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TRANSPORT UNIVERSITETI**

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**“QURILISHDA YASHIL IQTISODIYOT, SUV VA ATROF-MUHITNI ASRASH
TENDENSIYALARI, EKOLOGIK MUAMMOLAR VA INNOVATSION
YECHIMLAR” MAVZUSIDAGI RESPUBLIKA MIQYOSIDAGI
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Methods of washing filters in wastewater systems and their effectiveness

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Abstract: Filters used in industrial enterprises for wastewater treatment have become unusable due to long-term non-compliance with technical regulations and improper use during operation. This mainly involves the failure to wash, replace, and inspect installed filters in a timely manner. This article examines the solution to an effective method for washing filter cartridges. In the first experiment of the study, when the filters were washed with water at a temperature of 15-20 °C, the washing time was 16-25 minutes (long term). The solution to the above problem was the method of increasing the temperature in qualitative laboratory experiments. The results of this method show that it is very useful for washing oil and oil products and surfactants remaining in filter cartridges in high-temperature water. The reason is that at high temperatures, oil and oil products and surfactants melt and separate from the surfaces of filter cartridges, as a result, the washing coefficient of filter cartridges is higher than the washing coefficient with low-temperature water. It was proven that for the filter loads used in the article, changing the temperature of the wash water in counterflow conditions from the normal water temperature (15-20 °C) to a higher temperature (50-60 °C) reduces the filter washing time by a factor of 3.

Keywords: hanging particles, effluent, petroleum products, quartz sand, activated charcoal, activated bentonite, gravel, filter, filter loading.

Oqova suv tizimlarida filtrlarni yuvish usullari va ularning samaradorligi

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Annotatsiya: Sanoat korxonalarida oqova suvlarini tozalashda ishlatilayotgan filtrlar uzoq muddat davomida texnik qoidalarga amal qilinmasligi, ekspluatatsiya jarayonida to'g'ri foydalanilmasligi sababli ishlashga yaroqsiz xolga kelib qolgan. Bunda asosan o'rnatilgan filtrlarning o'z vaqtida yuvilmasligi, almashtirilmasligi va tekshirilmasligi o'rganildi. Mazkur maqolada yuklamali filtrlarni yuvishning samarali usulini echimi ko'rib chiqildi. Tadqiqotning birinchi tajribasida filtrlar 15-20 °S haroratli suv yordamida yuvilganda yuvish vaqti 16-25 daqiqa (uzoq muddat)ni tashkil qildi. Yuqoridagi muammoning echimi sifatida laboratoriya tajribalarida haroratni oshirib borish usuli tanlandi. Bu usul natijasi shuni ko'rsatadiki, harorati yuqori suvlarda filtr yuklamalarida qolib ketgan neft-moy mahsulotlari va sirt faol moddalarni yuvishda judayam foydali hisoblanadi. Sababi yuqori haroratda neft-moy mahsulotlari va sirt faol moddalar erib filtr yuklamalari sirtlaridan ajraladi, natijada filtr yuklamalarni yuvish koeffitsienti past haroratli suv bilan yuvilish koeffitsientidan yuqori bo'ladi. Maqolada qo'lanilgan filtr yuklamalari uchun teskari oqim sharoitida yuvish suvining haroratini oddiy suv harorati (15-20 °S)dan yuqori bo'lgan harorat (50-60 °S)ga almashtirilganda filtrlarni yuvish vaqti 3 barobarga qisqarishi isbotlandi.

Kalit so'zlar: muallaq zarralar, oqova suv, neft-moy mahsulotlari, kvarts qum, faollashtirilgan ko'mir, faollashtirilgan bentonit, shag'al, filtr, filtr yuklamasi.

1. Kirish

Suvni iste'moli ichimlik suvi, texnik suv, yong'inga qarshi foydalanish, sug'orish ishlari, obodonlashtirish ishlari uchun va boshqa maqsadlarda foydalaniladi. SHunga ko'ra suvni tozalash asosan uning qanday maqsadlarda ishlatilishiga qarab amalga oshiriladi. Sanoat korxonalarida oqova suvlarining tozalanish usullari ularning zararlanganlik darajasiga va uni qayta ishlatilishiga, tabiatga yoki oqova suv tarmoqlariga oqizilishiga qarab tanlaniladi. Tozalash usullari mexanik, kimyoviy, fizik-kimyoviy, biologik va chuqur tozalash turlariga ajratiladi. Oqova suvlarni tozalash uchun tanlangan filtrlarni yuvish jarayoni filtr yuklamalarida to'planib qolgan muallaq moddalar, neft-yog' mahsulotlari va sirt faol moddalaridan tozalanishidan iborat. [2, 6, 7]

2. Masalaning qo'yilishi

Sanoat korxonalarida oqova suvlarni tozalashda filtrlarning doimiy, uzoq muddat davomida to'xtovsiz ishlatilishi ularning filtrlash koeffitsientiga ta'sir ko'rsatadi. Sababi oqova suv tarkibidagi mayda zarrachalarning filtr yuklamalar g'ovaklarini to'ldirib qo'yadi. Buning natijasida oqova suvlar tarkibidagi zarralarni tutib qola olmaydi, yoki aksincha zarralarni tutib qolish bilan birgalikda oqova suvlarni o'tkazish tezligi kamayib ketadi. Buning echimi sifatida ikki usuldan birini tanlashga to'g'ri keladi: 1-usul filtrlarni almashtirish; 2-usul filtrlarni yuvish. Har safar filtr yuklamalari g'ovakdorligi to'lib qolganda ularni almashtiraverish xam resurs xam moddiy isrofgarchilikka olib keladi. Vaqti-vaqti bilan filtrlarni yuvish orqali yuklamalarining uzoq muddatli va ishonchli ishlashiga erishiladi. Filtrlarni yuvishda odatda oddiy toza suvlardan foydalaniladi. Qancha vaqt oraliq'ida filtr yuklamalari to'lib

yuvilishga ehtiyoj yuzaga keladi va ularni qancha vaqt davomida yuvish kerakligini aniqlash muammoning echimi xisoblanadi. [3, 8, 9]

Shu sababli mazkur maqolada filtr yuklamalrini yuvish vaqtini kamaytirish orqali filtrdan foydalanish samaradorligini oshirish masalasi ko'rib chiqilgan.

3. Yechish usuli

Tadqiqotni olib borish dastavval, kichik korxonalarda o'rnatilgan filtrlarni tozalash samaradorligi o'rganildi. Tadqiqot davomida Toshkent shahri va viloyatlarimiz hududlarida joylashgan kichik korxonalarda yumaloq kvars, faollashtirilgan ko'mir, faollashtirilgan bentanit, shag'al (mayda donali), shag'al (katta donali), sanoat chiqindisi bo'lgan rezina granularidan foydalanilgan xolda filtrlar o'rnatilgan. Kichik korxonalarning filtrlari almashtirilmaganligi va yuvilmaganligining natijasida oqova suvlari to'liq tozalanmasdan kanallarga yoki ariqlarga oqizilishi kuzatildi.

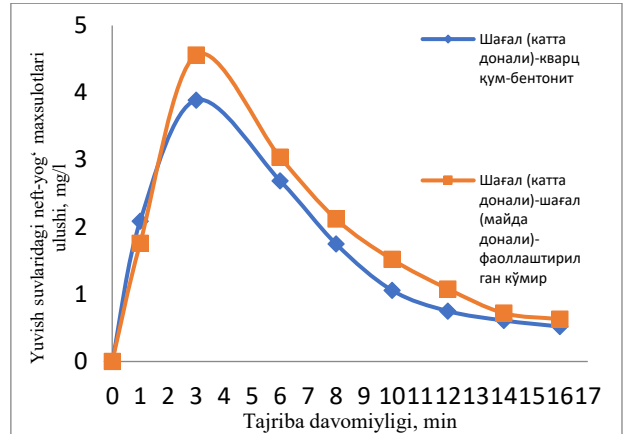
Tajribada o'rganilgan filtrlar muallaq moddalardan, sirt faol moddalardan, neft-yog' maxsulotlaridan tozalashga imkon beradi. Muallaq moddalar - qum, quriq moddalar, temir moddalar, yog'och qoldiqlari va shu kabi moddalar; sirt faol moddalar – soda, gel, sovun, shampun; neft-yog' mahsulotlari – kerosin, benzin, moylash mahsulotlari va boshqalar kiradi. Tajriba qurilmasi Toshkent davlat transport universiteti "Muhandislik kommunikatsiyalari va tizimlari" kafedrasining "GIDRAVLIKA" laboratoriyasidagi "Suv filtratsiyasi" qurilmasida amalga oshirildi.

Tozalash filtrining ishlash samaradorligi umuman suzuvchi filtr qatlamini yuvish jarayonining samaradorligiga bog'liq. YUvish suvining filtr maydoni bo'ylab notekis to'planishi va taqsimlanishi yukning mahalliy kengayishiga va kengaytirilgan polistirol granularining filtrdan tashqaridagi yuvish suvi bilan olib tashlanishiga olib kelishi mumkin. YUvish jarayonida donador qatlamning haddan tashqari kengayishi filtr korpusining balandligini va kapital qo'yilmalarni oshirishni talab qiladi. [11, 12, 14, 15, 18]

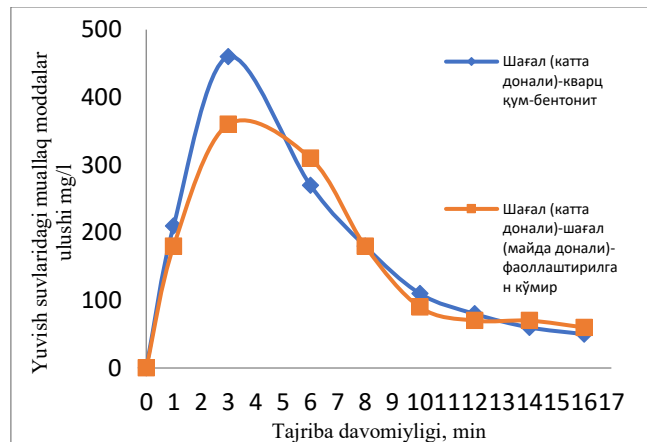
Filtrlarni suzuvchi yuk bilan yuvish filtr korpusining yuqoridagi filtr bo'shlig'idan yuvish suvining pastga tushishi bilan amalga oshiriladi. Suv harakatining past tezligida yukning granulari statsionar holatda bo'ladi. Donador muhitning teshiklaridan o'tadigan suv bosimi suv chegarasida - granular yuzasida paydo bo'ladigan ishqalanish kuchlarini engish uchun qisman yo'qoladi. Gidrodinamik bosim suvdagi yukning massasiga teng qiymatga tushganda, filtr qatlami kengayadi, uning g'ovakligi ortadi, granular ma'lum hajmda zich holatdan tasodifiy harakat holatiga o'tadi.

4. Natijalar va namunalar

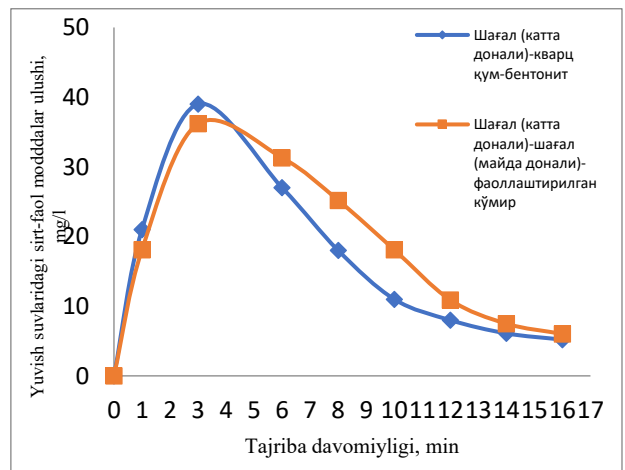
Ushbu tajribalar asosiy maqsadi filtr aylanish jarayonida hosil bo'lgan yukni yuvish samaradorligini o'rganish edi. Bunday samaradorlikni baholash mezonlari ifloslantiruvchi moddalarni yuvish darajasi bo'lib, bu yuvish davomida to'xtatilgan muallaq moddalar, neft-yog' maxsulotlar va sirt faol moddalarni yuvish suvi bilan olib tashlash bilan belgilanadi. Tajriba davomida xar 2 daqiqada tajriba suvidan namunalar olindi, bir filtrlash davri davomida yukning turli qatlamlarining ifloslanish darajasining asosiy xarakteristikasi sifatida uning ifloslanish qobiliyati quyidagicha aniqlanadi:



2-rasm. Yuvish suvlaridagi neft-yog' maxsulotlari ulushini vaqtga bog'liqlik grafigi



3-rasm. Yuvish suvlaridagi muallaq moddalarning ulushini vaqtga bog'liqlik grafigi

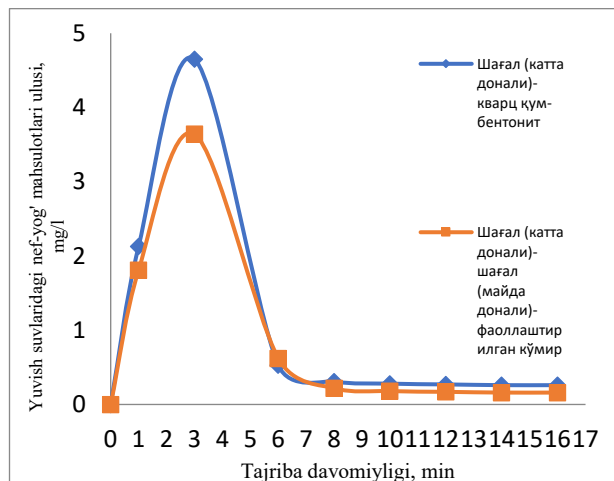


4-rasm. Yuvish suvlaridagi sirt faol moddalarning ulushini vaqtga bog'liqlik grafigi

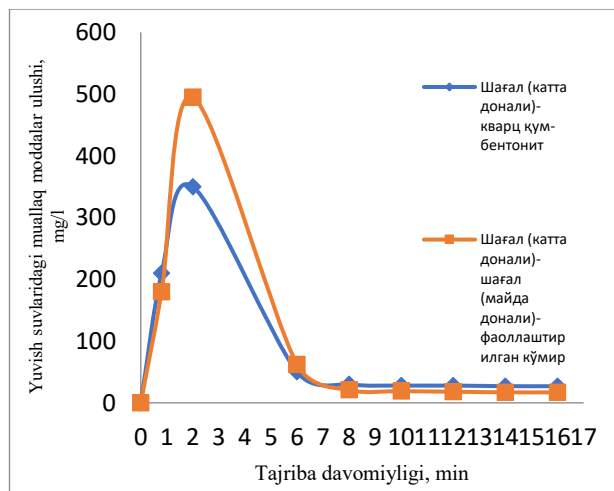
2-rasm, 3-rasm va 4-rasmlarda sanoat korxonalarda ishlatilayotgan filtrlar yani 1. SHag'al (katta donali)-kvars qum-bentonit, 2. SHag'al (katta donali)- shag'al (mayda donali)-faollashtirilgan ko'mir ikki xil turdagi filtrlarni xarorati 15-20 °S bo'lgan va $q \approx 15-18$ l/sm² talab qilinadigan intensivlikni ta'minlagan holda filtrlarini yuvishda dastlabki bosqichida olingan filtr yuklamalari suv bilan yuvish jarayonini o'rganish natijalari shuni ko'rsatdiki,

dastlabki 2-4 daqiqada neft-yog' maxsulotlar, muallaq moddalar va sirt faol moddalarni maksimal yuvish chegarasiga etadi va vaqt o'tishi bilan 16-19 daqiqalarda yuvishning minimal chegarasini qayt etadi va o'zgaras xolga keladi. [10, 16, 19, 20], 24 soat davomida ishlaydigan sanoat korxonalaridagi oqova suvlarni filtrlash doimiy ravishda bo'ladi. Oqova suvlarni 72 soat (3 kun) davomida tozalagan filtrlar tozalash koeffitsienti kamayib ketadi.

Filtrlarni yuvishga ketadigan vaqt 20 daqiqaga etgani uchun uni kamaytirishimiz kerak.

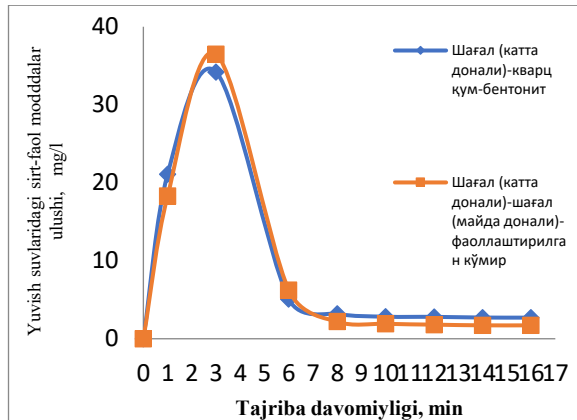


5-rasm. Yuvish suvlaridagi neft-yog' maxsulotlari ulushini vaqtga bog'liqlik grafigi



6-rasm. Yuvish suvlaridagi muallaq moddalarning ulushini vaqtga bog'liqlik grafigi

5-rasm, 6-rasm va 7-rasmlarda sanoat korxonalarida ishlatilayotgan filtrlar yani 1. SHag'al (katta donali)-kvarts kum-bentonit, 2. SHag'al (katta donali)-shag'al (mayda donali)-faollashtirilgan ko'mir ikki xil turdagi filtrlarni xarorati 50-60 °S bo'lgan va $q \approx 15-18$ l/sm² talab qilinadigan intensivlikni ta'minlagan holda filtrlarini yuvishda dastlabki bosqichida olingan filtr yuklamalari suv bilan yuvish jarayonini o'rganish natijalari shuni ko'rsatdiki, dastlabki 2-4 daqiqada neft-yog' maxsulotlar, muallaq moddalar va sirt faol moddalarni maksimal yuvish chegarasiga etadi va vaqt o'tishi bilan 6-7 daqiqalarda yuvishning minimal chegarasini qayt etadi va o'zgaras xolga keladi.



7-rasm. Yuvish suvlaridagi sirt faol moddalarning ulushini vaqtga bog'liqlik grafigi

Shundan kelib chiqqan holda, keyingi tadqiqotlar uchun filtrlar yuvishning muqobil usuli sifatida filtrlarni yuqori xaroratda yani 50-60 °S li suv bilan yuvilganda yuvilish davomiyligi 16-19 daqiqadan 6-7 daqiqaga kamaydi.

5. Xulosa

Tajribada qo'lanilgan filtrlarda sanoat korxonalaridan chiqqan oqova suvlarni yuqoridan pastgacha filtrlashda, ifloslantiruvchi moddalarning asosiy qismi yukning yuqori qo'pol taneli qatlamlarida to'planadi. SHu sababli, ulardagi ifloslantiruvchi moddalarni yuvish va ularni yuvish suvining pastga oqimi bilan mayda granularlarning butun yuk qatlami bo'ylab tashish samarasiz va tejamkor emas, ayniqsa suvning pastga siljishi jarayonida teskari oqim bo'lsa yuvish samaradorligini oshiradi.

Shuning uchun, qo'lanilgan filtrlar uchun teskari oqim sharoitida yuvish suvining xaroratini oddiy suv xarorati (15-20 °S)dan yuqori bo'lgan xarorat (50-60 °S)ga almashtirsak filtrlarni yuvish vaqti 3 barobarga qisqaradi.

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