

Николаев 11м

Олимпиада школьников по химии РГАУ-МСХА
имени К.А. Тимирязева 2024 года 11-й класс. 415

Задание 1.

Дано:

$$v(\text{H}_2\text{O}) = 3\text{ л}$$

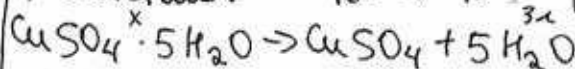
$$t(\text{CuSO}_4) = 20^\circ\text{C}$$

$$m(\text{CuSO}_4) = 20,5\text{ г}$$

$$m(\text{H}_2\text{O}) = 100\text{ г}$$

$$m(\text{CuSO}_4 \cdot 5\text{H}_2\text{O}) = ?$$

Решение:



$$250\text{ г/моль}$$

$$160\text{ г/моль}$$

$$M(\text{CuSO}_4) = 160\text{ г}$$

$$20,5\text{ г}$$

$$\frac{20,5\text{ г}}{160\text{ г/моль}} = 0,128\text{ моль}$$

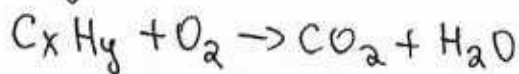
$$M(\text{CuSO}_4 \cdot 5\text{H}_2\text{O}) = 64 + 32 + 64 + 5 \cdot 18 = 250\text{ г/моль}$$

$$m = M \cdot n = 0,128\text{ моль} \cdot 250\text{ г/моль} = 32,0\text{ г}$$

$$32,0\text{ г} \cdot 30 = 960,0\text{ г}$$

$$\text{Ответ: } m(\text{CuSO}_4 \cdot 5\text{H}_2\text{O}) = 960,0\text{ г}$$

Задание 2.



$$v(\text{C}) = v(\text{CO}_2) = \frac{6,4\text{ г}}{44\text{ г/моль}} = 0,145\text{ моль} \quad m(\text{C}) = 1,74\text{ г}$$

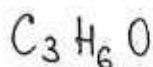
$$v(\text{H}) = 2v(\text{H}_2\text{O}) = \frac{2 \cdot 5,4\text{ г}}{18\text{ г/моль}} = 0,6\text{ моль} \quad m(\text{H}) = 0,6\text{ г}$$

$$M(\text{C}_x\text{H}_y) = 29 \cdot 2 = 58\text{ г/моль} \quad m(\text{C}_x\text{H}_y) = 5,8\text{ г}$$

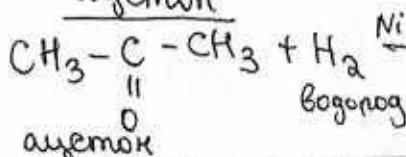
$$m(\text{O}) = 5,8\text{ г} - 1,74\text{ г} - 0,6\text{ г} = 3,46\text{ г}$$

$$x:y:z = 3,6:0,6:1,6$$

$$x:y:z = 0,3:0,6:0,1 = 3:6:1$$

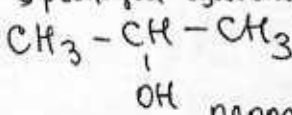


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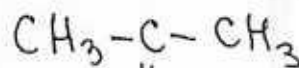


водород

реакция взаимодействия

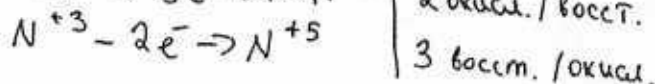
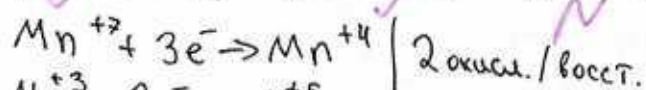
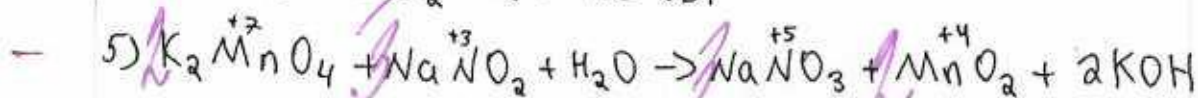
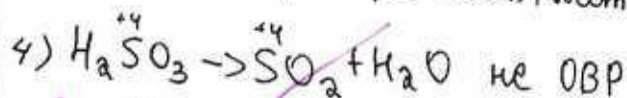
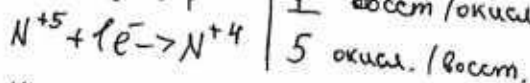
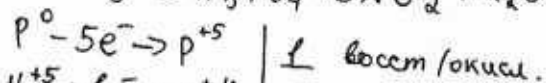
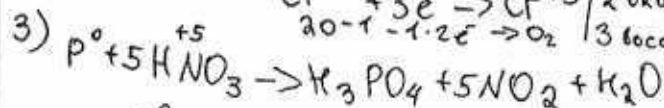
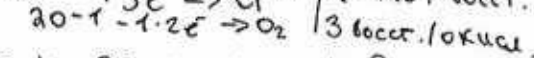
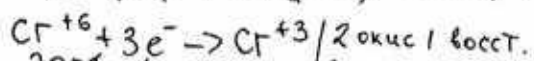
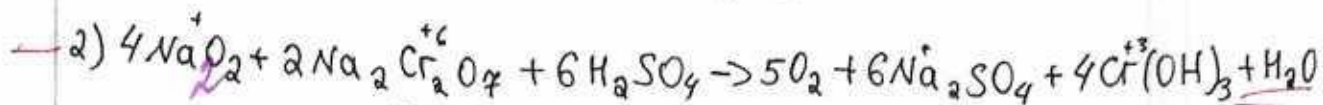
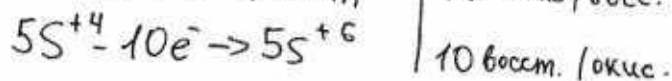
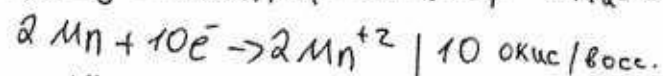
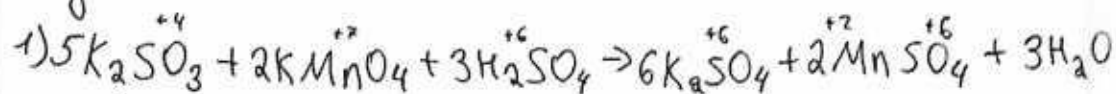


пропанол-2

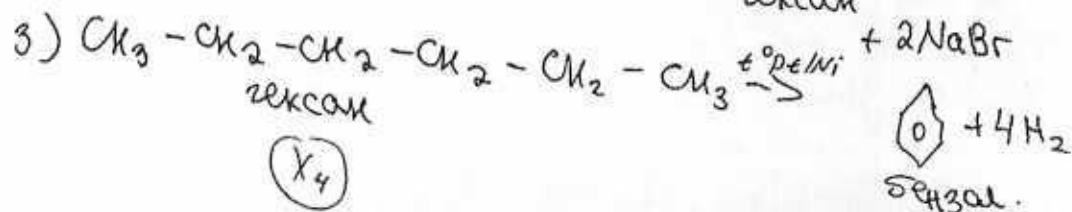
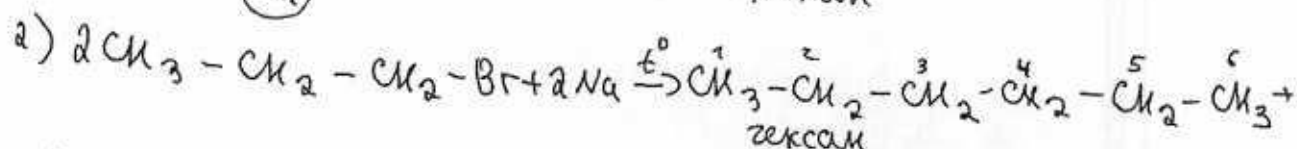
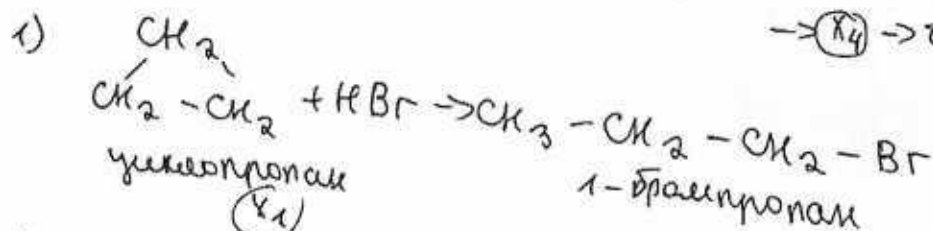
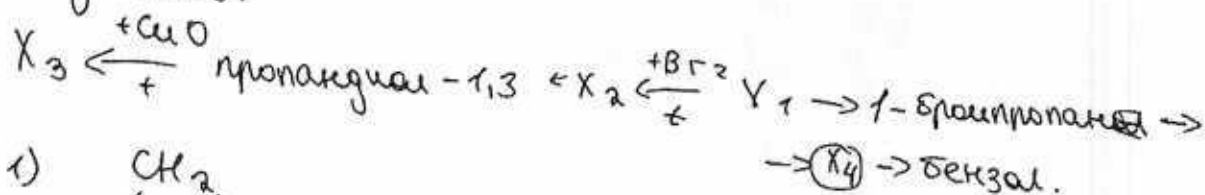


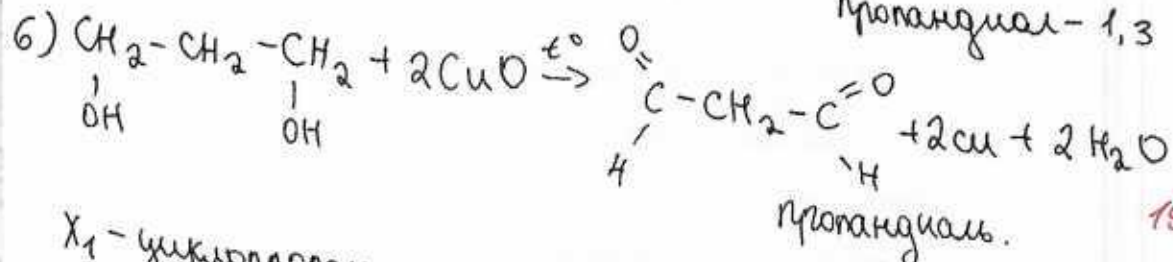
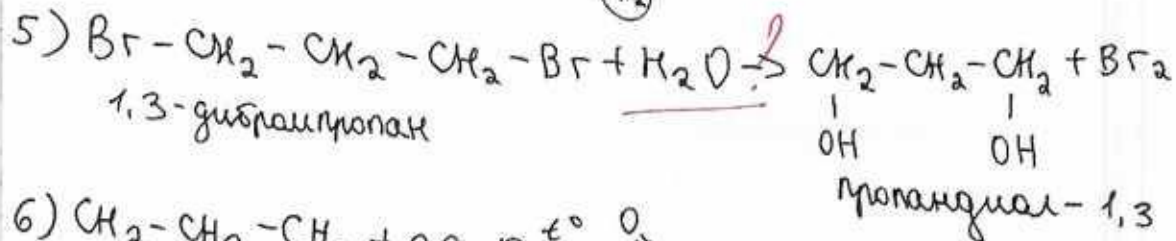
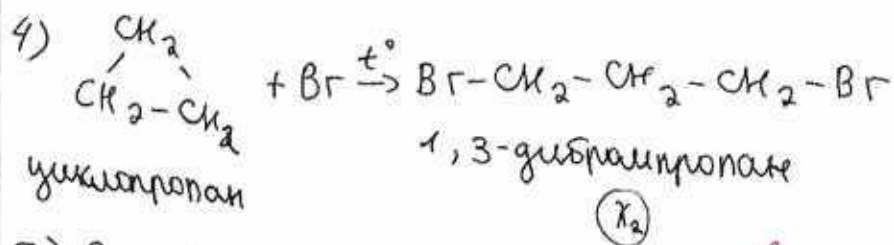
структурная формула.

Задача 4



Задача 5.





X₁ - циклопропан

X₂ - 1,3-дибропропан

X₃ - пропаналь

X₄ - гексан.

Задача 3.

Дано:

$w(\text{Cu}) = 92,31\%$

$m(\text{H}_2\text{SO}_4) = 196 \text{ г}$

$w(\text{H}_2\text{SO}_4) = 90\%$

$V(\text{Ca}_3) = 2,24 \text{ л}$

$V_m = 22,4 \text{ л/моль}$

$m(\text{BaCl}_2) = 1040 \text{ г}$

$w(\text{BaCl}_2) = 10\%$

$m(\text{SrNO}_3) = 353 \text{ г}$

$w(\text{SrNO}_3) = 30\%$

W - ?

Решение:

$m(\text{Cu}) = 196 \text{ г} \cdot 0,9231 = 180,922 \text{ г}$

$m(\text{CuO}) = 196 \text{ г} - 180,922 \text{ г} = 15,08 \text{ г}$

$m(\text{H}_2\text{SO}_4) = \frac{196}{0,9} = 217,8 \text{ г}$

$M(\text{Cu}) = 63,55 \text{ г/моль}$

$M(\text{CuO}) = 79,55 \text{ г/моль}$

$2,24 \text{ л} = 2240 \text{ мл}$

$n = \frac{m}{M} = \frac{15,08}{79,55} = 0,19 \text{ моль}$

$0,9 \cdot \frac{2240 \text{ мл}}{1000} : 98,09 \text{ г/моль} = 0,020$

$n(\text{Ba}) = 1040 \text{ г} \cdot 0,1 : 208,23 \text{ г/моль} = 0,499 \text{ моль}$