

## LITIY IONLARI KIRITILGAN KALIY ANTIMONAT-VOLFRAMATLARNI QATTIQ FAZALI REAKSIYA YORDAMIDA SINTEZ QILISH VA ULURNI TAYYORLASH TEXNOLOGIYASI

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**Annotatsiya.**  $x\text{Li}_2\text{CO}_3-(y-x)\text{K}_2\text{CO}_3-y\text{Sb}_2\text{O}_3-(2-y)\text{WO}_3$  tizimida fazalar hosil bo'lish xususiyatlari o'rganildi va qattiq fazali reaksiyasi ishlab chiqildi. Harorat 1123 K bo'lganida, piroxlor tipidagi tuzilishga ega  $\text{Li}_x\text{K}_{y-x}\text{Sb}_y\text{W}_{2-y}\text{O}_6$  o'zgaruvchan fazalar hosil bo'lishi aniqlandi.

### KIRISH

Yoqilg'i elementlari uchun anod va katod materiallarini, shuningdek, hozirgi an'anaviy elektrolitlar bilan raqobatlasha oladigan yangi kation va anion o'tkazuvchi materiallarni izlashga katta e'tibor qaratilmoqda. Bugungi kunga kelib, ishqoriy kationlarga nisbatan yuqori o'tkazuvchanlikka ega bo'lgan, har xil sinflar va tuzilish turlariga mansub o'nlab qattiq elektrolitlar sintez qilingan [1-6].

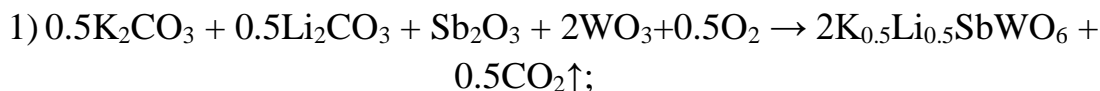
Ta'kidlash joizki, hozirgacha qattiq fazalarning termal barqarorligi, nuqsonli piroxlor tipidagi qattiq eritmalarining barqarorlik chegaralarini aniqlash, ionlarning strukturadagi kristallografik pozitsiyalar bo'yicha joylashuvi va olingan birikmalarda ionlarni tashish mexanizmi yaxshi tushunilmagan bo'lib qolmoqda. Shunday qilib, oksidli tizimlarning fazaviy diagrammasi, hosil bo'lish shartlari va xossalari haqida yangi ma'lumot olish kondensatsiyalangan moddalar fizikasi va zamonaviy materialshunoslikning dolzarb muammolaridan biridir [7-9].

**Asosiy qism. Murakkab oksidlarni tayyorlashda ishlatiladigan materiallar:** Shu munosabat bilan, bu ishning maqsadi  $x\text{Li}_2\text{CO}_3-(y-x)\text{K}_2\text{CO}_3-y\text{Sb}_2\text{O}_3-(2-y)\text{WO}_3$  tizimida fazalar hosil bo'lish jarayonlarini o'rganish, hosil bo'lgan fazalarning tarkibi va tuzilishini aniqlashdir. Bunday birikmalarni tayyorlashning eng keng tarqalgan usullaridan biri qattiq fazali reaksiya usuli hisoblanadi. Namunalarning sintezi standart qattiq fazali texnologiya bo'yicha kaliy karbonatlarning  $\text{K}_2\text{CO}_3$  boshlang'ich reaktivlari va reaktivlaridan, shuningdek, litiy karbonatlari ( $\text{Li}_2\text{CO}_3$ ), surma oksidlari ( $\text{Sb}_2\text{O}_3$ ), volfram ( $\text{WO}_3$ ) dan amalga oshirildi [9-11].

**Murakkab oksidlar sintezi va ularni tayyorlash.** Gidratlangan namlikni olib tashlash uchun bir valentli metall karbonatlar 500-600 K haroratda mufel pechida ikki soat davomida issiqlik bilan ishlov berildi. Boshlang'ich reagentlarning tortilgan qismlari tegishli qattiq fazali reaksiyalar komponentlarining molyar nisbatlaridan hisoblab chiqilgan [12-17]. Oksidlar va karbonatlar kukunlari aralashmalari oz

miqdordagi etil spirti qo'shilgan holda maxsus o'g'irchada yaxshilab maydalangan va havoda toblangan:  $T_1=700\text{ K}$ ,  $T_2=900\text{ K}$  va  $T_3=1123\text{ K}$ .

Биз қўйида изотермик термогравиметрия ( $\mu_3$ ) ва назарий ҳисобланган ( $\mu_T$ ) ( $T=123\text{ K}$ )  $x\text{Li}_2\text{CO}_3-(y-x)\text{K}_2\text{CO}_3-y\text{Sb}_2\text{O}_3-(2-y)\text{WO}_3$  тизими намуналари бўйича массасининг  $x = 0.5$  да нисбий ўзгаришини кўришимиз мумкин:



$y = 1.0$  (Mole ratio of reactants)

$$M_1 = (0.5\text{K}_2\text{CO}_3) = 0.5 \cdot (2 \cdot 39.09 + 12.01 + 48) = 276.38$$

$$M_2 = (0.5\text{Li}_2\text{CO}_3) = 0.5 \cdot (2 \cdot 6.9 + 12.01 + 48) = 36.905$$

$$M_3 = (\text{Sb}_2\text{O}_3) = 2 \cdot 121.75 + 48 = 291.5$$

$$M_4 = (2\text{WO}_3) = 2 \cdot (183.85 + 48) = 463.7$$

$$M_5 = (2\text{K}_{0.5}\text{Li}_{0.5}\text{SbWO}_6) = 2 \cdot (0.5 \cdot 39.09 + 0.5 \cdot 6.9 + 121.75 + 183.85 + 96) = 849.19$$

$$x_5 = 1$$

$$x_1 = \frac{x_5 \times M_1}{M_5} = \frac{1 \times 276.38}{849.19} = 0.325\text{ mg}$$

$$x_2 = \frac{x_5 \times M_2}{M_5} = \frac{1 \times 36.905}{849.19} = 0.043\text{ mg}$$

$$x_3 = \frac{x_5 \times M_3}{M_5} = \frac{1 \times 291.5}{849.19} = 0.343\text{ mg}$$

$$x_4 = \frac{x_5 \times M_4}{M_5} = \frac{1 \times 463.7}{849.19} = 0.546\text{ mg}$$



$y = 1.125$  (Mollar nisbati)

$$M_1 = (0.625\text{K}_2\text{CO}_3) = 0.625 \cdot (2 \cdot 39.09 + 12.01 + 48) = 86.36$$

$$M_2 = (0.5\text{Li}_2\text{CO}_3) = 0.5 \cdot (2 \cdot 6.9 + 12.01 + 48) = 101.46$$

$$M_3 = (1.125\text{Sb}_2\text{O}_3) = 1.125 \cdot (2 \cdot 121.75 + 48) = 327.94$$

$$M_4 = (1.75\text{WO}_3) = 1.75 \cdot (183.85 + 48) = 405.7$$

$$M_5 = (2\text{K}_{0.625}\text{Li}_{0.5}\text{Sb}_{1.125}\text{W}_{0.875}\text{O}_6) = 2 \cdot (0.625 \cdot 39.09 + 0.5 \cdot 6.9 + 1.125 \cdot 121.75 + 0.875 \cdot 183.85 + 96) = 840$$

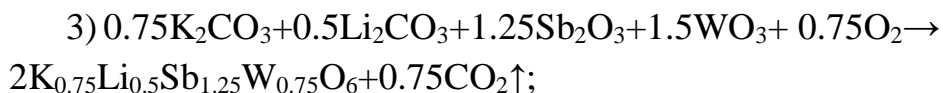
$$x_5 = 1$$

$$x_1 = \frac{x_5 \times M_1}{M_5} = \frac{1 \times 86.36}{840} = 0.102\text{ mg}$$

$$x_2 = \frac{x_5 \times M_2}{M_5} = \frac{1 \times 101.46}{840} = 0.121\text{ mg}$$

$$x_3 = \frac{x_5 \times M_3}{M_5} = \frac{1 \times 327.94}{840} = 0.391\text{ mg}$$

$$x_4 = \frac{x_5 \times M_4}{M_5} = \frac{1 \times 405.7}{840} = 0.483\text{ mg}$$



$$y = 1.25 \text{ (Mollar nisbati)}$$

$$M_1 = (0.75\text{K}_2\text{CO}_3) = 0.75 \cdot (2 \cdot 39.09 + 12.01 + 48) = 103.6$$

$$M_2 = (0.5\text{Li}_2\text{CO}_3) = 0.5 \cdot (2 \cdot 6.9 + 12.01 + 48) = 36.9$$

$$M_3 = (1.25\text{Sb}_2\text{O}_3) = 1.25 \cdot (2 \cdot 121.75 + 48) = 364.4$$

$$M_4 = (1.5\text{WO}_3) = 1.5 \cdot (183.85 + 48) = 347.7$$

$$M_5$$

$$= (2\text{K}_{0.75}\text{Li}_{0.5}\text{Sb}_{1.25}\text{W}_{0.75}\text{O}_6) = 2 \cdot (39.09 \cdot 0.75 + 0.5 \cdot 6.9 + 121.75 \cdot 1.25 + 183.85 \cdot 0.75 + 96) = 830.8$$

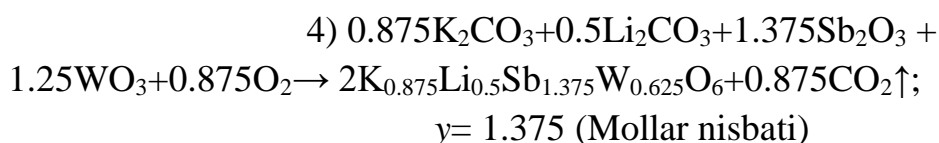
$$x_5 = 1$$

$$x_1 = \frac{x_5 \times M_1}{M_5} = \frac{1 \times 103.6}{830.8} = 0.125 \text{ mg}$$

$$x_2 = \frac{x_5 \times M_2}{M_5} = \frac{1 \times 36.9}{830.8} = 0.044 \text{ mg}$$

$$x_3 = \frac{x_5 \times M_3}{M_5} = \frac{1 \times 364.4}{830.8} = 0.439 \text{ mg}$$

$$x_4 = \frac{x_5 \times M_4}{M_5} = \frac{1 \times 347.7}{830.8} = 0.418 \text{ mg}$$



$$M_1 = (0.875\text{K}_2\text{CO}_3) = 0.875 \cdot (2 \cdot 39.09 + 12.01 + 48) = 122$$

$$M_2 = (0.5\text{Li}_2\text{CO}_3) = 0.5 \cdot (2 \cdot 6.9 + 12.01 + 48) = 36.9$$

$$M_3 = (1.375\text{Sb}_2\text{O}_3) = 1.375 \cdot (2 \cdot 121.75 + 48) = 400.8$$

$$M_4 = (1.25\text{WO}_3) = 1.25 \cdot (183.85 + 48) = 289.8$$

$$M_5 = (2\text{K}_{0.875}\text{Li}_{0.5}\text{Sb}_{1.375}\text{W}_{0.625}\text{O}_6) = 2 \cdot (39.09 \cdot 0.875 + 0.5 \cdot 6.9 + 121.75 \cdot 1.375 + 183.85 \cdot 0.625 + 96) = 639.9$$

$$x_5 = 1$$

$$x_1 = \frac{x_5 \times M_1}{M_5} = \frac{1 \times 122}{639.9} = 0.191 \text{ mg}$$

$$x_2 = \frac{x_5 \times M_2}{M_5} = \frac{1 \times 36.9}{639.9} = 0.058 \text{ mg}$$

$$x_3 = \frac{x_5 \times M_3}{M_5} = \frac{1 \times 400.8}{639.9} = 0.626 \text{ mg}$$

$$x_4 = \frac{x_5 \times M_4}{M_5} = \frac{1 \times 289.8}{639.9} = 0.453 \text{ mg}$$

Shakllangan fazalar tarkibi izotermik termogravimetriya ma'lumotlari bo'yicha namunalarni VLR-200 ikkinchi aniqlik sinfining analitik balansida tortish yo'li bilan hisoblab chiqilgan. Bu hisob - kitoblar olingan birikmalarning kimyoviy tarkibini

aniqlash imkonini berdi [18-22].

### **XULOSA**

Aralashmalar  $x\text{Li}_2\text{CO}_3-(y-x)\text{K}_2\text{CO}_3-y\text{Sb}_2\text{O}_3-(2-y)\text{WO}_3$  reagentlarining har xil nisbati bilan tayyorlanadi,  $x$  aralashmaning tarkibiy qismlarining molyar nisbati 0.125 qadam bilan  $1.0 \leq y \leq 1.375$  oralig'ida o'zgarib turadi.

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