	0,016	0,073	34,16	253,56
7	40	20	8,95	3,31	0,018	0,073	34,16	253,56
8	40	30	9,03	3,31	0,021	0,069	34,16	253,56
9	40	40	9,09	3,31	0,024	0,073	34,16	253,56
10	40	60	9,13	3,32	0,030	0,082	34,16	253,56
11	60	10	8,90	3,31	0,016	0,065	34,16	253,56
12	60	20	9,03	3,31	0,018	0,065	34,16	253,56
13	60	30	9,091	3,31	0,021	0,069	34,16	253,56
14	60	40	9,118	3,32	0,024	0,074	34,16	253,56
15	60	60	9,141	3,32	0,0298	0,082	34,16	253,56

Table 5: The influence of temperature on the degree of transition of dolomite components into a solution of 40% nitric acid, at a rate of 110% and a process duration of 30 minutes.

№	Temperature, °C	Degree of transition of components into solution, %			
		CaO	MgO	Fe_2O_3	Al_2O_3
1	20	98,21	99,88	32,57	75,09
2	25	98,24	99,88	34,69	75,78
3	30	98,28	99,88	36,71	76,47
4	35	98,33	99,89	38,45	77,11
5	40	98,40	99,89	39,60	77,70
6	45	98,49	99,89	39,97	78,08
7	50	98,62	99,89	40,08	78,28
8	55	98,79	99,90	40,15	78,37
9	60	98,98	99,90	40,21	78,41

4 DISCUSSION

It can be seen from the figure that large particles of undecomposed dolomite settle rather quickly and after 3 minutes the degree of precipitation of 100% is reached. A settling rate of 98% is achieved after 100 seconds.

To accelerate the process of decomposition of the liquid and solid phases, the influence of temperature and the rate of 40% nitric acid on the rate of filtration of dolomite decomposition products was studied. Obtaining results are shown in Table 6.

With an increase in the temperature of the pulp from 20 to 60°C, the filtration rates for the pulp, filtrate and wet solids increase. Thus, the pulp filtration rate increases from 770.75 kg/m^2•h at 20°C to 1190.79 kg/m^2•h at 60°C.

Increasing the rate of nitric acid from 100% to 110% leads to a slight increase in filtration rate. Thus, at a temperature of 60°C, the filtration rate in the liquid phase increases from 1184.94% at a rate of 105% to 1261.75 kg/m^2·h at a rate of 110%.

The suspension of nitric acid decomposition of dolomite with 40% nitric acid, unlike large particles of dolomite, settles very slowly and after 120 minutes the degree of clarification reaches 86.83%.

In the first 50 minutes, the clarification proceeds very slowly and the degree of clarification is 12.66%. Then the speed of clarification increases and after 100 minutes of clarification it starts to slow down (Fig. 1).

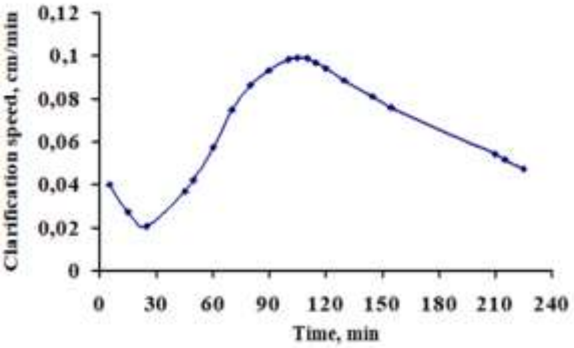

Figure 1: Influence of the duration of the process on the rate of clarification of the decomposition products of dolomite with nitric acid.

The creation of a 0.1 mm thick bed of insoluble residues leads to a sharp decrease in the filtration rate for pulp, filtrate and wet solids.

Table 6: Influence of technological parameters on the filtration rate after decomposition (depression 300 mm Hg).

№	Norm HNO$_3$, %	Temperature, °C	Filtration rate, kg/m2•h		
			by pulp	by solid phase	by filtrate
R = 0 mm					
1	100	20	770,75	3,79	766,96
		40	1107,88	5,44	1102,44
		60	1190,79	5,85	1184,94
2	105	20	801,73	3,78	797,95
		40	1152,42	5,43	1146,99
		60	1238,65	5,83	1232,82
3	110	20	820,42	3,73	816,69
		40	1179,30	5,36	1173,94
		60	1267,52	5,77	1261,75
R = 0,1 mm					
4	100	20	184,42	0,91	183,51
		40	300,56	1,48	299,08
		60	349,57	1,72	347,85
5	105	20	191,84	0,90	190,94
		40	312,64	1,47	311,17
		60	363,63	1,71	361,92
6	110	20	191,82	0,87	190,95
		40	319,93	1,46	318,47
		60	372,10	1,69	370,41
R = 0,2 mm					
7	100	20	100,23	0,49	99,74
		40	163,35	0,80	162,55
		60	189,98	0,93	189,05
	105	20	104,26	0,49	103,77
		40	169,91	0,80	169,11
		60	197,63	0,93	196,70
9	110	20	104,02	0,47	103,55
		40	173,88	0,79	173,09
		60	202,23	0,92	201,31

The nitric acid extract obtained during the decomposition of dolomite from the Dekhkanabad deposit has a pH below 1. In this regard, in order to obtain magnesium hydroxide, it must be neutralized. For this, it is best to use gaseous ammonia. However, with an increase in the ammonia content in the solution above that necessary for neutralization, ammoniates are formed. However, these considerations are valid for pure solutions of calcium nitrate. In our case, magnesium nitrate is present in the system, which, at high pH values (in an alkaline medium), will precipitate in the form of magnesium hydroxide. In this regard, the effect of pH on the chemical composition of calcium and magnesium nitrate solutions and the degree of magnesium precipitation was studied. The data obtained are shown in Table 7.

As can be seen from Table 7, with an increase in pH in the composition of the liquid phase at pH 10-12, the magnesium content sharply decreases and the content of other components is insignificant, which is explained by the introduction of ammonia. At high pH values, almost all magnesium precipitates.

The figure shows that when the extract is neutralized to pH 7.5–8, the degree of magnesium demagnetization does not exceed 3–7%. With an increase in pH to 10, about 85-87.5% of magnesium precipitates; at pH 11-12, 96.52-97.22% of magnesium precipitates.

Table 7: Influence of pH on the composition of the liquid phase of nitric acid extract.

pH	Chemical composition of the liquid phase, wt. %					
	MgO	CaO	Al$_2$O$_3$	Fe$_2$O$_3$	NH$_4^+$	Yield of MgO, %
Norm of nitric acid – 100 %						
-1,1	3,60	9,81	0,073	0,022	0,00	0
4	3,58	9,59	0,071	0,022	2,36	0,56
7,5	3,35	9,53	0,071	0,021	3,00	6,94
9	2,62	9,52	0,071	0,021	3,17	27,22
10	0,45	9,48	0,071	0,021	3,50	87,50
11	0,13	9,32	0,069	0,021	5,23	96,39
12	0,10	9,03	0,067	0,020	8,65	97,22
Norm of nitric acid – 110 %						
-1,2	3,45	6,45	0,069	0,021	0,00	0
4	3,43	6,30	0,067	0,021	2,52	0,58
8	3,35	6,26	0,067	0,020	3,20	2,90
9	2,42	6,24	0,067	0,020	3,35	29,86
10	0,51	6,20	0,066	0,020	4,12	85,22
11	0,17	6,09	0,065	0,0200	6,00	95,07
12	0,12	5,92	0,063	0,019	8,87	96,52

To obtain magnesium hydroxide, studies were carried out on the separation of the precipitate by filtration. Due to the fact that when the clarified nitric acid extract is neutralized with ammonia, its temperature rises, the influence of two parameters was studied: the temperature of the pulp and therate of nitric acid on the decomposition of dolomite at the rate of filtration in solution and in the dry residue (the concentration of nitric acid taken for the decomposition of dolomite is 57.5%, pulp pH before filtration - 11).

With an increase in the norm of nitric acid, the filtration rates for the solution and for the dry residue increase. The filtration rates by solution and by dry residue at a rate of nitric acid of 100% are 890.21 and 181.80 kg/m^2·h, respectively.

With an increase in temperature, the filtration rate increases, which is explained by a decrease in pulp viscosity.

Thus, in terms of filtration rate, it should be carried out at a higher temperature. The optimum temperature is 50-60°C.

5 CONCLUSIONS

The conducted experimental studies have conclusively demonstrated the efficiency of nitric acid processing of dolomite from the Dekhkanabad deposit for obtaining magnesium hydroxide of high purity. The optimal technological parameters were established as follows: nitric acid concentration of 40%, acid rate of 100–110% of the stoichiometric requirement, process temperature of 50 °C, process duration of 30 minutes and ammoniated extract pH of 10–11. Under these conditions, the degree of dolomite decomposition reached 99.13–99.22%, with 99.9% of MgO and 98.9% of CaO transitioning into the solution. The activation energy of dolomite decomposition was found to be 2.28–2.76 kcal/mol, confirming a diffusion-controlled mechanism at the later stages of the process. During the neutralization of the nitric acid extract with gaseous ammonia, it was established that at pH 10–12, 96.5–97.2% of magnesium precipitated as magnesium hydroxide, while the calcium and aluminum content in the liquid phase remained below 9.5% and 0.07%, respectively. Filtration and clarification parameters demonstrated strong dependence on pulp temperature and nitric acid rate. Increasing the temperature from 20 °C to 60 °C enhanced the pulp filtration rate from 770.75 kg/m^2·h to 1190.79 kg/m^2·h and at an acid rate of 110%, the filtration rate for the filtrate increased up to 1261.75 kg/m^2·h. The clarification process of the nitric acid extract reached 86.83% transparency after 120 minutes, while the settling of coarse dolomite particles achieved complete (100%) sedimentation within 3 minutes. The formation of a 0.1 mm insoluble residue layer caused the filtration rate to drop nearly fourfold, emphasizing the need for periodic cleaning or centrifugation. The magnesium hydroxide obtained under optimal conditions was characterized by a whiteness degree above 96%, a density of 2.38 g/cm^3 and a thermal decomposition onset at 350 °C, fully meeting industrial requirements for flame-retardant, chemical and pharmaceutical applications. Overall, the developed nitric acid–ammoniation process provides an efficient, environmentally acceptable and resource-saving method for converting dolomite into high-quality magnesium hydroxide with a yield of not less than 97%.

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