KARYER ATMOSFERASINI NORMALLASHTIRISH VOSITALARI.

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Annotatsiya: Ushbu maqolada karyer atmosferasini chang va gazlar bilan ifloslanishdan saqlash, ularni normallashtirish vositalari, tizimlari va texnologik yechimlari yoritilgan. Chang va gaz hosil qiluvchi manbalar, ularga qarshi kurashish mexanizmlari, ayniqsa aspiratsiyalash tizimlari va chang tutish uskunalari tafsilotlari bilan ko‘rib chiqilgan. Havo oqimidagi chang zarrachalarining turli kuchlar ta’sirida ajralib chiqishi, chang tutish samaradorligi, filtrlar turlari, ularning ishlash prinsiplari, shuningdek, tabiiy shamollatish omillari va ularni hisobga olish usullari keltirilgan.
Kalit so‘zlar: Karyer atmosferasi, chang tutish, aspiratsiyalash, chang manbalari, o‘rama konstruksiyasi, chang zarrachalari, filtrlar, elektr filtrlar, siklon, skrubber, shamollatish.

Kirish: Karyer atmosferasini chang va gaz omili bo‘yicha normallashtirish vositalari kompleksini tanlab olish ularning samaradorligi hamda chang va gaz hosil qiluvchi manbalarning tavsifi, shuningdek, tabiiy shamollatish omillarini hisobga olgan holda amalga oshirilishi kerak.

Karyerlarda chang tutish usulida atmosferani normallashtirish changlantiruvchi manbalarida changlangan havoni aspiratsiyalash va chang tutish apparatlari yordamida tozalashdan tashkil topadi. Changlanish joylarida havoni aspiratsiyalash uchun changlantiruvchi manbalarni (o‘rab qo‘yish) o‘rama usulidan foydalaniladi.

O‘rama konstruksiyasi chang fakeli yo‘nalishi, changlantiruvchi manbalarning joylashishi, changlangan havo oqimining tezligi kabi qator omillarga bog‘liq bo‘ladi.

Changlantiruvchi manbalarni o‘rash to‘liq va qisman bo‘lishi mumkin. Karyerlarda changlantirish manbalarini qisman o‘rash konstruksiyasidan keng foydalaniladi. O‘rama ichida havoni sun’iy siyraklashtirish sodir bo‘ladi. Natijada atrof-muhitdagi havo oqimini aspiratsiyalash tizimiga yo‘naltirish ta’minlanadi. Bu esa, o‘z navbatida changning karyer atmosferasiga qo‘shilib ketishining oldini oladi. O‘ramani yasashda uning germetizatsiyasi yuqori bo‘lishi talab etiladi.

O‘ramadan havoni so‘rib olishda hosil bo‘ladigan havoning depressiyasi quyidagi ifoda orqali aniqlanadi:

$Q_{ot} = F\ V_n$, m^3/s,

bunda F – o‘ramadagi ochiq teshiklar, darzlar va boshqa zich yopilmagan joylardagi havo oqimi tezligi, m/s.

O‘ramadan so‘rib olinadigan havo miqdori ejeksiya natijasida materiallarni tashish, ishlab chiqarish va boshqa jarayonlarda hosil bo‘ladigan havoning qo‘shilishi hisobiga ko‘payadi:

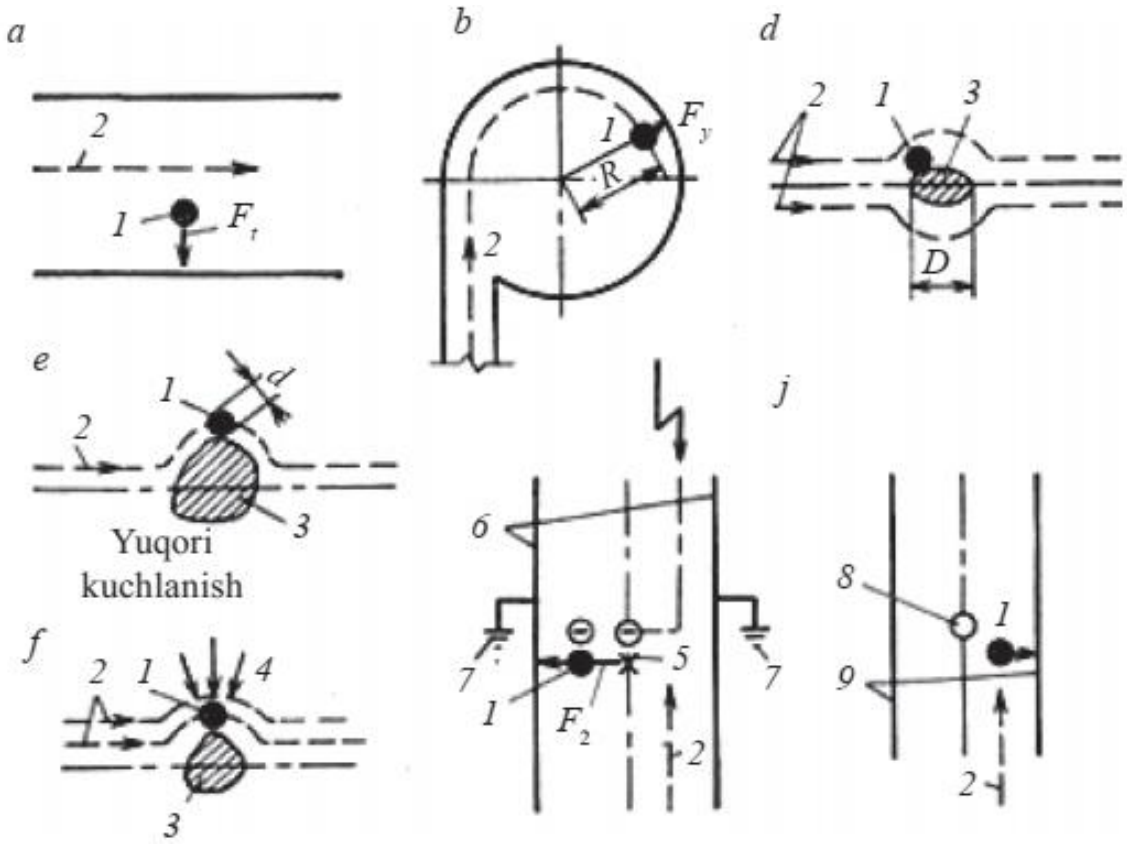
$Q'_{ot} = Q_{ot} + Q_d$,

bunda Q_d – o‘ramaga kirib keladigan qo‘shimcha havo miqdori, m^3/s.

Havo oqimidagi changlarning tutilishi chang zarrachalarining og‘irlik, markazdan qochma va inersiya kuchlari ta’sirida bevosita havo oqimidan ajralib chiqishi tufayli amalga oshadi (2.1- rasm). Chang zarrachasiga ta’sir etuvchi og‘irlik kuchi quyidagi ifoda orqali aniqlanadi:

$$F_T = m \cdot g = \frac{\pi d_n^{\ 3}}{6} \cdot \rho_n \cdot g ,$$

bunda m – zarracha massasi, kg; g – erkin tushish tezlanishi, m/s^2; ρ – havo zichligi, kg/m^3.



2.1- rasm. Chang-havo oqimidan chang zarrachalarining ajralib chiqish sxemalari: a – og‘irlik kuchi ta’sirida; b – markazdan qochma kuch ta’sirida; d – cho‘ktirish tanasi bilan chang zarrachalarining urilishi natijasida; e – bevosita cho‘kish orqali; f – diffuzion cho‘kish bo‘yicha; j – elektrostatik cho‘kish orqali; 1 – chang zarrachasi; 2 – gaz oqimi yo‘nalishi; 3 – cho‘ktirish tanasi; 4 – diffuziya kuchi; 5 – manfiy qutbli koronalash elektrodi; 6 – cho‘ktirish (o‘tkazish) elektrodlari; 7 – yer; 8 – qizdirilgan tana; 9 – sovuq yuzalar.

Ushbu kuch ta’sirida havo haydagichlaridagi changlar cho‘kadi. Changli havo oqimini sun’iy aylantirishda markazdan qochma kuchlar paydo bo‘ladi:

$$F_y = \frac{m \cdot v_n^2}{R} = \frac{\pi d_n^3}{6} \cdot \rho_n \cdot \frac{v_n^2}{R},$$

bunda v_n – changli havo oqimi tezligi, m/s; R – oqimning egrilik radiusi, m; d_n – zarracha diametri, m; ρ_n – zarracha moddasining zichligi, kg/m^3.

Bu kuch og‘irlik kuchidan bir necha marta katta bo‘lib, siklonlarda qo‘llanadi. Tolasimon va matoli filtrlar qo‘llanganda, bunda chang tutilishi inersion kuch ta’siriga zarrachalarning tolali va matoli filtrlarga, shuningdek, skrubberlarda suv tomchilariga urilishi natijasida sodir bo‘ladi.

Changtutkichlarda bir vaqtda turli kuch va mexanizmlardan foydalanish mumkin. Masalan, matoli filtrlar qo‘llanganda inersion, bevosita zarrachalarni cho‘ktirish, diffuziya va boshqa kuchlardan foydalanish mumkin. Havoni tozalash usuli bo‘yicha chang tutkichlar: quruq, ho‘l va elektrik guruhlarga bo‘linadi. Havoni quruq usulda tozalashda gravitatsiya-inersion va matoli filtrli apparatlardan foydalaniladi.

Cho‘ktirish kameralari, inersion apparatlar va siklonlar gravitatsiya-inersion tozalash guruhini tashkil qiladi. Havoni ho‘l usulda tozalashda qo‘llanadigan apparatlar yuvuvchi va yupqa plyonkali turlarga bo‘linadi. Forsunkali skrubberlar, Ventur skrubberlari va dinamik gaz yuvgichlar yuvuvchi apparatlar hisoblanadi.

Zarba-inersion, ko‘piklash va markazdan qochma apparatlar yupqa plyonkali tozalash apparatlariga tegishli. Zaryadlash va changni cho‘ktirish zonalarining joylashishi bo‘yicha elektr filtrlar bir zonali va ikki zonali guruhlarga bo‘linadi.

Gorizontal va vertikal yo‘nalishda gaz yuradigan quruq plastinkali hamda suvli naysimon plastinkali elektr filtrlardan karyer atmosferasini tozalashda foydalaniladi. Changtutkichlarning ishlash samaradorligi havoni tozalash darajasi η bilan tavsiflanadi:

$$\eta = \frac{K_{\text{H}}}{K_{\text{K}}},$$

bunda K_H va K_K – tozalangandan oldin va undan so‘ng mos ravishda havo tarkibidagi chang miqdori, mg/m^3.

Agar havoni tozalash bir necha bosqichlarda bajariladigan bo‘lsa, havoning umumiy tozalanish darajasi quyidagi ifoda bilan aniqlanadi:

$$\eta_{\text{um}} = 1 - (1 - \eta_1) \cdot (1 - \eta_2) \cdot \ldots \cdot (1 - \eta_{\text{n}}),$$

bunda η_1, η_2, ... , η_n mos ravishda birinchi, ikkinchi va n-bosqichlarda havoning tozalanish darajasi.

Xulosa: Karyer hududlarida atmosferani ifloslantiruvchi omillarni bartaraf etish uchun kompleks texnik vositalardan foydalanish zarur. Aspiratsiyalash va chang tutish uskunalari orqali havo tarkibini normallashtirish, ekologik xavfsizlikni ta’minlashda muhim rol o‘ynaydi. Chang zarrachalarini ajratib olishda bir necha mexanizmlarning birgalikdagi ta’siri natijasida samaradorlik oshiriladi. Karyer sharoitida havo oqimi, chang fakeli yo‘nalishi, va tabiiy shamollatish omillarini inobatga olgan holda mos texnologiyalarni qo‘llash muhim ahamiyat kasb etadi. Shu bilan birga, har bir texnologik yechimning samaradorligini tozalash darajasi orqali baholash kerak.

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