For today, the stub is agglomerated. In the process of agglomeration, sulfur burns out of it, and the stub is sintered into porous pieces-agglomerates. The stub prepared in this way is the raw material for the production of cast iron.

The chemical composition of gas and cinder depends not only on the feedstock, but also on the design of the furnace in which pyrite is fired. The design of the furnace also affects the scheme for further purification and processing of sulfur dioxide.

The most convenient apparatus for this reaction is *a pyrite fluidized bed furnace* (*PFBF*).

The process temperature should be high enough to ensure a high reaction rate. At low temperatures (below 500 °C), the endothermic reaction of thermal decomposition of iron disulfide cannot occur. However, firing at very high temperatures can cause an undesirable physical process of sintering particles of burning material, leading to an increase in their size.

The consequence of this may be an increase in the time of complete conversion of solid particles τ_n and a decrease in furnace productivity. The sintering temperature varies depending on the composition (grade) of pyrites from 800 to 900°C. Carrying out the process in adiabatic mode would lead to heating to higher temperatures.

Therefore, part of the heat of firing has to be removed inside the furnace. It is most convenient to do this in furnaces of the "fluidized bed" type, since in the fluidized bed of solid material the heat transfer coefficient from the pyrite to the surface of the cooling elements is sufficiently high [≈1,000 kJ/(m^2·h·K)] and cooling coils can be introduced into the "fluidized" layer.

Several types of continuously operating furnaces are used for firing pyrite, in which the question of the nature of the movement of the solid phase is solved in different ways. In the old sulfuric acid plants can be found mechanical (hearth) furnace. The crushed pyrite is in such furnaces on several hearths and burns as it is moved by strokes from one hearth to another. In furnaces firing pulverized particles of pyrites are burned during the fall in the hollow chamber. In cyclone furnaces pyrite is fed tangentially with hot air at high speed. Pyrite burns, rotating in the furnace with the air. The melted stub flows out through special holes.

In the production of sulfuric acid, pyrite is mainly used for fluidized bed furnaces with a fluidized bed of solid material. In the fluidized bed, a high speed of diffusion and heat transfer processes is ensured (oxygen supply to the pyrite surface, removal of sulfur dioxide into the gas stream, removal of heat from the surface of the feed to the gas stream). The absence of inhibitory effect of mass and heat transfer allows pyrite firing in such furnaces at high speed. Fluidized Bed furnaces are characterized by maximum intensity in comparison with other designs used for firing pyrites. The disadvantages of the type of fluidized bed furnaces include high dust content of the calcining gas.

In practice, during the firing of pyrites, the furnace gas contains 13-14% sulfur (IV) oxide, 2% oxygen and about 0.1% sulfur (VI) oxide. Since there must be an excess of oxygen in the furnace gas for the subsequent oxidation of sulfur (IV) oxide, its composition is adjusted by diluting with air to the content of sulfur oxide (IV) 7-9% and oxygen 11-9%.

Cleaning of roasting (furnace) gas

The firing gas must be cleaned of dust, sulfuric acid mist and substances that are catalytic poisons or of value as byproducts. The firing gas contains up to 300 g/m^3 of dust, which at the contact stage clogs the equipment and reduces the activity of the catalyst, as well as sulfuric acid mist.

In addition, when firing pyrite simultaneously with the oxidation of iron disulfide oxidized sulfides of other metals contained in pyrite. In this case, arsenic and selenium form gaseous oxides As_2O_3 and SeO_2, which pass into the firing gas and become catalytic poisons for vanadium contact masses.

Dust and sulfuric acid mist are removed from the firing gas in the general gas cleaning process, which includes mechanical (coarse) and electrical (fine) cleaning operations. Mechanical cleaning of the gas is carried out by passing the gas through centrifugal dust collectors (cyclones)