KIMYOVIY MASALANI 9 XIL MATEMATIK USULLARDA YECHISH

Xasanova Nargiza Ismagilovna
Chirchiq davlat pedagogika universiteti Kimyo kafedrasi o'qituvchisi
xasanovanargizaa@gmail.com

Abdusalomova Maftuna O'ralovna
Chirchiq davlat pedagogika universiteti Kimyo yo'nalishi II kurs talabasi

ANNOTATSIYA:

Maqolada kimyodan masala yechishning ta'limiy ahamiyati, bitta masalani har xil usullarda yechish yo'llari bayon etilgan.

Kalit so'zlar: ta'limiy ahamiyati, algebraik usul, diagonal usul, aralashma, eritma, konsentratsiya, proporsiya, normal sharoitda.

АННОТАЦИЯ:

В статье излагается образовательная значимость решения задачи по химии, способы решения одной задачи разными способами.

Ключевые слова: образовательная ценность, алгебраический метод, диагональный метод, смесь, решение, концентрация, пропорция, в нормальных условиях.

ANNOTATION:

The article describes the educational significance of solving a problem from chemistry, ways to solve one issue in different ways.

Keywords: educational significance, algebraic method, diagonal method, mixture, solution, concentration, proportion, under normal conditions.

Kimyodan masalalar yecha bilish bu fanni ijodiy o'zlashtirishning asosiy mezonini tashkil qiladi. Afsuski masalalar yechishga hamma vaqt ham yetarli darajada e'tibor berilavermaydi. Kimyo darslarida nazariy materiallarni o'rgatish bilan birga doimo parallel ravishda eksperimental va hisoblashga oid masalalarni yechishni o'rgatish maqsadga muvofiqdir. Odatda, kimyodan barcha masalalar o'zining mazmuni bilan birinchi navbatda nazariya, qonun, jarayon, moddalarning xossalari va kimyoviy reaksiyalarning borish shart-sharoitlari hamda kimyoviy tenglama formulalarini tuzishni ko'zda tutadi. Masalalarni muntazam yechib borish kimyodan va yondosh fanlardan olingan bilimlarni amalda o'xshash va yangi sharoitlarda qo'llashga imkon beradi. Bularning barchasi yuqori darajada mulohaza qilish bilan mantiqiy fikrlashni talab etadi.Kimyodan masalalar yecha bilish bu o'quvchi va talabalarni ijodkorlik qobiliyatlarini oshirishda muhim ahamiyatga ega. Kimyodan hisoblashga oid masalalarni yechishda o'quvchi va talabalar faqat kimyoviy bilimlardan foydalanibgina qolmasdan balki biologiya, fizika, matematika fanlaridan olgan bilimlaridan ham foydalanadilar. Bu esa o'z navbatida o'quvchi va talabalarni ijodiy qobiliyatlarini rivojlantiribgina qolmasdan, boshqa fanlarni ham chuqur o'rganishga yo'naltiradi.

Ayniqsa, o'quvchi va talabalarni ijodiy qobiliyatlarini kimyoviy masalalar yechish orqali rivojlantirishda kimyoviy hisoblashga oid masalalarni yechish usullari alohida ahamiyatga egadir. Quyida biz bitta masalani har xil usullarda yechish yo'llariga oid masalalardan namunalar keltirib, yechish usullarini tavsiya etamiz:

Etan siklopropan va butilendan iborat 1 mol aralashma yondirilganda 3,3 mol karbonat angidrid va 3,5 mol suv hosil bo'lsa, dastlabki aralashmadagi moddalarning hajmiy ulushini hisoblang.

$$1\begin{cases} C_2H_6 + 3{,}5O_2 \rightarrow 2CO_2 \\ C_3H_6 + 4{,}5O_2 \rightarrow 3CO_2 \\ C_4H_8 + 6O_2 \rightarrow 4CO_2 \end{cases}\!\!\!\!3.3 \quad \begin{matrix} +3H_2O \\ +3H_2O \\ +4H_2O \end{matrix}\Bigg\}3.5$$

1-usul. Tenglamal sistemasining qoshish(+) usuli.

$$\begin{cases} x + y + z = 1 \\ 2x + 3y + 4z = 3{,}3 \\ 3x + 3y + 4z = 3{,}5 \end{cases}$$

3x+3y+4z=3,5

2x+3y+4z=3,3

x=0,2

0,2+y+z=1

y+z=0,8

$$\begin{cases} 2x + 3y + 4z = 3{,}3 \\ x + y + z = 1\ (2) \end{cases} \Rightarrow \quad -\begin{cases} 2x + 3y + 4z = 3{,}3 \\ 2x + 2y + 2z = 2 \end{cases}$$

y+2z=1,3

$$-\begin{cases} y + 2z = 1{,}3 \\ y + z = 0{,}8 \end{cases}$$

z=0,5

x+y+z=1
0,2+y+0,5=1
y=1-0,7
y=0,3

x=0,2 y=0,3 z=0,5

Javob: 0,2 : 0,3 : 0,5

2-usul. Tenglamalar sistemasining o‘rniga qo‘yish usuli.

$$\begin{cases} x+y+z=1 \\ 2x+3y+4z=3,3 \\ 3x+3y+4z=3,5 \end{cases} \quad x=1-y-z$$

3x+3y+4z=3,5
3(1-y-z)+3y+4z=3,5
3-3y-3z+3y+4z=3,5
z=0,5

2x+3y+4z=3,3
2(1-y-z)+3y+4z=3,3
2-2y-2z+3y+4z=3,3
y+2z=1,3

y+2×0,5=1,3
y=1,3-1
y=0,3

x=1-0,3-0,5
x=0,2

Javob: 0,2 : 0,3 : 0,5

3-usul. Tenglamalar sistemasining Krammer formulasida determinatning Δ uchburchak usuli.

$$\begin{cases} x+y+z=1 \\ 2x+3y+4z=3,3 \\ 3x+3y+4z=3,5 \end{cases}$$

$$\Delta=\begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{vmatrix}=$$

$$\Delta=\begin{vmatrix}1 & 1 & 1\\ 2 & 3 & 4\\ 3 & 3 & 4\end{vmatrix}=\begin{matrix}1 & 1 & 1\\ 2 & 3 & 4\\ 3 & 3 & 4\end{matrix}=12+12+6=30$$

$$\begin{matrix}1 & 1 & 1\\ 2 & 3 & 4\\ 3 & 3 & 4\end{matrix}=9+8+12=29$$

$$\Delta=30-29=1$$

$$\Delta x=\begin{vmatrix}1 & 1 & 1\\ 3{,}3 & 3 & 4\\ 3{,}5 & 3 & 4\end{vmatrix}=\begin{matrix}1 & 1 & 1\\ 3{,}3 & 3 & 4\\ 3{,}5 & 3 & 4\end{matrix}=12+9{,}9+14=35{,}9$$

$$\begin{matrix}1 & 1 & 1\\ 3{,}3 & 3 & 4\\ 3{,}5 & 3 & 4\end{matrix}=10{,}5+13{,}2+12=35{,}7$$

$$\Delta=35{,}9-35{,}7=0{,}2$$

$$\Delta y=\begin{vmatrix}1 & 1 & 1\\ 2 & 3{,}3 & 4\\ 3 & 3{,}5 & 4\end{vmatrix}=\begin{matrix}1 & 1 & 1\\ 2 & 3{,}3 & 4\\ 3 & 3{,}5 & 4\end{matrix}=13{,}2+12+7=32{,}2$$

$$\begin{matrix}1 & 1 & 1\\ 2 & 3{,}3 & 4\\ 3 & 3{,}5 & 4\end{matrix}=9{,}9+8+14=31{,}9$$

$$\Delta y=32{,}2-31{,}9=0{,}3$$

$$\Delta z=\begin{vmatrix}1 & 1 & 1\\ 2 & 3 & 3{,}3\\ 3 & 3 & 3{,}5\end{vmatrix}=\begin{matrix}1 & 1 & 1\\ 2 & 3 & 3{,}3\\ 3 & 3 & 3{,}5\end{matrix}=10{,}5+9{,}9+6=26{,}4$$

$$\begin{matrix}1 & 1 & 1\\ 2 & 3 & 3{,}3\\ 3 & 3 & 3{,}5\end{matrix}=9+7+9{,}9=25{,}9$$

$$\Delta z=26{,}4-25{,}9=0{,}5$$

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$$y=\frac{\Delta y}{\Delta}=\frac{0,3}{1}=0,3 \quad z=\frac{\Delta z}{\Delta}=\frac{0,5}{1}=0,5 \quad x=\frac{\Delta x}{\Delta}=\frac{0,2}{1}=0,2$$

Javob: 0,2 : 0,3 : 0,5

4-usul. Tenglamalar sistemasi yechishning Kramer formulasida determinatning sarius usuli.

$$\begin{cases} x+y+z=1 \\ 2x+3y+4z=3,3 \\ 3x+3y+4z=3,5 \end{cases}$$

$$\Delta=\begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 2 & 3 & 4 & 2 & 3 \\ 3 & 3 & 4 & 3 & 3 \end{vmatrix} = 12+12+6-9-12-8=1$$

$$\Delta x=\begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 3,3 & 3 & 4 & 3,3 & 3 \\ 3,5 & 3 & 4 & 3,5 & 3 \end{vmatrix} = 12+14+9,9-10,5-12-13,2=0,2$$

$$\Delta y=\begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 2 & 3,3 & 4 & 2 & 3,3 \\ 3 & 3,5 & 4 & 3 & 3,5 \end{vmatrix} = 13,2+12+7-9,9-8-14=0,3$$

$$\Delta z\begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 2 & 3 & 3,3 & 2 & 3 \\ 3 & 3 & 3,5 & 3 & 3 \end{vmatrix} = = 10,5+9,9+6-9-9,9-7=0,5$$

$$X=\frac{\Delta x}{\Delta}=\frac{0,2}{1}=0,2 \quad y=\frac{\Delta y}{\Delta}=\frac{0,3}{1}=0,3 \quad z=\frac{\Delta z}{\Delta}=\frac{0,5}{1}=0,5$$

Javob: 0,2 : 0,3 : 0,5

5-usul. Tenglamalar sistemasining matritsa usullari. ∆ ning uchburchak usuli.

$$\begin{cases} x+y+z=1 \\ 2x+3y+4z=3,3 \\ 3x+3y+4z=3,5 \end{cases}$$

$$\Delta==\begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{vmatrix} = \begin{matrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{matrix} = 12+12+6=30$$

$$\begin{matrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{matrix} = 9+8+12=29 \qquad \Delta=30-29=1$$

$A_{11}=(-1)^{1+1}\begin{vmatrix} 3 & 4 \\ 3 & 4 \end{vmatrix} = 12-12=0$ $A_{12}=(-1)^{1+2}\begin{vmatrix} 2 & 4 \\ 3 & 4 \end{vmatrix} = -(8-12)=4$ $A_{13}=(-1)^{1+3}\begin{vmatrix} 2 & 3 \\ 3 & 3 \end{vmatrix} = 6-9=-3$

$A_{21}=(-1)^{2+1}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=-(4-3)=-1$ $A_{22}=(-1)^{2+2}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=4-3=1$ $A_{23}=(-1)^{2+3}\begin{vmatrix}1 & 1\\ 3 & 3\end{vmatrix}=-(3-3)=0$

$A_{31}=(-1)^{3+1}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=4-3=1$ $A_{32}=(-1)^{3+2}\begin{vmatrix}1 & 1\\ 2 & 4\end{vmatrix}=-(4-2)=-2$ $A_{33}=(-1)^{3+3}\begin{vmatrix}1 & 1\\ 2 & 3\end{vmatrix}=3-2=1$

$$\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\frac{1}{\Delta}\begin{pmatrix}A_{11} & A_{21} & A_{31}\\ A_{12} & A_{22} & A_{32}\\ A_{13} & A_{23} & A_{32}\end{pmatrix}\begin{pmatrix}a\\ b\\ c\end{pmatrix}=\frac{1}{1}\begin{pmatrix}0 & -1 & 1\\ 4 & 1 & -2\\ -3 & 0 & 1\end{pmatrix}\begin{pmatrix}1\\ 3,3\\ 3,5\end{pmatrix}=$$

$$\begin{pmatrix}0+(-3,3)+3,5\\ 4+3,3-7\\ -3+0+3,5\end{pmatrix}=\begin{pmatrix}0,2\\ 0,3\\ 0,5\end{pmatrix}$$

x=0,2 y=0,3 z=0,5

Javob: 0,2 : 0,3 : 0,5

6-usul. Tenglamalar sistemasining matritsa usuli. ∆ ning sarius usulida yechish.

$$\begin{cases}x+y+z=1\\ 2x+3y+4z=3,3\\ 3x+3y+4z=3,5\end{cases}$$

$$\Delta=\begin{vmatrix}1 & 1 & 1 & 1 & 1\\ 2 & 3 & 4 & 2 & 3\\ 3 & 3 & 4 & 3 & 3\end{vmatrix}=12+12+6-9-12-8=1$$

$A_{11}=(-1)^{1+1}\begin{vmatrix}3 & 4\\ 3 & 4\end{vmatrix}=12-12=0$ $A_{12}=(-1)^{1+2}\begin{vmatrix}2 & 4\\ 3 & 4\end{vmatrix}=-(8-12)=4$ $A_{13}=(-1)^{1+3}\begin{vmatrix}2 & 3\\ 3 & 3\end{vmatrix}=6-9=-3$

$A_{21}=(-1)^{2+1}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=-(4-3)=-1$ $A_{22}=(-1)^{2+2}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=4-3=1$ $A_{23}=(-1)^{2+3}\begin{vmatrix}1 & 1\\ 3 & 3\end{vmatrix}=-(3-3)=0$

$A_{31}=(-1)^{3+1}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}=4-3=1$ $A_{32}=(-1)^{3+2}\begin{vmatrix}1 & 1\\ 2 & 4\end{vmatrix}=-(4-2)=-2$ $A_{33}=(-1)^{3+3}\begin{vmatrix}1 & 1\\ 2 & 3\end{vmatrix}=3-2=1$

$$\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\frac{1}{1}\begin{pmatrix}0 & -1 & 1\\ 4 & 1 & -2\\ -3 & 0 & 1\end{pmatrix}\begin{pmatrix}1\\ 3,3\\ 3,5\end{pmatrix}=\begin{pmatrix}0+(-3,3)+3,5\\ 4+3,3-7\\ -3+0+3,5\end{pmatrix}=\begin{pmatrix}0,2\\ 0,3\\ 0,5\end{pmatrix}$$

x=0,2 y=0,3 z=0,5

Javob: 0,2 : 0,3 : 0,5

7-usul. Tenglamalar sistemasining matritsa usuli. ∆ ning minorlarga yoyish usuli yordamida yechish.

$$\begin{cases}x+y+z=1\\ 2x+3y+4z=3,3\\ 3x+3y+4z=3,5\end{cases}$$

$\Delta=\begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{vmatrix}$ = 1*0+1*4+1*(-3)=4-3=1

$A_{11}=(-1)^{1+1}\begin{vmatrix} 3 & 4 \\ 3 & 4 \end{vmatrix}$ = 4-4=0 $A_{12}=(-1)^{1+2}\begin{vmatrix} 2 & 4 \\ 3 & 4 \end{vmatrix}$ = -(8-12)=4 $A_{13}=(-1)^{1+3}\begin{vmatrix} 2 & 3 \\ 3 & 3 \end{vmatrix}$ = 6-9=-3

$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = A^{-1}\begin{pmatrix} a \\ b \\ c \end{pmatrix}$

$A_{11}=(-1)^{1+1}\begin{vmatrix} 3 & 4 \\ 3 & 4 \end{vmatrix}$ = 12-12=0 $A_{12}=(-1)^{1+2}\begin{vmatrix} 2 & 4 \\ 3 & 4 \end{vmatrix}$ = -(8-12)=4 $A_{13}=(-1)^{1+3}\begin{vmatrix} 2 & 3 \\ 3 & 3 \end{vmatrix}$ = 6-9=-3

$A_{21}=(-1)^{2+1}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = -(4-3)=-1 $A_{22}=(-1)^{2+2}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = 4-3=1 $A_{23}=(-1)^{2+3}\begin{vmatrix} 1 & 1 \\ 3 & 3 \end{vmatrix}$ = -(3-3)=0

$A_{31}=(-1)^{3+1}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = 4-3=1 $A_{32}=(-1)^{3+2}\begin{vmatrix} 1 & 1 \\ 2 & 4 \end{vmatrix}$ = -(4-2)=-2 $A_{33}=(-1)^{3+3}\begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix}$ = 3-2=1

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix}=\frac{1}{1}\begin{pmatrix} 0 & -1 & 1 \\ 4 & 1 & -2 \\ -3 & 0 & 1 \end{pmatrix}\begin{pmatrix} 1 \\ 3,3 \\ 3,5 \end{pmatrix}=\begin{pmatrix} 0+(-3,3)+3,5 \\ 4+3,3-7 \\ -3+0+3,5 \end{pmatrix}=\begin{pmatrix} 0,2 \\ 0,3 \\ 0,5 \end{pmatrix}$$

x=0,2 y=0,3 z=0,5

Javob: 0,2 : 0,3 : 0,5

8-usul. Tenglamalar sistemasining Kramer usuli. Δ ni minorlarga yoyish usulida yechish.

$$\begin{cases} x+y+z=1 \\ 2x+3y+4z=3,3 \\ 3x+3y+4z=3,5 \end{cases}$$

$$\Delta=\begin{vmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 3 & 3 & 4 \end{vmatrix}=2*(-1)+3*1+0=1$$

$A_{21}=(-1)^{2+1}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = -(4-3)=-1 $A_{22}=(-1)^{2+2}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = 4-3=1 $A_{23}=(-1)^{2+3}\begin{vmatrix} 1 & 1 \\ 3 & 3 \end{vmatrix}$ = -(3-3)=0

$\Delta x=\begin{vmatrix} 1 & 1 & 1 \\ 3,3 & 3 & 4 \\ 3,5 & 3 & 4 \end{vmatrix}$ = 3,3*(-1)+3*0,5+4*0,5=0,2

$A_{21}=(-1)^{2+1}\begin{vmatrix} 1 & 1 \\ 3 & 4 \end{vmatrix}$ = -(4-3)=-1 $A_{22}=(-1)^{2+2}\begin{vmatrix} 1 & 1 \\ 3,5 & 4 \end{vmatrix}$ = 4-3,5=0,5 $A_{23}=(-1)^{2+3}\begin{vmatrix} 1 & 1 \\ 3,5 & 3 \end{vmatrix}$ = -(3-3,5)=0,5

$\Delta y=\begin{vmatrix}1 & 1 & 1\\ 2 & 3{,}3 & 4\\ 3 & 3{,}5 & 4\end{vmatrix}$ = 2*(-0,5)+3,3*1+4*(-0,5)=0,3

$A_{21}=(-1)^{2+1}\begin{vmatrix}1 & 1\\ 3{,}5 & 4\end{vmatrix}$ = -(4-3,5)=-0,5 $A_{22}=(-1)^{2+2}\begin{vmatrix}1 & 1\\ 3 & 4\end{vmatrix}$ = 4-3=1 $A_{23}=(-1)^{2+3}\begin{vmatrix}1 & 1\\ 3 & 3{,}5\end{vmatrix}$ = -(3,5-3)=-0,5

$\Delta z=\begin{vmatrix}1 & 1 & 1\\ 2 & 3 & 3{,}3\\ 3 & 3 & 3{,}5\end{vmatrix}$ =2*(-0,5)+3*0,5+0=0,5

$A_{21}=(-1)^{2+1}\begin{vmatrix}1 & 1\\ 3 & 3{,}5\end{vmatrix}$ = -(3,5-3)=-0,5 $A_{22}=(-1)^{2+2}\begin{vmatrix}1 & 1\\ 3 & 3{,}5\end{vmatrix}$ = 3,5-3=0,5 $A_{23}=(-1)^{2+3}\begin{vmatrix}1 & 1\\ 3 & 3\end{vmatrix}$ = 0

$$X=\frac{\Delta x}{\Delta}=\frac{0{,}2}{1}=0{,}2 \quad y=\frac{\Delta y}{\Delta}=\frac{0{,}3}{1}=0{,}3 \quad z=\frac{\Delta z}{\Delta}=\frac{0{,}5}{1}=0{,}5$$

Javob: 0,2 : 0,3 : 0,5

9-usul. Tenglamalar sistemasining gaus usuli.

$$\begin{cases} x^1+x^2+x^3=1\\ 2x^1+3x^2+4x^3=3{,}3\\ 3x_1+3x_2+4x_3=3{,}5\end{cases}$$

$x_1+x_2+x_3=1$

$$-\begin{cases} x^2+2x^3=1{,}3\\ x_2+x_3=0{,}8\end{cases}$$

$x_1=0{,}2$ $x_3=0.5$

$x_1+x_2+x_3=1$

$0{,}2+x_2+0{,}5=1$

$0{,}7+x_2=1$

$x_2=0{,}3$

Javob: 0,2 : 0,3 : 0,5

O‘quvchilarga beriladigan masalalar soni va qiyinligi darajasi ularning imkoniyati yoshhususiyati va bilimiga mos bo‘lmog’i maqsadga muofiq, aks holda o‘quvchi qiziqishini so‘ndirib qo‘yish mumkin. Zarur vaqtda albatta individual yondashish kerak bo‘ladi. Bir xil turdagi masalalardan ko‘p ishlash yaxshi natija bermaydi, bu ularni tushunmasdan o‘rniga qo‘yib yechishiga olib keladi, o‘quvchi fikrlamay qo‘yadi. O‘qituvchi masalalar tanlashda shunga ahamiyat bermog‘i kerakki, bitta masalada o‘tilgan mavzuga oid tushuncha bilan birga yangi ma’lumot ham bo‘lsa o‘quvchi masala yechish davomida yangi bilimlar ham oladi. Natijada o‘quvchida mustahkam bilimlar hosil bo‘ladi.

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