

Scientific Journal of SCIENTIFIC PROGRESS

ISSN: 2181-1601

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2022/IX

VOLUME #3
ISSUE #9

www.scientificprogress.uz



Scientific Journal Impact Factor (SJIF 2022=5.016)
Passport: <http://sjifactor.com/passport.php?id=22257>

SCIENTIFIC PROGRESS

Scientific Journal

VOLUME #3, ISSUE #9, SEPTEMBER 2022

ISSN: 2181-1601



UZBEKISTAN

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OOVA SUVLARINING MINERALLIK DARAJASINI KAMAYTIRISHDA ELEKTR AKTIVATORNI QO‘LLASH VA PARAMETRLARNI ASOSLASH

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ANNOTATSIYA

Maqolada kolektor-drenaj suvlaridan bugungi kundagi foydalanish muammolari va ularni qayta ishlashda elektroaktivatoridan foydalanish asoslangan. Sug‘orishda va kollektor–drenaj suvlarini mineralizatsiyasini kamaytirishda diafragmali elektroaktivator yordamida suvga unipolyar ishlov berish bilan suyuqlikni elektrokimyoviy aktivatsiyalash prinsipial yangi usul hisoblanadi. Unipolyar ishlov berish uslubi moddaga elektrokimyoviy ta’sir o‘tkazib uning mineralizatsiyalanish darajasini pasaytiradi, moddaning kimyoviy va ion tarkibini o‘zgartiradi, fizik–kimyoviy va elektrodinamik xususiyatlarini oshiradi, kerakli miqdordagi suvga ishlov berish imkonini beradi. Elektr aktivatorning optimal ko‘rsatkichlarini tanlash uchun eksperimentlar boshlanguncha statistik uslublar qo‘llaniladi, ya’ni tajribalarni o‘tkazish rejasi ishlab chiqilgan. Masalaning umumiy ko‘rsatilishidagi yechimlarining natijalari optimallashtirish parametriga faktorlarning ta’sirini o‘rganish, va ular orasidagi bog‘liqlikni aniqlashni ko‘zda tutadi. O‘tkazilgan tajriba natijalari Boks-Benken usulidan foydalanib, jarayonning optimal qiymatlari aniqlangan.

Kalit so‘zlar: kolektor-drenaj suvlari, elektrokimyoviy ishlov, elektroaktivator, elektrodlar yuzasi, elektrodning oralig‘i, diafragma turi, unipolyar, membrana.

KIRISH. O‘zbekiston Respublikasi o‘z suv resurslariga ega bo‘lsada, suv resurslariga zaruriyati bo‘lgan mamlakatlar sirasiga kiradi. Bu esa qishloq xo‘jaligini intensiv rivojlanishi va aholi turmush darajasining yuksalishiga salbiy ta’sir ko‘rsatadi [1-27].

Mamlakat hududida suv resurslarining sifati ba’zi bir regionlarda qoniqarli emas. Minerallasish va ifloslanishning eng yuqori darajasi asosiy daryolarning o‘rta va quyi oqimida ko‘proq kuzatiladi. Bu esa aholi hayoti va salomatligi hamda yashash muhitini talablari darajasida saqlash uchun jiddiy xavf tug‘diradi. Yer ustki va osti suvlarini asosiy ifloslantiruvchi qishloq xo‘jaligi hisoblanadi. Sanoat va kommunal-maishiy

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korxonalar oqova suvlari ulushi unchalik katta bo'lmada, biroq ziyon yetkazish darajasi bo'yicha o'ta xavfli va zararlidir [2-27].

ASOSIY QISM

Masalaning qo'yilishi. Minerallashgan suvdan foydalanish uchun suvga qayta ishlov berib, foydalanishga tayyorlanishi zarur. Bunda texnologik sxema talabiga ko'ra qimmatbaho texnik jixozlar va texnologiyalar kerak bo'ladi [1].

Sug'orish va kollekt-drenaj suvlarini mineralizatsiyasini kamaytirish bo'yicha diafragmali elektiroaktivatorlarda suvga unipolyar ishlov berish bilan suyuqlikni elektrokimyoviy aktivatsiyalash prinsiplari yangi usul hisoblanadi. Unipolyar ishlov berish uslubi moddaga elektrokimyoviy ta'sir o'tkazib uning minerallashish darajasini pasaytiradi, moddaning kimyoviy va ion tarkibini o'zgartiradi, fizik-kimyoviy va elektrodinamik xususiyatlarini oshiradi, kerakli miqdordagi suvga ishlov berish imkonini yaratadi [2].

Unipolyar ishlov berishning samaradorligi elektrokimyoviy jarayonlarning an'anaviy sifat ko'rsatkichlari bilan birgalikda (moddaning parchalanish darajasi va boshqalar), daslabki va ishlov berilgan suyuqlikning rN farqi va relaksatsiya vaqti bilan ham harakterlanadi.

Bu usulda suvga ishlov berishning arzonligi (1-2 sh.b./m³), qurulma konstruksiyasining soddaligi va ekspluatatsiyasining soddaligi uni qishloq xo'jaligida ko'llashga keng imkonini beradi [3, 4].

O'tkazilgan bir qator tajriba izlanishlarimizdan ma'lumki, moddallarni unipolyar elektrokimyoviy aktivlashtirish usulini turli texnologik jarayonlarda qullanilishiga keng imkon beradi.

Yechish usuli. Elektr aktivatorning optimal ko'rsatkichlarini tanlash uchun biz eksperimentlar boshlanguncha statistik uslublarni qo'lladik va tajribalarni quyish sxemasini ishlab chiqdik.

Masalaning umumiy ko'rsatishidagi yechimlarining sxemasi avval aptimallashtirish parametriga faktorlarning ta'sirini o'zgarishini, keyin esa ular orasidagi bog'liqlikni aniqlashni ko'zda tutadi. Kutilayotgan funksional bog'lanishni umumiy ko'rinishi keltiriladi [5].

Bunda masala bosqichma-bosqich ko'rib chiqiladi. Tajribalarni rejalashtirishning asosiy prinsipi ham shundadir. Birinchi bosqichda har bir tajribada o'zgaruvchan parametrlarni turli kattaliklarida natijalar olinib optimum sohasiga harakatlanish yo'nalishi qidiriladi, buning uchun natijalar kichik bo'lmalarda o'rganiladi va chiziqli bog'lanishlar bilan chegaralanadi. Keyinchalik, ikkinchi darajali tenglamalar kutilayotgan natijalarni bermasa, har bir bosqichdagi oldingi tajribalarda natijalariga ko'ra intuitsiyaga ishongan xolda qushimcha tajribalar qo'yib keyingi qadam yo'nalishi topiladi [6].

Scientific Journal Impact Factor (SJIF 2022=5.016)

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Bu amaliyot to optimum topilmaguncha davom ettirilaveradi. Bu yerda tajribalar soni yetarli darajada ko'p bo'ladi, va optimumning xarakterlanishi nochiziqli funksiya bilan xarakterlanadi. Tajribalar natijasida olingan regressiya tenglamasi jarayonning matematik modeli bo'ladi va tenglama koeffitsientlari kattaliklariga qarab effektlar haqida qarab xulosa qilish mumkin bo'ladi, faktorlar bilan optimallashtirish parametri orasidagi bog'lanish darajasi baholanadi. Koeffitsientlarning statistik aniqligi mos effektlarining aniqligi yoki ta'sir darajasini ko'rsatadi [7].

Tajribani rejalashtirishning asosiy g'oyasi bu o'rnatilayotgan xodisadagi mexanizmlarni bilmay turib optimal bolshqarishdir. Ekstremal masalalarni yechish uchun o'tkaziladigan tajribalarni rejalashtirishning umumiy sxemasi qator jarayonlar (operatsiyalar) ketma – ketligidan iborat bo'lib, ularni quyidagi bosqichlarga bo'lish mumkin [8].

Masalani quyish; Optimallashtirish parametrini tanlash; Faktorlarni tanlash; Ikkinchi darajali eksperimentni rejalashtirish; Ikkinchi darajali eksperimentni o'tkazish va modelni kurish; Ekstremumni qidirish; Natijalarni tahlil qilish;

Tajribalar matematik rejalashtirish usulida olib borildi. Boshlang'ich xolatda, regressiya tenglamasi quyidagi ko'rinishda qabul qilingan.

$$y = b_0 + \sum_{i=1}^3 b_i x_i + \sum_{i=1, j=1}^{n, m} b_{ij} x_i x_j + \sum_{i=1}^n b_{ii} x_i^2 \quad (1)$$

Optimizatsiya parametri sifatida 1 litr suvga sarflangan elektr energiya miqdori qabul qilingan faktorlar sifatida elektrodlar yuzasi, elektrodning oralig'i va diafragmaning turlari qabul qilingan. Tajribalar 3 marotabadan takrorlangan [9].

Aktivator olinayotgan katolit sifati tarkibida bor tuzlar miqdori rN, oksidlanish va qayta tiklanish potentsiallari bilan baholanadi.

Natijalar taxlili va misollar. Anolit sifatida, yuqorida keltirilgan ko'rsatgichlardan tashqari, aktiv xlor miqdori bilan ham baholanadi. Tajribalarda qo'llanilgan aktivatorning laboratoriya nusxasini texnik ko'rsatgichlari quyidagicha:

Aktivator xajmi-1; Nominal kuchlanishi, V-220; Tok miqdori, A-0.2-1,0; Iste'mol quvvati, Vt-12-26; Ishlov berish muddati, min-8-30; Vodorod ionlarini aktivligi, rN 3-13; Suvning xarorati, °C - 45-55

1-jadval

Faktorlarni kodlashtirish va ularning miqdorlari

Faktorlar	Elektrodlar yuzasi, mm ²	Elektrodlar oralig'i	Diagframa
kodi	X ₁	X ₂	X ₃
Asosiy darajasi	2000	45	
O'zgarish intervali	500	10	

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Yuqori darajasi	2500	55	Bolonya
Pastki darajasi	1500	35	mato

2-jadval

Ekspiriment natijalariga statistik ishlov berish va bazis funksiya matritsasi

g	X_1	X_2	X_3	Y
1	+1	+1	+1	21,2
2	+1	-1	+1	18,3
3	-1	+1	+1	11,8
4	-1	-1	+1	10,3
5	+1	+1	-1	31,5
6	+1	-1	-1	39,9
7	-1	+1	-1	31,5
8	-1	-1	-1	23,3
9	-1	0	0	18,5
10	+1	0	0	9,4
11	0	-1	0	9,5
12	0	+1	0	28,2
13	0	0	-1	23
14	0	0	+1	8,2

3-jadval

b_j - koeffitsentlar va t_j -kriteriyalar axamiyatligi

Bazis funksiya	j	z_j	b_j	$S^2(b_j)$	$S(b_j)$	t_j
1	0	284,6	12,31	0,71706	0,84680	14,53
X_1	1	24,9	2,49	0,17651	0,42013	5,93
X_2	2	22,9	2,29	0,17651	0,42013	5,45
X_3	3	-79,4	-7,49	0,17651	0,42013	-18,90
$X_1 \cdot X_2$	5	-15,2	-1,9	0,22063	0,46972	-4,04
$X_1 \cdot X_3$	6	0,8	0,1	0,22063	0,46972	0,21
$X_2 \cdot X_3$	8	4,6	0,58	0,22063	0,46972	1,22
X_1^2	11	216,7	1,89	0,71706	0,84680	2,24
X_2^2	12	225,5	6,29	0,71706	0,84680	7,43
X_3^2	13	219,0	3,04	0,71706	0,84680	3,59

Regressiya koeffitsentlarini kattaliklari quyidagi formulalar yordamida aniqlaniladi.

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$$b_0 = \frac{\sum_{n=1}^n y_{\bar{y}p.H}}{N} \quad (2); \quad b_i = \frac{\sum_{n=1}^n X_{iu} y_{\bar{y}p.H}}{N} \quad (3);$$

$$b_{ij} = \frac{\sum_{n=1}^n X_{ju} X_{iu} y_{\bar{y}p.H}}{N} \quad (4);$$

Eksperiment natijalariga statistik ishlov berilib, koeffitsentlarni ahamiyatga ega ekanliklarini tekshirildi [10].

Natijada quyidagi ko‘rinishdagi matematik model olindi

$$Y = 12,31 + 2,49x_1 + 2,29x_2 - 7,94x_3 - 1,9x_1x_2 + 1,89x_1^2 + 6,29x_2^2 + 3,04x_3^2$$

Boks-Benken usulidan foydalanib, jarayonni optimal qiymatlari aniqlanda: elektrodlar yuzasi-2400 mm², elektrodlar oralig‘i-50 mm va diafragma materialı–boloniya. Bunda mineralizatsiya darajasi 9,4 mt/l. ni tashki qiladi.

XULOSA

1. Elektr aktivlashtirish bilan suvning tarkibida elektrokimyoviy o‘zgarishlar xosil bo‘ladi, suyuqlikning mineralligi kamayadi, oksidlanish va kayta tiklanish potentsiallari o‘zgaradi. To‘la faktorli eksperiment yordamida aktivatorning konstruktiv parametrlari asoslangan va regressiya tenglamasining ifodasi aniqlandi.

2. Optimal qilib quyidagi parametrlar qabul qilingan: elektrodlar yuzasi-2400 mm², elektrodlar oralig‘i-50 mm va diafragma materialı–boloniya. Bunda kolektor-drenaj suvlariga elektroaktivator yordamida ishlov berilganda suvning minerallashish darajasi 9,4 mt/l. ni tashki qiladi

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CONTENTS

M. I. Abdumauvlanova, M. E. Urinova

Ta'lim mazmuni va o'quvchilarning nutqini rivojlantirish (pp. 4-6)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200001.%204-6.pdf>

Мадина Фарходовна Хушвақтова

Нефтни қайта ишлаш корхоналари атрофида яшовчи болаларда атопик дерматитнинг клиник кечиш хусусиятлари (pp. 7-12)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200002.%207-12.pdf>

Nursulton Shayxislamov

Tilshunoslik: zamonaviy yo'nalishlar hamda ular xususida tahlil va muammolar (pp. 13-17)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200003.%2013-17.pdf>

Shaxnoza Po'lot qizi Shavkatova, Otabek Ganiyevich Nabijonov

Xotiraning ishlash modeli, qayta shakllantirish va qayta tiklash mexanizmlari (pp. 18-21)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200004.%2018-21.pdf>

Sadoqat Rasul qizi Rajabova

O'zbek qarorlar tili terminlarida shakl va mazmun birligi (sinonimiya va omonimiya masalasi) (pp. 22-26)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200005.%2022-26.pdf>

M. Ibragimov, A. A. Turdiboev, A. M. Tursunov

Oqova suvlarining minerallik darajasini kamaytirishda elektr aktivatorni qo'llash va parametrlarni asoslash (pp. 27-33)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200006.%2027-33.pdf>

O'g'iloy Abdukadirovna Abdullayeva, O'g'iloy Karimovna Misirova

Ona tili darslarida o'quvchiarning nutqiy ko'nikmalari va mustaqil fikrlash salohiyatini o'stirish (pp. 34-36)

<http://www.scientificprogress.uz/storage/app/media/3-9.%200007.%2034-36.pdf>
