POLITETRAFTORETILENNING ULTRADISPERS ZARRACHALARINING TUZILISHI VA XUSUSIYATLARI

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Annotatsiya. *Ushbu maqola politetraftoretilen (PTFE) zarrachalarining turli o‘lchamlarda olinishi va ularga ta’sir qiluvchi texnologiyalarni tahlil qiladi. PTFE kukunining dispersiyasi va o‘lchami sanoat texnologiyalariga ta’sir qiladi, bu esa mahsulot sifatini va undan foydalanish samaradorligini belgilaydi. Maqolada, shuningdek, kukunsimon PTFE olishning turli usullari, jumladan, sintetik, mexanik, radiatsion, lazer, termik va termogazodinamik metodlar haqida batafsil ma’lumot berilgan. Bularning har biri o‘ziga xos afzalliklar va cheklovlarga ega. Yangi ishlab chiqilgan termogazodinamik (TGD) usuli, PTFE zarrachalarining sifatini yaxshilashda samarali bo‘lib, sanoat miqyosida yuqori sifatli ultradispersli PTFE ishlab chiqarishni ta’minlashga imkon beradi. Ushbu texnologiya PTFE ishlab chiqarishning samaradorligini oshirish uchun innovatsion yondashuvlarni taklif qiladi.*

Kalit so‘zlar: *Politetraftoretilen (PTFE), ultradispers zarrachalar, dispersiya, texnologik usullar, termogazodinamik usul , sintetik usul, radiatsion usul, lazerli ishlov berish, mexanik maydalanish, sanoat texnologiyalari, innovatsion yondashuvlar.*

Abstract. *This article analyzes the various particle size ranges of polytetrafluoroethylene (PTFE) and the technologies that influence them. The dispersion and size of PTFE powders have a significant impact on industrial technologies, determining the quality and efficiency of the products derived from them. The article provides detailed information about the different methods for obtaining PTFE powders, including synthetic, mechanical, radiation, laser, thermal, and thermogasodynamic methods. Each of these methods has its own advantages and limitations. The newly developed thermogasodynamic (TGD) method is shown to be effective in improving the quality of PTFE particles, offering the possibility of producing high-quality ultradispersed PTFE on an industrial scale. This technology presents an innovative approach to enhance the efficiency of PTFE production.*

Keywords: *Polytetrafluoroethylene (PTFE), Ultrafine particles, Dispersion, Technological methods, Thermogasdynamic method, Synthetic method, Radiation method, Laser processing, Mechanical grinding, Industrial technologies, Innovative approaches*

Sanoatda ishlab chiqariladigan mahsulot - politetraftoretilen (PTFE) zarrachalarining o‘lchami 1-2 mkm dan 250-300 mkm gacha bo‘lgan kukunsimon modda bo‘lib, u osongina katta o‘lchamdagi agregatlar hosil qiladi, bu esa mahsulotlarni ishlab chiqarishda, moylash materiallarini olishda amaliy qo‘llanilishini qiyinlashtiradi.

sanoatning turli tarmoqlarida qo‘llaniladigan emulsiyalar va suspenziyalar va boshqa yarim tayyor mahsulotlarni tayyorlashda foydalaniladi. Kukunsimon mahsulotning dispersligi olish texnologiyasiga bog‘liq bo‘lib, ko‘p jihatdan ushbu modifikatorning moylash va maxsus muhitlarda ta’sir qilish samaradorligini, shuningdek, uni presslash usuli bilan konstruksion, tribotexnik, germetiklash, keyinchalik pishirish va ekstruziyalash mahsulotlariga qayta ishlash texnologikligini belgilaydi.

Kukunsimon PTFE olishning ma’lum usullarini oltita guruhga bo‘lish mumkin [127, 1) sintetik, 2) mexanik, 3) radiatsion, 4) lazer. 5) termik, 6) termogazodinamik.

Birinchi guruh usullarining mohiyati tetraftoretilendan suspenzion yoki emulsion usullar bilan zarracha o‘lchamlari 3-5 mkm bo‘lgan PTFE suspenziyalari va organogellarini sintez qilishdan iborat. Usullar yetarlicha samarali va sanoat amaliyotida qo‘llaniladi, ammo texnologik jihatdan murakkab, yuqori tozalikdagi reagentlarni talab qiladi bu esa olinadigan mahsulotning yuqori narxini belgilaydi. Bundan tashqari, kichikroq o‘lchamdagi zarrachalarni olish qiyin.

Suspenziyalardan zarrachalarni quruq holda ajratib olish ularning aglomeratsiyalanishiga olib keladi.

Ikkinchi guruh usullari PTFEning massiv namunalarini maxsus tegirmonlar yordamida yoki zarrachalarning tovushdan tez gaz oqimlarida o‘zaro to‘qnashuvida mexanik maydalashga asoslangan. Ushbu maydalash usuli mo‘rt materiallar uchun samarali bo‘lib, PTFE suyuq azot haroratidan (77 K) past haroratda bo‘ladi. Past haroratlardan foydalanish zarurati bu dispergatsiya usulini kam unumli va qimmat qiladi. Olingan kukun zarrachalarining o‘lchamlari katta tarqoqlikka ega bo‘lib, 5-100 mkm oralig‘ida bo‘ladi; zarrachalar o‘lchamini rostlash va monofraksion mahsulot olish qiyin.

Dispers zarrachalar olishning radiatsion usuli PTFEning nurlanishga nisbatan past barqarorligiga asoslangan. PTFE massiv namunalarining destruksiyasi zarrachalar

oqimi yoki -kvantlar ta’sirida makromolekulalarning uzilishi natijasida sodir bo‘ladi. Yarim tayyor mahsulotni nurlantirish mahsulotning molekulyar og‘irligini 10-30 marta kamayishiga olib keladi va o‘lchami 5 mkm gacha bo‘lgan kukunsimon kukun zarrachalarini olishni ta’minlaydi. Ko‘rinib turibdiki, usul yuqori unumdorlikka va mahsulot tannarxining pastligiga ega emas. Usul ftoroplast chiqindilarini qayta ishlashda istiqbolli deb baholandi, ammo sanoat miqyosida amalga oshirilmadi.

Lazer nurlanishi ta’sirida PTFE massiv namunasining lokal destruksiyasini o‘z ichiga oladi. Ishda faqat usulning prinsipial imkoniyati muhokama qilinadi va uni bir qator sabablarga ko‘ra keng qo‘llash imkoniyati shubhasiz emas: yuqori tannarx, past unumdorlik.Blokli PTFE asosida g‘ovakli yarim tayyor mahsulotlar olish uchun lazer ta’sirini qo‘llash bo‘yicha ishlar ma’lum.

Dispergirlashning termik usullari termodestruksiya jarayonida hosil bo‘ladigan monomer - gazsimon tetraftoretilen (TFE) ning qayta polimerlanishiga asoslangan. Bu jarayon tetraftoretilenning ortiqcha bosimida va polimerlanish sharoiti mavjudligida amalga oshishi mumkin. Biroq, yakuniy mahsulotning chiqishi juda past, bir foizdan kam, bu esa kukunsimon PTFEni kerakli miqyosda ishlab chiqarish uchun termik usuldan amalda foydalanishni istisno qiladi.

Yuqorida sanab o‘tilgan barcha usullar PTFE asosida sifatli dispers mahsulot olish uchun cheklovlarga ega. PTFE kukunining sifatini yaxshilash uchun bir qator usullar qo‘llaniladi. Masalan, radiatsion usulda olingan kukunga qo‘shimcha mexanik ishlov berish zarrachalar o‘lchamini 1-3 mkm gacha kamaytirish imkonini beradi. Rossiya Fanlar akademiyasi Uzoq Sharq bo‘limi Kimyo institutida (Vladivostok) Rossiya Fanlar akademiyasi Sibir bo‘limi Kataliz instituti (Novosibirsk) bilan hamkorlikda K.x.f.d. Svetnikov A.K. va xodimlari tomonidan yuqorida qayd etilgan muammolarni qisman hal qiladigan va sifati bo‘yicha boshqariladigan ultradispersli politetraftoretilen (UPTFE) ni sanoat miqyosida ishlab chiqarishni ta’minlay oladigan termogazodinamik (TGD) usuli ishlab chiqilgan.

Ishlab chiqilgan texnologiya ma’lum texnologiyalardan farq qiladi, chunki u PTFE termodestruksiyasi mexanizmiga yangi yondashuvlarga asoslangan.

Xulosa. Maqola PTFE zarrachalarining o‘lchami va dispersiyasini boshqarish uchun turli texnologik usullarni tahlil qiladi. Ushbu usullar har biri o‘zining samaradorligi va cheklovlari bilan ajralib turadi. Radiatsion va mexanik usullar bilan solishtirganda, termogazodinamik usul PTFE kukunining sifatini oshirish va yuqori sifatli ultradispersli materiallar ishlab chiqarish imkonini beradi. Ishlab chiqilgan TGD usuli sanoat miqyosida ulardan foydalanish uchun istiqbolli yondashuv sifatida kiritilgan va uning samaradorligi yuqori bo‘lishi mumkin. Shuningdek, maqolada bu

usullarni qo‘llashning amaliy ahamiyati va kelajakdagi rivojlanish yo‘llari muhokama qilinadi.

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