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REKTIFIKATSION JARAYONLARINING KOLONNALARDA MODDIY VA ISSIQLIK BALANSLARINI TADQIQ QILISH

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ANNOTATSIYA

Maqolada rektifikatsion kalonnada fraksiya ajratish usullari tadqiq kilingan. Bug' yordamida ajratuvchi rektifikatsion kalonaning konstruksiyasi, ishlash prinsipi berilgan. Rektifikatsion kalonnaning uzluksiz ish rejimida ko'p kompanentli suyuqliklarni moddiy va issiqlik balansini xisoblash asoslarini o'rganilgan.

Kalit so'zlar: *Rektifikatsiya, kalonna,tarelka,issiqlik almashinish,etilasetat, bug', kantakt yuza, xisoblash, asoslari, panjara.*

ABSTRACT

The article discusses the methods of fractionation in a distillation column. The design and principle of operation of the steam-separating rectifier are presented. The basics of calculating the material and heat balance of multicomponent liquids during continuous operation of a distillation column have been studied.

Keywords: *Rectification, column, plate, heat transfer, ethyl acetate, steam, contact surface, calculation, bases, grid.*

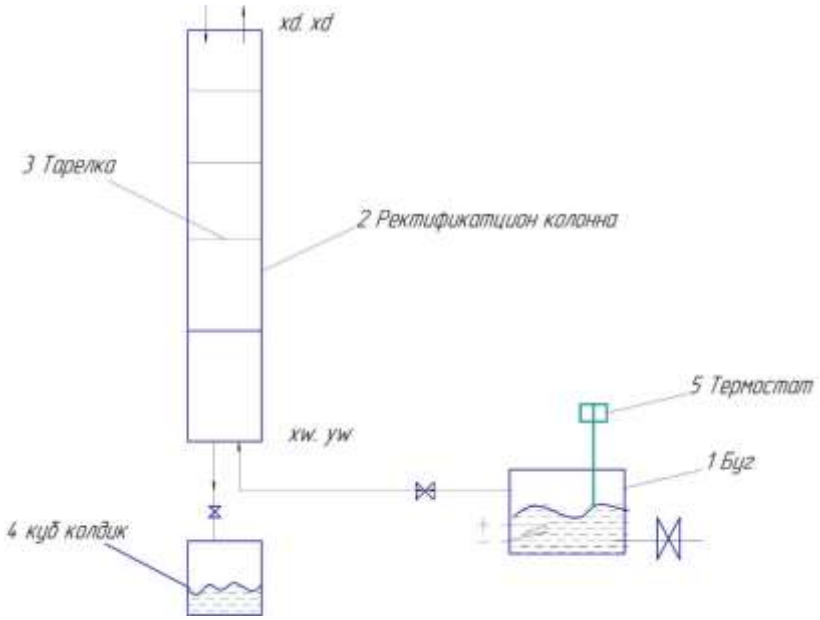
KIRISH

Bugungi kunda kimyo va neftni qayta ishlash sanoatida xaydash yoki rektifikatsiya jarayoni juda ko'p ishlatiladi. Bu jarayonni amalga oshirishda tarelkali kalonnalardan keng ko'lamda foydalanib, rektifikatsion kalonna apparatining moddiy va issiqlik balanslarini nazariy tadqiq qilish ko'zda tutilgan.

Rektifikatsiya jarayonining tajriba ekspriment qurilmasini sxemasi 1-rasmda keltrilgan bo'lib. Ekspriment qurilmasini qisqacha tasnifi; 1-kalonna kubidan

chiqayotgan bug‘, 2- rektifikatsion kolonnaga uzatiladi va 3-kontak yuzali tarelkalarda to‘qnashib ikki kompanentli fazalar ajralib 4-qoldiq kubga tushadi. Bu jarayonda suyuqlik ikki kampanentga yani flegma F va distillyatga ajraladi.

MUHOKAMA VA NATIJALAR



1-rasm Rektifikatsiya jarayonining ekspriment qurilmasini texnologik sxemasi.

Jarayon moddiy balansi ushbu ko‘rinishga ega:

$$G_f = G_d + G_w \tag{1}$$

Yengil uchuvchan komponent bo‘yicha esa:

$$G_f \cdot x_f = G_d \cdot x_d + G_w \cdot x_w \tag{2}$$

Bu yerda G_f, G_d, G_w-boshlang‘ich eritma distillyat va kub qoldig‘i massalari; kmol. Boshlang‘ich eritma distillyat va kub qoldiqlaridagi yengil uchuvchan komponentning konstentrastiyalari. Mol ulushlar.(1)va (2) tenglamalardan distilyat va kub qoldig‘ining massalari aniqlanadi:

$$G_d = G_f \frac{x_f - x_w}{x_d - x_w} \tag{2}$$

Boshlang‘ich eritma kub qoldig‘i va flegmalarning 1 kmol distillyatga nisbatlarini quyidagicha belgilab olamiz:

$$\frac{G_f}{G_d} = F;\ \frac{G_w}{G_d} = W;\ \frac{\Phi}{G_d} = R$$

(3)

Flegma miqdoriga nisbati flegma soni R deb nomlanadi. Rektifikatsion kolonnaning ta'minlash tarelkasi uni 2 ga yuqori va pastki qisimlarga ajratadi. Umumiy tenglama asosida kolonnaning yuqori va pastki qisimlari uchun moddiy balans tenglamalarini tuzamiz:

$$G \cdot dy = L \cdot (-dx)$$

(4)

Bu erda $L = R \cdot G_d$ -kolonna yuqori qismida oqib tushayotgan suyuqlik miqdori.

Kolonna bo'yicha yuqoriga ko'tarilyotgan bug' miqdori:

$$G = G_d + \Phi = G_d + RG_d = G_d(1+R)$$

(5)

Kolonnaning yuqori qismi uchun:

$$(R+1) \cdot dy = R \cdot (-dx)$$

(6)

Konstentrastiyalari ***x,u*** bo'lgan kolonna yuqori qismining istalgan ko'ndalang kesimi va konstentrastiyalari x_d, u_d bo'lgan kolonnaning yuqori qismi uchun tenglamani quydagicha yozish mumkin:

$$(R+1) \cdot dy = (F+R) \cdot (x_d - y) = R \cdot (x_d - x)$$

(7)

Yoki:

$$y = \frac{R}{R+1}x + \frac{x_d}{R+1}$$

(9)

Pastki qismi uchun:

$$(R+1) \cdot dy = (F+R) \cdot (-dx)$$

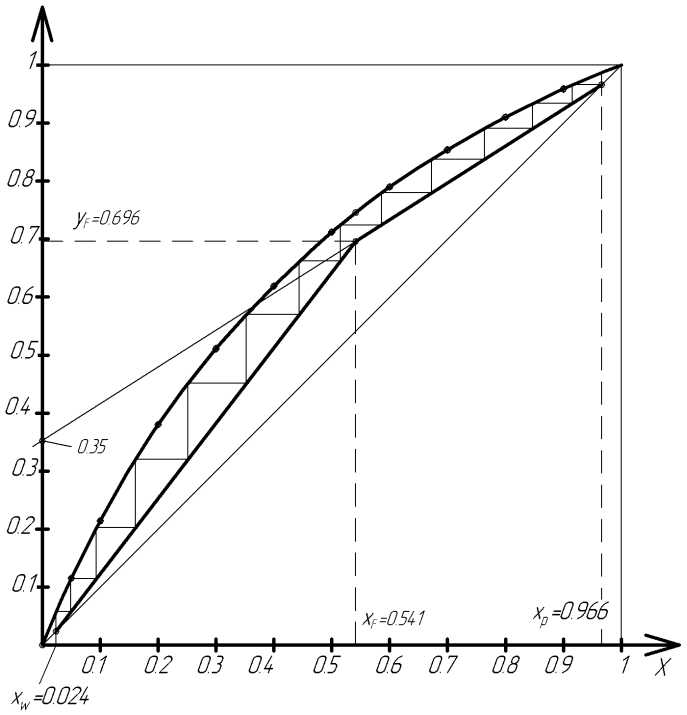
(10)

Konstentratsiyasi ***x,u*** bo'lgan kolonnaning pastki qismi va konstentratsiyalari x_w, u_w bo'lgan kubning istalgan ko'ndalang kesimi uchun, $x_w = u_w$ ni xisobga olib quydagicha tenglamani yozamiz:

$$(R+1) \cdot (y - y_w) = (R+1) \cdot (y - x_w) = (F+R) \cdot (x - x_w)$$

Yoki:

$$y = \frac{R+F}{R+1}x + \frac{F-1}{R+1}x_w \quad (11)$$



2-rasm Rektifikatsiya jarayoni ishchi chizig‘ining tasnifi.

Ko‘rinib turibdiki (10) va (11) tenglamalar 2-rasmdagi to‘g‘ri chiziqni ifodalaydi. Shunday qilib, (10) va (11) tenglamalar rektifikatsion kolonna yuqori va pastki qismining ishchi chizig‘i bilan ifodalanadi. Ishchi chiziqning tekkis va notekkis xolati bilan farqlanadi. Xisoblash natijalari bosimning o‘zrarishini asoslash va maqbul parametrlarini aniqlash uchun asosiy formula sifatida ishlatish mumkin.

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