AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Pedagogical and Educational Research
ISSN (E): 2832-9791| Volume 11, | April, 2023

RESEARCH OF PHYSICO-CHEMICAL TECHNOLOGY OF CERAMICS AND GLASS PRODUCTION

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ABSTRACT	KEYWORDS
After this process, it is reduced to a size of 10-30 mm in hammer and cone crushers. Percussive grinders can also be used for this purpose. In it, the material is crushed by means of special grates installed in the body and the tukmokdar, which rotates at high speed. For the last time, the raw materials are crushed in ball mills together with the clay from the roller mill. Extraction and transportation of raw materials. Raw materials, for example, clay, are dug out from the ground in open shallow mines near the enterprise.	The material is milled better in Karaganda water than when milled without water, because water drastically reduces the hardness of the milled material, clay, limestone, quartz, clinker, feldspar, magnesite, stone

Introduction

Ceramics and glass production technology

General understanding of technological operations. Technology knowledge refers to the knowledge of tools and methods of working with materials. Therefore, we present some general information about the production process of silicate and its products[1].

The basis of the production technology of ceramics and refractory materials, as well as glass and steel products, is the transformation of natural or artificial raw materials and materials (powder) into a technical monolithic stone characterized by complex properties to a certain extent[2].

Some parts of ceramics and glass technology can be schematically described as follows[3]:

Technology of ceramics and refractory materials: raw materials —> powder. preparation of plastic mass or slinker —> «.polishing —> drying —> incineration —> thermal mechanical or chemical treatment —> sorting —> packing — warehouse of goods;

Technology of glass and steels: raw materials —> preparation of cement powder or briquettes —> melting —> crimping —> thermal mechanical or chemical treatment —> sorting —> packing —> storage of finished goods[4].

First of all, we will focus on the materials used as raw materials in the technological process[5]. Raw materials such as clay, loess, feldspar, sand and fireclay, glass and steel products are used in the production of ceramics and refractory materials, and raw materials such as sand, limestone, soda or potash are used[6]. As you can see, there is a lot of similarity in the types of raw materials used in the production of various silicate products[7]. However, depending on the characteristics of the manufactured products, their ratio and type may change.For example[8]: in construction FHLUTH, FOBUK and porous rings, easily liquefiable and low temperature resistant type of clay 1620 Klan is used[9]. Various additives such as quartz or quartz sand, iron oxides, limestone particles and organic compounds cause them to liquefy at lower temperatures. Fire-resistant clays are used to obtain fire-resistant materials[10]. They are purer than easily liquefiable clays, and because of relatively less mixing of quartz, feldspar, mica, iron compounds and others, they withstand temperatures above 1850 K. The third type of clays, liquefiable clays, are liquefied at 1620-1850 K[11]. They do not produce refractory FHLLIT because mechanical additions are more dirty than in refractory clays. Among them, mainly sewage pipes. used in the production of floor and interior finishing tiles and facade ceramics[11].

One of the main technological operations performed in the production of silicate products is the preparation of raw materials, which is carried out in a wet or dry method[12]. Raw materials are prepared in water. the production method is called the "khul" method[13]. The choice of this method depends on a number of factors of the type of raw material and its properties, technological and technical economic nature[14].

The main task related to the preparation of materials is to create a homogeneous mixture of raw materials with the required moisture and chemical, mineralogical and granulometric composition[15]. To prepare such a mixture, the materials included in the composition (limestone, clay, feldspar, admixture, etc.) are finely ground and thoroughly mixed with a certain amount of water or steam[16. When the ingredients are crushed and mixed, the oxides in the raw mix interact with each other as they burn or melt[17].

Raw materials are prepared exactly the same for both parts of ceramics and glass technology[18]. Extraction of raw materials from underground, transportation, grading, sorting, dosing, lifting, transfer. mixing. flouring and bagging ready homogeneous raw materials are the main technological operations in production[20].

Extraction and transportation of raw materials. Raw materials, such as clay, are dug out from the ground in open shallow quarries near the enterprise[19].

With the help of a scraper, bulldozer, or excavator, the raw material loading and unloading machine is first cleaned of gray soil and limestone, the pit is leveled, and an access road is built[21]. Excavation and loading of clay into vehicles is carried out in various ways (open in dry regions and closed in dry regions). Excavators with a bucket volume of 0.5-2 m3, and in many cases with a bucket, are suitable for these purposes[22].

Limestone.hard materials such as marl, magnesite, dolomite, quartz, feldspar, tof crystal are mined at the blast site and placed on wagons, platforms or machines using a single-hoe excavator[23].

Rail and non-rail, periodic and non-stop conveying machines are used for raw material transportation. The range of rail vehicles includes locomotives, electric locomotives, suspension wire rope hoists, etc. Non-rail freight vehicles can be represented by various brands of vehicles (for example, "BelAZ" and "KrAZ"), electric loaders, scrapers, and bulldozers. Non-stop transfer of goods from one place to another can be done by conveyors in the horizontal direction and elevators in the vertical direction. If the quarry is about 1 km away from the factory, belt conveyors can be used, and if there are low places between the factory and the quarry, a hanging wire archon can be used. In some cases, hydrotransport is used.

In order to ensure normal operation in severe weather conditions, certain time stocks of necessary materials for production are stored in the yard of the enterprise.

Grinding raw materials. Grinding of raw materials in the production of ceramic and glass products is carried out in various grinding and grinding machines. These machines crush, beat, rub, and split material flakes. disconnection and explosion processes occur frequently. This type of process usually involves the physical properties of substances,

The material is selected according to the particle size and the specified level of grinding.

For example, the density of clay is 1710-2010 kg/m' and the limit of compressive strength is 0.2-0.6 MPa; volume weight of limestone is 2640-3110 kg/m3 and compressive strength limit is 40-380 MPa; the volume weight of quartz is 2650 kg/m3 and the compressive strength limit is 85-148 MPa; The volume weight of firewood is 1710-2110 kg/m3 and the compressive strength limit is around 11 MPa. Depending on the difference in the visible physical properties of the raw materials, the tendency of the substances to be crushed is determined by the coefficient of friction.

The coefficient of grinding efficiency means the ratio of the specific energy amounts of the grinding standard and the tested substances to a certain degree and is characterized by the following values for the types of raw materials:

Clay	**1,6**	**- 2,1**
Limestone	**0.7**	**- 1.0**
Quartz	**0,6**	**- 0,6**
Clinker		**1,1**
Feldspar	**0,8**	**- 0.8**
Magnesite	**0,71**	**- 1,1**
Stone	**0,71**	**- 1,31**

The initial particle size of the crushed material varies depending on their extraction from the quarry, transportation and moisture content. If we assume that the appearance of the bubbles is conditional spherical, then their diameter is found as follows:

$$Д = xfJbh \text{ or } Д = {}^{,+b+h}$$

In most cases, the initial state of this size is equal to 760-260 mm, and the state after conception can be 0.01 mm or even smaller.

The ratio of the initial average size of material flakes (D ,,,) to the average size after grinding (d' i) is called the degree of grinding of the material and it is denoted by the letter /':

The degree of grinding of materials can be 4-30 for grinding machines, up to 300 for flour milling machines, and sometimes up to several thousand.

Roller mill for crushing raw materials. hammer crusher (a machine used for grinding consisting of a millstone and generally one or two stone rollers), with a hammer face (lungi). conical. rotor (percussion) grinding machines, strugach (grinding machine for soft raw materials with scraping wheel) and tonraspler (rubbing aid on the screen surface) are used. As a flour milling machine, it is spherical. Stergen and bol Fa chat i mills are used. Later, for this purpose, pneumo-. iibro and energy OK. IMLI mills are widely used.

It depends on the three factors (compressive strength, initial size of flakes and level of grinding) mentioned above. Large stones such as limestone, quartz and chamog. and is crushed to a size of 100-200 mm in grinders with a solid surface (jagli. Sungra is reduced to a size of 10-30 mm in hammer and cone grinders. Percussion grinders can also be used for this purpose. In it, the material is crushed by means of special grates installed in the body and the tukmokdar, which rotates at high speed. For the last time, the raw materials are crushed in ball mills together with the clay from the roller mill.The material is milled better in Karaganda water than when milled without water, because water drastically reduces the hardness of the milled material.

Limestone and other components are conveyed to the ball mill using continuous machinery. Since their work is controlled by machines, the mill always produces serum at the same voltage, grinds and mixes the materials as required.

Cleaning and repair of raw materials. During this operation, crushed material or a homogeneous mixture is separated into certain grades and classes and is cleaned of unnecessary additives. In general, materials are sorted in different ways in the silicate technology: mechanical sorting the material is sifted with the help of machines and tools with a type grid, and according to the size of the grains, the ball is divided into two or more types;

sorting in air - material grains are separated and fractionated from air flow in horizontal or vertical direction under the influence of gravity and rotational forces in air separators, cyclones, filters and electrofilters;

magnetic sorting — the material is cleaned of iron compounds and metal additives with electromagnetic separators;

hydraulic screening — in which the material is conical. In chamber and hydromechanical classifiers, it is divided into fractions based on the difference in particle size or specific gravity in the medium.

In technology, regulation of the supply of raw materials, water, fuel, etc. to equipment such as flouring machines, krilling devices, nonstop conveying of goods is carried out with the help of special plate (disc), plate (lentyai), drum and screw feeding machines. Sometimes these machines can also act as dispensers.

Dosers serve to supply technological line materials in a certain amount continuously or in portions (cycles). They are divided into bulk and weight dosers according to the dosing method. Dosing accuracy in volumetric dispensers is 2-5%.They are easy and simple in terms of structure and are widely used in technology. Where accurate measurement is required, facet cyclic or continuous scales are used.

Mixing, adjusting and storing raw materials. Mixing raw materials with each other and with water is an important technological process, which is carried out in machines such as vane slurries, screw slurries, melters, blade mixers, slurries. As an example, you can familiarize yourself with the process

of making a plastic construction finger. In this method, one or two wings of crushed clay are used. Here, 18-25% of water is added to the flour and mixed with auger cotton wool until it becomes homogeneous. If the plastic mass, for example, is prepared from a slip or solution for obtaining household porcelain, then the amount of water in it is reduced using filter presses. Further, the quality of the mass can be improved by additional processing in vacuum or non-vacuum belt presses.

Molding of a homogeneous finished substance. Ceramics and refractory materials semi-dry powder, plastic method mass. the slurry or solution is obtained by grinding using special tools and machines. Semi-dry powder with a moisture content of 7-12% is pressed at a pressure of 20-40 MPa in one- or two-way single-stage or cup-stage methods. The pressing process is performed in elbow, friction, rotary and hydraulic presses. Pressing of plastic mass with 18-25% moisture is carried out in tape or stamp presses at a pressure of 1-2 MPa. Usually, the mass is pushed and compacted in a press using an auger.The brush continuously coming out of the press mouthpiece is cut using the steel wire of the cutting machine and the fhllit xrsil of the given size is cut. Since the process is carried out periodically in stamping presses, there is no need for a cutting device. These presses are very productive and can mold 10,000 or more products per hour. In the production of products such as porcelain, the above-mentioned moisture masses are also used, but the molding process depends on the type of machine and tools used.

In the production of glass and steel products, the molding process is carried out after the main thermal operation of the melting process, using the technology of obtaining ceramics and fire-resistant materials. Molding is carried out using ash and machines, drawing, burning, rolling, pressing, blowing. For example, window glass is made on vertical and horizontal machines. In these machines, the slot of the sealing device called "tsayihcha" in which the continuous glass tape is immersed in the solution is pulled out with an orca, and it is cut in the form of a varakugar with a thickness of 2-6 mm. The continuous glass tape can be drawn freely without the bear method. In this method, since the glass mass is not in contact with another substance, it is free from defects such as air bubbles, ridges and dull spots.

Before the melting of glass and slag (in some cases) small grains - granules are formed. In the process of dry Portland cement production, such grains are prepared in a hole press, special drum or plate granulators. With this, the flying out of glass slag or cement flour in large quantities with small gases was stopped. As a result, the oven works normally and the productivity increases.

Thermal mechanical and chemical treatment of the product. Among these methods, thermal treatment is the most complex and responsible process of ceramic and glass technology, which ensures the quality of the finished product to a certain extent.In the technology of ceramics and refractory materials, it includes the main processes such as drying and burning of the product, and in the technology of glass and ceramics, the melting of the mixture or granules and the stress relief of the molded product.

Thermal treatment of the above-mentioned silicate products is carried out in different ways, conditions and temperatures.

In the production of ceramics and refractory materials, the raw product is first dried. Currently, the process of drying products is carried out using 360-390 K heating in modern chamber, conveyor or tunnel dryers, which are free from ash power and ash labor. The drying time is in Kisharmok as the technology develops.

We can give an example of the drying of raw dough. FHUJT, cut from the brush with beam or rotary machines, is loaded into drying wagons with the help of "Automating" machines. In particular, such a machine of the brand "SM 562A" puts 8,000 pieces of FHLUTH in one hour, that is, it does the work that 8-10 people used to do in one piece, and then it is dried to 6-9% moisture. The process of making FULIJT was considered a laborious operation in the past, and it was dried for weeks in open fields and in special palaces with the help of heat or burning smoke. Currently, the drying time has been reduced several times: it is 40-70 hours in the chamber unit, and 15-40 hours in the tunnel.
Dried cotton is taken from dryer cars and placed in special cars or special rooms. Then it is cooked. Various types of ovens are widely used in this area

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