ASFALTOBETON QOPLAMALARIDAGI BITUMLARGA STRUKTURA HOSIL QILUVCHI QO‘SHIMCHALAR TA’SIRI

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Annotatsiya: *Ushbu maqolada yo‘llar sifatini yaxshilash va yo‘l-transport qoplamalarining ekspluatatsiya xossalarini hamda uzoq vaqt xizmat qilish muddatini oshirishda modifikatsiyalangan asfalt-betonning tarkibidagi bitumga tuzilish va polimer qo‘shimchalarining kompleks qo‘llanilishi natijasida bitumning yemirilishga chidamliligini oshishi aniqlangan.*

Kalit so‘zlar: *ultrabinafsha, radikal, termostat, yumshatish harorati, bitum, smola, katalizator, polikondensatsiya, supramolekulyar.*

Аннотация: *В данной статье в результате комплексного применения структурных и полимерных добавок к битуму в модифицированном асфальтобетоне для улучшения качества дорог и повышения эксплуатационных свойств и длительного срока службы дорожных покрытий установлено, что устойчивость битума к гниению увеличивается.*

Ключевые слова: *ультрафиолет, радикал, термостат, температура размягчения, битум, смола, катализатор, поликонденсация, супрамолекулярный.*

Annotation: *In this article, as a result of the complex application of structural and polymer additives to bitumen in modified asphalt concrete to improve the quality of roads and increase the operational properties and long service life of road surfaces, it was found that the resistance of bitumen to decay increases.*

Keywords: *ultraviolet, radical, thermostat, softening temperature, bitumen, resin, catalyst, polycondensation, supramolecular.*

Asfaltbeton qoplamalarining muhim xossalaridan biri bu-chidamlilik. Asosan bitum va bitum-mineral aralashmalarining yemirilishi tufayli uzoq vaqt davomida ish sharoitida xossalarni saqlab qolish qobiliyatidir.

Asfaltbeton yo‘l qoplamalarining iqtisodiy tamondan xizmat muddati ularning amal qilish muddatidan ortib bora boshladi. Shu sababli neft va energiya narxlarining ortishi, past sifatli bitum-mineral materiallardan foydalanish, transport vositalarining qoplamalariga, ayniqsa og‘ir yukli avtomobillarga ta’sir intensivligini oshishi sababchidir.

Yo‘l to‘shamalarining xizmat qilish muddatiga ta’sir qiluvchi omillardan biri yo‘lbob bitumlardir. O‘zbekistonda yo‘llarga ishlatiladigan bitumlarning sifatiga bog‘liqligi natijasida to‘shamalarni xizmat qilish muddati o‘rtacha 5-7 yil, rivojlangan mamlakatlarda bu ko‘rsatkich 12-16 yilni tashkil etadi. Yo‘l qoplamalarining mustahkamligini ta’minlashda bitumning sifati asosiy hal qiluvchi omillardan biri hisoblanadi[1].

Bitum-mineral qorishmalarni texnologik aralashtirishni 140-160 ^{0}C haroratda olib borish jarayonida kimyoviy tarkibining keskin o‘zgarishlari hosil bo‘ladi. Ular mineral materiallar bilan o‘zaro ta’sirlashganda yupqa bitum qatlamining yemirilishi mumkin. Yemirilish jarayoni tashqi omillar ta’sirida, yo‘l ishlarida +80 dan -26 °C harorat oralig‘ida sekinroq sodir bo‘lishini kuzatiladi, bitumning xossalarida esa qaytariladigan va qaytarilmaydigan jarayonlar bo‘lishi

kuzatildi. Bularda mo‘rtlik, yopishqoqlik, gidrofobning pasayishi, asfaltbeton qoplamalarning qattiqligi ortishi aniqlangan. Bitum tarkibidagi mo‘rt qattiq moddalar miqdorining ortishiga sabab, ularning uchuvchi tarkibiy qismlarning bug‘lanishi, katalizatorlar ta’siri ostida polimerizasiyaga uchrash, birikmalarning polikondensatsiyasi va vodorodni yo‘q qilish bog‘liq bo‘lgan suvning shakllanishi esa ularni yog‘li qismida joylashganligidir. Natijada smola va neftning tarkibini kamaytiradi. Molekulyar birikmalarning faol funksional guruhlarini adsorbsiyasi bitumning atmosferada eskirishi qarshiligini kuchaytiradi, shu bilan birga kimyoviy faolligi bitum bog‘lovchilarining tarkibiga qarab kamayadi [2].

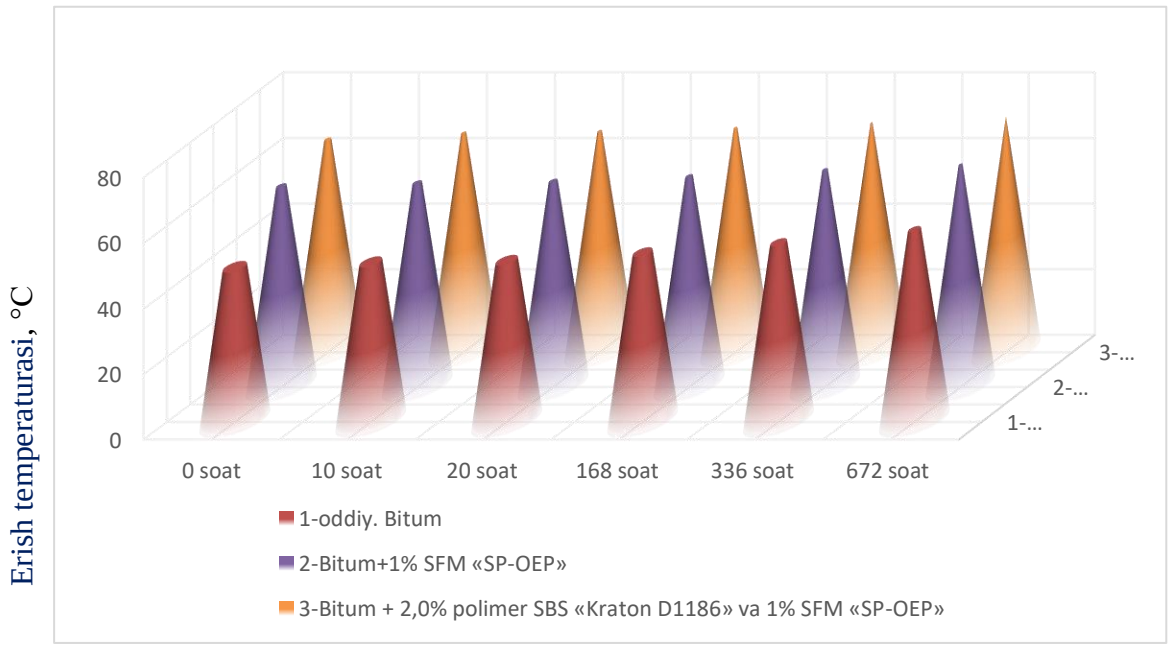
Ultrabinafsha nurlarining ta’siri vayron bo‘lgan ionlangan molekuladan vodorod ajralishi natijasida erkin radikallarni hosil qiladi. Ularni mexanikaviy usul yordamida yo‘q qilish zanjirdagi molekulalararo va kimyoviy aloqalarning energiyasi orqali sodir bo‘ladi. Bitumni oksidlash jarayonida reaksiya zanjirlari radikal mexanizm sababli yo‘q qilinishi kuzatiladi. Bitumni modifikatsiyalash, bitum-mineral materiallardan foydalanishni texnologik jarayonida qorishmalar tayyorlashning harorat rejimiga amal qilib olib borildi [3].

Tadqiqot ishida qurilishni tashkil etuvchi va polimer bitum modifikatorlarini birgalikda ishlatishi eng istiqbolli uslublardan bo‘lib, bu usulda plastiklikning harorat oralig‘ini ortishi orqali ish vaqtida qoplamaning barqarorligini ta’minlashini kuzatish mumkin. Bular natijasida bog‘lovchi moddalarning eskirishiga ularning tarkibi va faol funksional guruhlarni o‘z ichiga olgan molekulalarda, tez oksidlanadigan guruhlarda esa bog‘lanishlarning mavjudligiga asos bo‘lishi aniqlangan [4].

Qorishmada qo‘shimchalarsiz va modifikatsiyalangan bitumsiz «Kraton D1186» polimeri massasining 2,0% miqdori 180 ^{0}C haroratda SFM «SP-OEP» ni fizik va kimyoviy xossalarning o‘zgarish jarayonlarini natijalari [5] keltirilib o‘tilgandir.

Materialning chidamliligi, natijalarining obyektivligi va ishonchliligini ta’minlash, uning ish sbharoitida uzoq vaqt davomida o‘z xossalarini saqlab qolish qobiliyati bilan tajriba sinovlarida aniqlandi. Shu sababli, biz Ferganeftsintez MCHJ tomonidan tavsiya etilgan usuldan qo‘llagan holda 80 ^{0}C

haroratda 7, 14 va 28 kundan keyin termostat bitumni bog‘lovchilik xossalarini baholashi kuzatilgan.



BND 200/300 Termostatlash vaqti 180 ^{0}C da (10 va 20 soat) va 80 ^{0}C da (168,336 va 672 soat)

1-rasm. BND 200/300 bitumini yumshatish haroratining o‘zgarishi va haroratni nazorat qilish vaqtidan boshlab o‘zgartirilgan bitum.

Ushbu 1-rasmda keltirilgan ma’lumotlardan bilamizki, sinovdan oldin modifikatsiyasiz boshlang‘ich bitum modifikatsiyalangan bitumga qaraganda ancha past yumshatish haroratiga ega, ammo haroratni boshqarishning dastlabki davrida allaqachon yumshatish haroratining jadal ko‘tarilishi kuzatilmoqda. O‘rganilayotgan kompozitsiyalar parametrlarining tahlili: ignaning kirib borish chuqurligi (yopishqoqlik), harorat va vazn yo‘qotish, modifikatsiyalangan bitumda yemirilishi tezroq o‘sishini ko‘rsatdi. Modifikatsiyalangan bitum namunalari yemirilishni sekinlashtiradi. «SP-OEP» 1%li SFMsi bilan bitum juda termostabil bo‘lib chiqdi, bu yerda yemirilish boshqa bitum tarkibiga qaraganda sekinroq sodir bo‘ladi.

Polimer bilan tuzilgan qo‘shimchali modifikatsiyalangan bitum yemirilishga qarshiligining o‘sishini ko‘rsatadi, haroratni nazorat qilish davrida

yumshatuvchi haroratning o‘sish sur’ati 43% ga, diabet bilan ishlaganda 75% ga kamayadi.

Biz taklif etgan yuqori sifatli qoplamali bitumni termal barqarorlik (qarish) uchun ishlab chiqarishni o‘rganish shuni ko‘rsatdiki, tarkibiy haroratni boshqarish davrida 180 ^{0}C haroratda 10 va 20 soat davomida, 168 soat uchun esa 80 ^{0}C haroratda yetarlicha barqarordir, o‘z navbatida 336 va 672 soat davrida ham. Ushbu sinov hodisalari yemirilish jarayonini esa kislorod ta’siri ostida vodorodning uglevodorodlardan ajralmasligini ta‘minlash va shu bilan bitum-mineral materiallarning mustahkamligini oshirishga yordam beradigan qo‘shimcha supramolekulyar tuzilmalarning shakllanishi bilan bog‘liq bo‘lishi aniqlangan [6].

Taklif qilinayotgan modefikatsiyalangan bitumga tuzilish va polimer qo‘shimchalarining kompleks qo‘llanilishi natijasida bitumning yemirilishga chidamliligini oshishi aniqlangan. Qoplamalaridagi modifikatsiyalangan bitumlarning yemirilish qobiliyati shuni ko‘rsatadiki mustaqil bitum tuzilmalarining shakllanishi, shuningdek tarkibiy qismlarning muvofiqligi, kimyoviy tabiati va qo‘shimchalarning samaradorligi bilan bog‘liq bo‘lishi tadqiqot ishlarida aniqlangan [7].

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