

ELEKTROTERMİK FOSFOR OLISH TEXNOLOGIYASI

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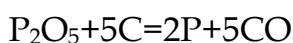
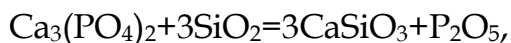
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Annotatsiya

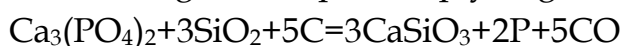
Elektrotermik fosfor olish uchun kalsiy fosfatni kalsiyoksid bilan fosfat angidriddan iborat birikma deb tasavvur qilish kerak, qum esa ma'lumki kremniy 4 oksid, yani silikat angidriddan iboratdir. Buni esa elektr o'chog'larida yuqori haroratda silikat angidrid ko'mir ishtirokida fosfat angidridni siqib chiqarib, kalsiy oksid bilan birikadi, natijada silikat kislotaning kalsiyli tuzini hosil qiladi, fosfat angidridni esa ko'mir erkin fosforgacha olib keladi. Keyin esa fosfat angidrid fosforning havo yoki kisloroddan yonishidan metofosfat kislotaga aylanadi. Metofosfat kislota eritmasi esa qaynatilib 3 negizli ortofosfat kislota olinadi. Ortofosfat kislota asosan o'g'it olishda ishlatiladi.

Fosforlar erkin holatda quyidagicha olish mumkin: Kalsiy fosfat, qum va ko'mir bilan aralashtiriladi va maxsus o'chog'larda havo kiritmay turib, elektr toki yordamida qattiq qizdiriladi.

Bunda bo'ladigan reaksiyani tushunish uchun kalsiy fosfatni kalsiy oksid bilan fosfat angidriddan iborat birikma ($3\text{CaO}\cdot\text{P}_2\text{O}_5$) deb tasavvur qilish lozim, qum esa ma'lumki kremniy (IV) oksid, yani silikat angidrid SiO_2 dir. Elektr o'chog'larda 1300-1500 daraja haroratda silikat angidrid ko'mir ishtirokida fosfat angidridni siqib chiqarib, kalsiy oksid bilan birikadi va silikat kislotaning kalsiyli tuzi CaSiO_3 ni hosil qiladi, fosfat angidridni esa ko'mir erkin fosforgacha qaytaradi:



Bu ikki tenglamani qo'shib quyidagi tenglamani olamiz:



Ajralib chiqadigan fosfor bug'ga aylanadi, bu esa yig'gichdagi suv ostida quyultiriladi.

Fosfor angidrid (P_2O_5) fosforning havo yoki kislorodda yonishida hajmdor qorsimon oq massa hoida hosil bo'lib, u suvda eritilsa, metofosfat kislota (HPO_3)ga aylanadi. Metafosfat kislota eritmasini qaynatib 3 negizli ortofosfat kislota olinadi. Ortofosfat kislota asosan o'g'it olishda ishlatiladi.

Fosfat, koks va eritgich moddadagi kremniy, alyumniy, kalsiy, magniy va boshqa oksidlari elektrotermik haydash sharoitida erib, silikatli toshqollarga aylanadi. Pech ichida sodir bo'ladigan sharoitda temir va boshqa metall oksidlari erkin holatgacha qaytarilib, jadallik bilan o'chog' ichida fosfor bug'lari bilan reaksiyaga kirishib, ferrofosfor hosil qiladi. Suyuqlangan ferrofosforning haqiqiy zichligi katta bo'lganligi uchun o'chog'ning pastki qismiga oqib tushadi, suyuq toshqol esa ferrofosforning betiga yig'iladi. Yig'ilgan ferrofosfor va toshqol maxsus teshiklar orqali chiqarilib turiladi. Ferrofosfor toshqolga nisbatan juda kam miqdorda hosil bo'ladi. Uning miqdori fosforit tarkibidagi temir oksidi va boshqa metall oksidlarining miqdoriga bog'liq bo'ladi.

O'chog' uzluksiz ishlaydi. Ruda bilan ko'mirning yuqorigi qatlamlari pastga siljiy borishi bilan o'chog'ga ruda, kvarsit hamda ko'mirning yangidan-yangi shixta deb ataladigan aralashmasi qo'shilib turadi.

Qizigan suyuq toshqollar kimyoviy tarkibining deyarli o'zgarmasligidan foydalanib, u o'chog'dan oqib chiqayotgan vaqtidanoq biror maqsadga mo'ljallab foydali mahsulot olish mumkin. Toshqol dastlabki tarzidayoq turli qurilish materiallari va buyumlari ishlab chiqarish uchun qimmatbaho xomashyo bo'lib xizmat qilishi mumkin. Ammo qalovini topsang qor yonar deganlaridek, toshqolning foydali xususiyatini 10 baravar oshirish mumkin. Buning uchun maxsus usullar ishlab chiqilishi kerak, albatta. Shuningdek, toshqollarning hosil bo'lish jarayonlarini boshqarib, kerakli xossaga ega bo'lgan toshqollar olsa ham bo'ladi. Bu ish ko'p tadqiqotlar, izlanishlar olib borishni taqozo etadi.

O'zbekiston Fanlar akademiyasining Kimyo institutida bir guruh olimlar ishtirokida Qoratog' va O'zbekiston fosforitlaridan fosfor bilan birga turli qurilish materiallari olish texnologiyasi ishlab chiqish va elektrotermik usulda hosil bo'ladigan toshqollarni ishlatish ustida olib borayotgan tadqiqotlari diqqatga sazovordir.

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ELECTROTHERMAL PHOSPHORUS EXTRACTION TECHNOLOGY

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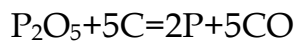
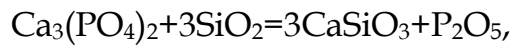
Abstract

In order to obtain electrothermal phosphorus, it is necessary to imagine calcium phosphate as a compound consisting of calcium oxide and phosphate anhydride, and sand, as is known, consists of silicon 4 oxide, that is, silicate anhydride. At high temperature in electric furnaces, silicate anhydride in the presence of coal displaces phosphate anhydride and combines with calcium oxide, resulting in the formation of a calcium salt of silicic acid, and coal reduces phosphate anhydride to free phosphorus. Phosphate anhydride is then converted to metaphosphoric acid by burning phosphorus from air or oxygen. The solution of methophosphate acid is boiled and 3 basic orthophosphate acid is obtained. Orthophosphoric acid is mainly used in making fertilizers.

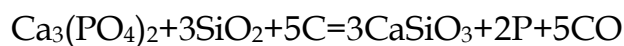
Phosphorus can be obtained in the free state as follows: Calcium phosphate is mixed with sand and coal and is heated strongly with the help of electricity in special furnaces without introducing air.

In order to understand the reaction, it is necessary to imagine calcium phosphate as a compound consisting of calcium oxide and phosphate anhydride

($3\text{CaO}\cdot\text{P}_2\text{O}_5$), and sand is known as silicon (IV) oxide, that is, silicate anhydride SiO_2 . In electric furnaces, at a temperature of 1300-1500 degrees, silicate anhydride in the presence of coal displaces phosphate anhydride, combines with calcium oxide and forms the calcium salt of silicic acid CaSiO_3 , and coal reduces phosphate anhydride to free phosphorus:



Adding these two equations, we get the following equation:



The released phosphorus turns into steam, which is condensed under water in the collector.

Phosphorus anhydride (P_2O_5) is formed in the form of a bulky snow-white mass when phosphorus burns in air or oxygen, and when it is dissolved in water, it turns into metaphosphoric acid (HPO_3). By boiling a solution of metaphosphoric acid, 3-basic orthophosphate acid is obtained. Orthophosphoric acid is mainly used in making fertilizers.

Phosphate, coke and silicon, aluminum, calcium, magnesium and other oxides in the solvent dissolve under electrothermal driving conditions and turn into silicate rocks. Under the conditions of the furnace, iron and other metal oxides are reduced to a free state and rapidly react with phosphorus vapors in the furnace to form ferrophosphorus. Due to the high real density of the liquefied ferrophosphorus, it flows to the bottom of the furnace, and liquid scale collects on the surface of the ferrophosphorus. Collected ferrophosphorus and stone are removed through special holes. Ferrophosphorus is formed in a very small amount compared to rock. Its amount depends on the amount of iron oxide and other metal oxides in phosphorite.

The furnace works continuously. As the upper layers of ore and coal move down, a mixture of ore, quartzite, and coal is added to the hearth, which is called fresh slag.

Using the fact that the chemical composition of hot liquid rocks does not change, it is possible to obtain a useful product from the moment it flows out of the furnace. Stone in its original form can serve as a valuable raw material for the production of various construction materials and products. But as they say, if you find a stone, the snow will burn, so the beneficial properties of stone can be increased 10 times. Special methods must be developed for this, of course. It is also possible to control the processes of stone formation and obtain stones with the desired properties. This work requires a lot of research.

The research conducted by a group of scientists at the Institute of Chemistry of the Academy of Sciences of Uzbekistan on the development of technology for obtaining various building materials with phosphorus from phosphorites of Karatog and Uzbekistan and the use of rocks produced by the electrothermal method is noteworthy.

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