Translated from Russian

"APPROVED" by the Director of
"Gallaorol Kaliy Fosfat" LLC

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PASSPORT OF SECURITY FOR SULFATE POTASSIUM

Ts 27174298-001:2019

Technical features:

The name of indicators	Norms	Control method
1 Appearance	Crystalline. cream powder, grayish or reddish tint allowed	P. 6.3 of this Ts
2 Mass fraction of potassium in terms of K2O,% not less	50	GOST 20851.3
3. Mass fraction of chlorides. % no more	2	GOST 6318
4. Mass fraction of moisture. % no more	1	GOST 6318 or GOST 20851.4
5. Mass fraction of water-insoluble residue. % no more	1	GOST 6318
6. Friability%	100	GOST 21560.5
Rn1% of conversation	5.0-7.5	GOST 27979

Obtaining potassium sulfate from potassium chloride and sulfuric acid. Mannheim method.

The formation of potassium sulfate and hydrogen chloride through the interaction of potassium chloride and sulfuric acid can be expressed as follows: **$2KCL+H_2SO_4=K_2SO_4+2HCL$**

The real reaction takes place in two stages:

$KCL+ H_2SO_4$ K_2SO_4* $KHSO_4 + H_2SO_4$ » K_2SO_4+ HCL

First stage: This is an exothermic reaction that occurs at a relatively low temperature to produce potassium hydrosulfate.

Second stage: The formation of potassium sulfate from potassium hydrogen sulfate is an endothermic reaction.

Potassium sulfate forms at low temperature, which is encapsulated on the surface of potassium chloride and forms an impermeable film, which slows down the reaction or stops the mail. The conversion of potassium chloride to potassium sulfate is small. KIISO4 and K2SO4 are most stable in potassium acid sulfate. Their melting point is 218 ° C and 268 ° C, respectively. Therefore, the reaction for producing potassium sulfate should be carried out above 268 C.

The degree of conversion of potassium chloride to potassium sulfate increases with increasing temperature, and the reaction rate accelerates. However, when the temperature is too high, equipment is not allowed, and the economic cost is not reasonable when considering the consumption of regent material and heating fuel. The optimum reaction temperature is 540 ° C.

The lowest temperature for the production of hydrogen chloride is 450 C. Hydrogen chloride is the main condition for the production of potassium sulfate, otherwise the ns reaction will be performed. Therefore, the temperature of 540 ° C in the furnace is the most suitable for the production of hydrogen chloride.

Mannheim furnace 6000 x 4,000.2 sets.

The formation of potassium sulfate and hydrogen chloride by the interaction of potassium chloride and sulfuric acid can be expressed as follows:

KC1 + H2SO4 - K2SO4 K.HSO4 + H2SO4 - K2SO4 + HC1

First stage: This is an exothermic reaction that occurs at a relatively low temperature to produce potassium hydrosulfate.

Second stage: The formation of potassium sulfate from potassium hydrosulfate is an exothermic reaction.

Solid potassium chloride and 98% concentrated sulfuric acid are added to the reaction chamber in a certain proportion and a chemical reaction is carried out under high temperature conditions. The drum rotates and mixes evenly, toothed and rotary racks on the handle, the material (raw materials) moves from the inside and moves outward at a constant speed, and then the process ends with a chemical reaction. Provided that the normal height of the product layer is maintained with a

uniform continuous feed of finished products, potassium sulfate is discharged from the outlet into the reaction chambers.

A reactive furnace mainly consists of a combustion chamber (upper part), a reaction chamber (middle part), a smoke chamber (lower part) and is equipped with a feed device, mechanical stirring and pushing of the finished product.

1. Combustion chamber: at the top of the reaction chamber, the air inlet, gas inlet, air volume and gas amount can be adjusted. The gas used comes from the collector, and after dosing into the burner of the combustion chamber is maintained at 680 730 C to supply heat to the reaction chamber.

Combustible gas enters the smoke chamber through the chimney, and air is transferred to the combustion chamber by the fan after heat transfer through the recuperation to the flue gas and part of the cold air is sent to the main engine system for air cooling.

2. The smoke chamber in the lower part of the reaction chamber of the high-temperature flue gas from the combustion chamber is directed to the re-heater through the chimney and flue gas pipe after the heat is transferred by cold air, then it is released into the atmosphere through an induced fan and chimney. High temperature flue gas continues to provide the heat needed in the smoke chamber to ensure normal movement and full use of heat.

3. Reaction chamber: in the middle of the combustion chamber and smoke chamber, the reaction layer is about 28 square meters in the lower part, and the upper high-temperature stable round domed black flint brick. The upper part of the reaction layer is equipped with rotating teeth. The speed of the gearbox is set in motion by the engine, and its speed is about 1.1 rpm produced by the main shaft of the engine. It is used as mixing material, and crushing, transferring the final product and maintaining the height of the layer of material. The top of the main shaft is equipped with a distributor of sulfuric acid and potassium chloride, respectively, and the distributor of sulfuric acid is provided with a guide groove: the potassium chloride distributor is equipped with two flow grooves, the upper part of the feed gel distributor is equipped with a supply sleeve, and the sleeve passes through the combustion chamber on top of the furnace. Pipes for supplying sulfuric acid and potassium chloride are introduced into the upper ends of the two distributors, respectively, through the sleeve. The reaction chamber is equipped with a symmetrical distribution of the output of the finished potassium product on both sides and is connected to the pushing machine through a guide tube. The upper part of the reactor is equipped with devices for dispensing the supply of

potassium chloride and sulfuric acid, respectively, in order to maintain a reasonable feed rate in the production of potassium sulfate and to ensure high quality and low consumption of the product and long service life of the teeth of the reaction layer. Monitor micro-negative pressure during operation of the reaction chamber.

Application:

The main consumer of potassium sulfate is agriculture. Potassium sulfate is a valuable chlorine-free fertilizer. The effectiveness of potassium sulfate is better manifested in potassium-poor sod-podzolic soils of granulometric composition and peat soils. On chernozem soils it is usually used for crops that absorb a lot of potassium and sodium (sugar beets, sunflowers, fruit, for root crops, vegetables). On chestnut and gray-earth soils, they are used depending on the type of crop, the technology of cultivation and the potassium content in the soil. Potassium sulfate much more effectively affects the size of the crop and its quality, if used in combination with nitrogen and phosphorus fertilizers. On acidic soils, the effect of potassium sulfate increases with the use of lime.

Potassium will try the content of sugars and vitamins in the cultivated products, and top dressing at the end of August-September contributes to a better wintering of fruit and ornamental trees and shrubs. It is used on various soils, for all crops, as well as for indoor and balcony flower growing. Potassium sulfate is suitable for all methods of application: the main one (when digging the soil in spring or autumn) and for feeding during the growing season.

It is used primarily for crops sensitive to chlorine (potatoes, tobacco, flax. Grapes, citrus fruits, etc.). The presence of sulfate ion in the fertilizer positively affects the yield of cruciferous plants (cabbage, rutabaga, turnip, etc.) and legumes that consume a lot of sulfur.

Also, potassium sulfate is used in the production of glass, various alum and other potassium compounds, like flux in metallurgy. In the European Union it is approved as use as a food additive E515.

Security Details:

The following actions of potassium sulfate on parts of the body can cause:

- hole: dust can cause mechanical irritation,
- Skin: skin contact may cause irritation,
- Ingestion: eating large amounts may cause gastrointestinal irritation,
- Inhalation: if inhaled, may cause respiratory irritation,

• In chronic use of potassium sulfate: poisoning can occur in rare cases of prolonged exposure.

Toxic properties

The hazard class of potassium sulfate is very low, since it is permissible to use in a niche. At the same time, it is impossible to forget that this chemical compound. An excess of agrochemical leads to disruption of the digestive system, impaired plant immunity.

The fact is taken into account and that in the composition there may be additional microelements that are needed by the culture, but which can harm human health. To protect yourself from the effects of chemicals, use a protective suit, goggles and a respirator. In case of contact with skin, mucous membranes of the working solution or dry powder: damaged areas are treated.

Do not increase recommended doses. The drug does not have high toxicity, but the excess dosage contributes to the death of parts of the plant.

Transportation, storage.

Potassium sulfate is transported by all means of transport in accordance with the rules for the transportation of 1 cargoes applicable to this type of transport.

Potassium sulfate is stored in a dry place. Since the substance is not explosive, the temperature regime does not affect safety. It is nevertheless advisable to prevent overheating, moisture, dust.

Ready working solution of potassium sulfate is not subject to storage. Therefore, it is calculated strictly according to the cultivated area, the number of plants. It is recommended to buy powder for the season dry. Sale is made in packages of 500 g. The maximum volume is 5 kg.

After the expiration date, sulfate is prohibited to use. The chemical composition loses its positive abilities. If the substance gets wet during storage or use, sulfate changes its structure and formula, which leads to a deterioration in soil quality.

Chemical formula - K_2SO_4

Packaging:

The drug is packaged and labeled in accordance with regulatory documents. Guaranteed shelf life of the product: 3 years from the date of manufacture.

Safety requirement: under normal condition of heating, fire and explosion proof.

Wash hands thoroughly after handling product. When working with stress, personal protective measures must be observed.

Security information

The following actions of potassium sulfate on parts of the body can cause:
. Eyes: dust may cause mechanical irritation,
• Skin: skin contact may cause irritation,
• Ingestion: eating large amounts may cause gastrointestinal irritation,
Inhalation: if inhaled, may cause respiratory irritation,
In chronic use of potassium sulfate: poisoning can occur in rare cases of prolonged exposure.
ETSNG code 434023 Potassium sulfate (potassium sulfate)
Position on the Unified Tariff and Statistical Nomenclature of Goods (ETSNG)

Code	Name	Securi	Danger	Class	MBH
434023	Potassium sulfate (potassium sulfate)	No	No	2	GP

Relevant Items of the Harmonized Nomenclature of Goods (GNG)

Code	Name
31043000	Potassium sulfate

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Translation was done

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