INTERNATIONAL MULTIDISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
SJIF 2019: 5.222 2020: 5.552 2021: 5.637 2022:5.479 2023:6.563 2024: 7,805
eISSN :2394-6334 https://www.ijmrd.in/index.php/imjrd Volume 12, issue 08 (2025)

STUDY OF THE SEPARATION PROCESS OF THE DOLOMITE SOIL FORMED DURING THE DISSOLVING OF DOLOMITE WITH SULFURIC ACID INTO LIQUID AND SOLID PHASES

Mixliyev Oybek Avloyorovich
Karshi State Technical University
Shamayev Baxodir Ergashevich
Termez State University of Engineering and Agrotechnology
Xushvaqtov Elnur Iskandar ugli
Karshi State Technical University

Abstract: The foam height and foam density formed during the decomposition of local dolomite raw materials in the presence of sulfuric acid under optimal conditions were determined, and methods and optimal conditions for reducing foam density were studied using "PAA-gel" and "Structol SB-2195" as antifoaming reagents.
Keywords: Foam density, PAA – gel, Structol SB-2195, blue ribbon-TU, SFM.

In order to accelerate the process of sulfuric acid decomposition of local dolomite raw materials and establish optimal conditions and technological parameters for its processing into liquid and crystalline $MgSO_4$, $(NH_4)_2Mg(SO_4)_2$, $(NH_4)_2Mg(SO_4)_2 \cdot 6H_2O$ and liquid and granular nitrogen calcium and magnesium fertilizers, as well as to carry out scientific research in laboratory conditions, dolomite raw materials were imported from Dehqanabad district, Kashkadarya region. The filtration rate of the sour slurry obtained from the decomposition of the selected dolomite sample with sulfuric acid with a concentration of 20 to 40%, standard 110%, was determined by slurry, liquid and solid phases, and the results obtained are presented in this table [1].

The effects of surfactants (PAA - gel and Structol SB-2195) and acid concentrations on the filtration rate of the slurry formed by the processing of dolomite raw materials with sulfuric acid at acid concentrations of 20, 30 and 40%, standard 110%, solid:liquid phase ratios of 1:3.5, 1:2.8, 1:2.3, 1:2.0 and 1:1.8 and a temperature of 50 °C were determined. Technological parameters for the filtration of sour slurry obtained from the processing of dolomite with sulfuric acid, at a temperature of 50 °C and a pressure of 0.06 MPa or 450 mm.cm.st., the effects of 10, 20 and 30 g/ton of PAA - gel and Struktol SB-2195 surfactants on the filtration process on filter paper of the blue ribbon-TU 2642-001-05015242-07 brand were determined. In this case, it was determined that the filtration rate of the slurry obtained by disintegrating the dolomite raw material with sulfuric acid with a concentration of 20% was 2025.50 kg/m2·s for the slurry without surfactants, 1418.30 kg/m2·s for the filtrate (sour liquid phase), 607.20 kg/m2·s for the solid phase and 162.80 kg/m²·s for the sum of the amounts of CaO+MgO. When we added PAA-gel and Structol SB-2195 surfactants in the amount of 10-30 g/t to the process of dolomite decomposition in 20% H_2SO_4 (10 SFM added to 1 ton of dolomite raw material), the filtration rate of the slurry increased from 3066.40 to 3355.40 kg/m³·s and 3152.50 to 3194.00 kg/m²·s for the slurry, from 2330.55 to 2550.20 kg/m²·s and 2404.80 to 2434.90 kg/m²·s for the filtrate (sour liquid phase), from 735.85 to 805.20 kg/m²·s and 747.70 to 797.35 kg/m²·s for the solid phase. and the sum of CaO+MgO increased from 246.65 to 269.70 kg/m²·s and from 253.40 to 256.70 kg/m²·s, respectively. The filtration rate of the slurry, which was decomposed with 30% sulfuric acid, was 2184.00 kg/m2·s for the slurry without

surfactants, 1386.65 kg/m²·s for the filtrate (sour liquid phase), 797.35 kg/m²·s for the solid phase, and 222.20 kg/m²·s for the sum of CaO+MgO.

Table 1.
The effect of surfactants on the filtration rate of slurry obtained from the decomposition of dolomite with sulfuric acid (N=110%; t=50 °C and τ=40 min)

Const. H_2SO_4 %	Surfactant, gr/ton	Porridge filtration rate, kg/m²·s (0,06 MPa)			
		Bo‘tqa bo‘yicha	Fil‘trat (nordon suyuq faza) bo‘yicha	Qattiq faza bo‘yicha	CaO+MgO bo‘yicha
20	0	2025,50	1418,30	607,20	162,80
	PAA-gel				
	10	3066,40	2330,55	735,85	246,50
	20	3210,90	2440,38	770,52	258,10
	30	3355,40	2550,20	805,20	269,70
	“Struktol SB 2195”				
	10	3152,50	2404,80	747,70	253,40
	20	3173,25	2419,85	753,40	255,05
	30	3194,00	2434,90	759,10	256,70
30	0	2184,00	1386,65	797,35	222,20
	PAA-gel				
	10	2712,00	1672,17	1039,83	276,89
	20	3229,30	1917,72	1311,58	332,71
	30	3746,60	2163,27	1583,33	388,52
	“Struktol SB 2195”				
	10	2861,96	1806,83	1055,13	292,15
	20	2936,11	1844,34	1091,77	299,75
	30	3010,25	1881,84	1128,41	307,34
40	0	2342,50	1355,00	987,50	327,95
	PAA-gel				
	10	2357,60	1013,80	1343,80	330,06
	20	3328,40	1452,73	1875,67	465,97
	30	4299,20	1891,65	2407,55	601,88
	“Struktol SB 2195”				
	10	2571,43	1208,87	1362,56	360,00
	20	2698,97	1268,83	1430,14	377,85
	30	2826,51	1328,78	1497,73	395,70

When we added PAA-gel and Structol SB-2195 surfactants in the process of dolomite decomposition at 30% H_2SO_4 in an amount of 10 - 30 g/t (10 SFM added to 1 ton of dolomite raw material), the filtration rate of the slurry increased from 2712.00 to 3746.60 kg/m³·s and 2861.96 to 3010.25 kg/m²·s for the slurry, from 1672.17 to 2163.27 kg/m²·s and 1806.83 to 1881.84 kg/m²·s for the filtrate (sour liquid phase), from 1039.83 to 1583.33 kg/m²·s and

1055/13 to 1128.41 kg/m²·s for the solid phase. It was also found that the sum of the CaO+MgO amounts increased from 276.89 to 388.52 kg/m²·s and from 292.15 to 307.34 kg/m²·s, and the filtration rate of the slurry, which was crushed with 40% sulfuric acid concentration of dolomite raw material, was 2342.50 kg/m²·s for the slurry without surfactants, 1355.00 kg/m²·s for the filtrate (sour liquid phase), 987.50 kg/m²·s for the solid phase, and 327.95 kg/m²·s for the sum of the CaO+MgO amounts. When we added PAA – gel and Structol SB-2195 surfactants in the process of dolomite decomposition in 40% H_2SO_4 in an amount of 10 - 30 g/t (10 SFM added to 1 ton of dolomite raw material), the filtration rate of the slurry increased from 2357.60 to 4299.20 kg/m³·s and 2571.43 to 2826.51 kg/m²·s for the slurry, from 1013.80 to 1891.65 kg/m²·s and 1208.87 to 1328.78 kg/m²·s for the filtrate (sour liquid phase), from 1343.80 to 2407.55 kg/m²·s and 1362.56 to 1497.73 kg/m²·s for the solid phase. and the sum of CaO+MgO amounts increased from 330.06 to 601.88 kg/m²·s and from 360.00 to 395.70 kg/m²·s. The experimental analyses conducted in the experimental model device under laboratory conditions and the results obtained are presented in the table [2.3].

Thus, it was found that when decomposing the Dehqanabad mine dolomite raw material with 20% H_2SO_4, the filtration rate increased by 1.51 - 1.66 times and 1.55 - 1.58 times in slurry compared to 10-30 g/ton of surfactants "PAA-gel" and "Structol SB 2195", while at 30% H_2SO_4, the filtration rate increased by 1.24 - 1.72 times and 1.31 - 1.38 times in slurry. It was found that the filtration rate increased by 1.01 - 1.83 times for porridge and 1.10 - 1.21 times for 40% H_2SO_4.

References

1. O.A.Mixliyev.,X.Ch.Mirzaqulov.,R.Ch.Yorboboyev.,Sh.M.Olmurova.. The study of rheological properties of dolomite raw materials during the processing of sulfuric acid into magnesium sulfate and gypsum. Innovative developments and Research in education International scientific-online conference. Part 28.April 23rd. Colletions Of Scientific Works. Canada 2024 yil. c. 470-472.
2. O.A.Mixliyev., X.Ch.Mirzaqulov., R.Ch.Yorboboyev. Investigation of the foaming process during decomposition of local dolomite gaiters and in sulfuric acid. Ethiopian in international journal of multidisciplinary research. May. Hindiston-2024 yil. - c. 610-611.
3. O.A.Mixliyev., X.Ch.Mirzaqulov., R.Ch.Yorboboyev. Dehqonobod koni dolomit xomashyosi nitrat va sulfat kislota. bilan parchalanish jarayonida ko‘piklanish jarayonini o‘rganish. Ilm fan xabarnomasi. Ilmiy elektron jurnal. 2-tom. Andijon-2024-yil. - c.462-464.