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(54) Titre : SALICYLATE DE SODIUM COMME AGENT MODIFICATEUR DANS LE TRAITEMENT ELECTROSTATIQUE DE SELS DE POTASSE BRUTS RENFERMANT DE LA CARNALLITE

(54) Title: SODIUM SALICYLATE AS A CONDITIONING AGENT IN THE ELECTROSTATIC PROCESSING OF CARNALLITE-CONTAINING CRUDE POTASH SALTS

(57) Abrégé/Abstract:
In the multi-stage electrostatic separation of a crude salt containing kieserite and carnallite, sodium salicylate is used as a conditioning agent for separating potash and kieserite and also for purifying the potash.

Abstract

In the multi-stage electrostatic separation of a crude salt containing kieserite and carnallite, sodium salicylate is used as a conditioning agent for separating potash and kieserite and also for purifying the potash.

Crude potash salts which contain essentially carnallite, sylvite, kieserite and rock salt may be separated by an electrostatic process. According to German Patent DE-PS 19 53 534, first the bulk of the rock salt is separated from the crushed, crude potash salt. The carnallite-sylvite-kieserite concentrate can also be further processed by means of electrostatic separation.

In this connection, a process is known from German Patent DE-PS 10 76 593 according to which already conditioned intermediate products from the electrostatic potash salt processing step are post-conditioned using fatty acids with at least 3 C-atoms in the molecule. Next, the conditioned salt is triboelectrically charged in ambient air having a relative humidity of 2.5 to 10% and a temperature of 40 to 80°C by vigorously agitating the salt particles in relation to each other in a fluid bed heater and then separating them into a potash pre-concentrate and a kieserite pre-concentrate in a gravity separator. The middlings also flowing from the gravity separator, which has passed through the electrical field without being substantially deflected, is fed to the triboelectric charging stage and, together with fresh feed material, once more undergoes triboelectric charging and gravity separation.

In a further electrostatic separation step, after further conditioning using the above-mentioned fatty acids and triboelectric charging, a product containing less than 6% rock

salt and a residual fraction can be obtained from the potash pre-concentrate.

However, conditioning with fatty acids is associated with certain disadvantages. The high solidification point means that the feed lines have to be insulated or equipped with supplementary heating. Salt dust wetted with fatty acid gums up the filter bags in the dust-removal systems. Over long exposure times, the fatty acid attacks the coating of the filter holders. The coating hardens and splits off and this may result in damage to the filter bags. At the feed input points lumps of salt heavily impregnated with fatty acid form, thus impairing homogeneous metering of the fatty acid and giving rise to heavy caking at subsequent distribution points, such as chutes.

Studies have shown that the fatty acid may be replaced by another compound. The object of the invention is to demonstrate that alkaline salts of hydroxycarboxylic acids, such as sodium salicylate, may advantageously be used as conditioning agents.

A process has been discovered for improving the NaCl selectivity during the electrostatic processing of hard salts, wherein after crushing and conditioning, multi-stage separation is carried out with initially the bulk of the rock salt being removed while using the conditioning agent salicylic acid or known conditioning agents; then, in the subsequent separation stage the potash and

kieserite are separated; and, in a final stage, the potash is purified and a residual fraction accumulates at this point together with the pure potash product.

The invention uses sodium salicylate as the conditioning agent in the potash-kieserite separation and potash purification stages.

Furthermore, the process is characterized by the fact that the sodium salicylate is used in the amount of 20 to 80 g/t of feed material.

Sodium salicylate may be added in crystalline form or as an aqueous solution. If salicylic acid was used as the conditioner in the rock salt separation step, this acid can be converted into sodium salicylate by adding caustic soda. The great need for repair and servicing of the installations which is caused when fatty acid is used is reduced when the changeover is made to sodium salicylate. In addition, sodium salicylate has a positive influence on the separating efficiency. The progress represented by the process according to the invention is confirmed by the following examples.

The examples given in Table 1 relate to the extraction of potash and kieserite pre-concentrates from a crude salt, from which the rock salt has been removed and containing about 14% K_2O and 20% kieserite, at a temperature of 71°C, corresponding to 5% relative

humidity at an absolute humidity of 10.0 g H_2O/m^3 of air, and also the electrostatic charging of the particles. The procedure then continues in the known manner in mixers, fluid bed heaters and tubular gravity separators.

The following results were achieved:

Table 1:

Crude potash fraction	(1) State of the art		(2) Invention	
	Content in%	Yield in%	Content in%	Yield in%
Effective amount		59.4		56.2
K_2O	22.6	90.7	20.54	83.8
Sylvite	20.97	85.9	16.08	72.2
Carnallite	51.98	99.1	61.28	99.5
Kieserite	3.37	8.9	3.27	9.5
Anhydrite	0.14	24.5	0.11	17.2
Rock salt	23.54	44.5	19.26	32.7
Crude kieserite fraction				
Effective amount		40.6		43.8
K_2O	3.29	9.3	5.08	16.2
Sylvite	5.02	14.1	7.94	27.8
Carnallite	0.69	0.9	0.38	0.5
Kieserite	50.71	91.1	40.15	90.5
Anhydrite	0.63	75.5	0.68	82.8
Rock salt	42.95	55.5	50.85	67.3

In contrast with comparative test 1, conducted using the state-of-the-art technique (conditioning agent: fatty acid), the K_2O yield in the crude potash fraction was 6.9% lower in test 2, which was conducted using the process according to the invention (conditioning agent: sodium salicylate). In the crude kieserite fraction, a comparable kieserite yield and an 11.8% higher rock salt yield are achieved by the process according to the invention.

The better rock salt yield makes for easier post-separation. The examples given in Table 2 show the extraction of a potash product, containing less than 6% rock salt from the crude potash fraction at a separation temperature of 71°C, corresponding to 5% relative humidity at an absolute atmospheric humidity of 10.0 g H_2O/m^3 air.

Table 2:

Potash product	(1) State of the art		(2) Invention	
	Content in%	Yield in%	Content in%	Yield in%
Effective amount		35.4		48.3
K_2O	25.46	40.9	22.14	52.1
Sylvite	20.16	34.0	12.70	38.2
Carnallite	75.07	51.0	83.28	65.6
Kieserite	0.00	0.0	0.00	0.0
Anhydrite	0.00	0.0	0.00	0.0
Rock salt	4.77	7.2	4.02	10.1
Residual fraction				
Effective amount		64.6		51.7
K_2O	20.20	59.1	19.05	47.9
Sylvite	21.42	66.0	19.23	61.8
Carnallite	39.32	48.9	40.72	34.4
Kieserite	5.41	100.0	6.33	100.0
Anhydrite	0.22	100.0	0.22	100.0
Rock salt	33.83	92.8	33.50	89.9

In the process according to the invention the rock salt content in the potash product is slightly lower, at 4.02%, than that obtained by using the state-of-the art technology (4.77%). At the same time, the K_2O yield increases by 11.2%.

Seen over the entire process, i.e. pre-separation together with post-purification, the process according to the invention attains a K_2O yield of 43.7%, while the process according to the state of the art achieves a K_2O yield of 37.1%. Thus the process according

to the invention provides not only a somewhat better quality product but also a 6.6% higher yield of K_2O.

Patent Claims

1. A process for improving the NaCl selectivity during the electrostatic processing of hard salts, wherein following grinding and conditioning, at first the bulk of the rock salt is removed in a multi-stage separation procedure, using salicylic acid or a known conditioner as the conditioning agent, and in the subsequent stage the potash and the kieserite are separated, and finally in a further stage the potash is purified and a residual fraction accumulates along with the pure potash product, characterized in that in the potash-kieserite separation stage and in the potash purification stage, sodium salicylate is used in the amount of 20-80 g/t of feed material as the conditioning agent.