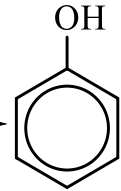
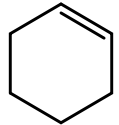
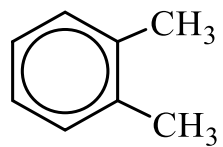
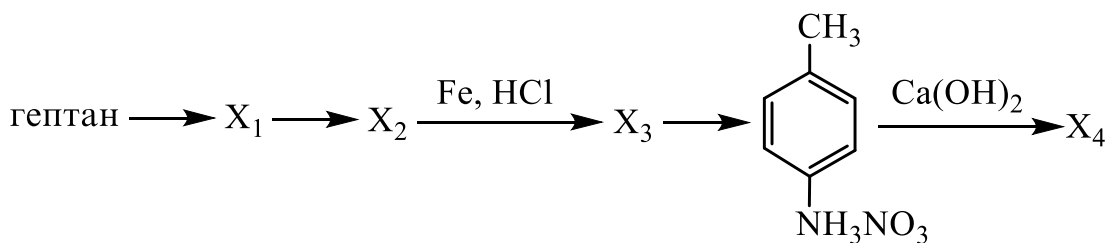


Формулировка задания: «Напишите уравнения реакций, с помощью которых можно осуществить следующие превращения. При написании уравнений реакций указывайте преимущественно образующиеся продукты, используйте структурные формулы органических веществ.»

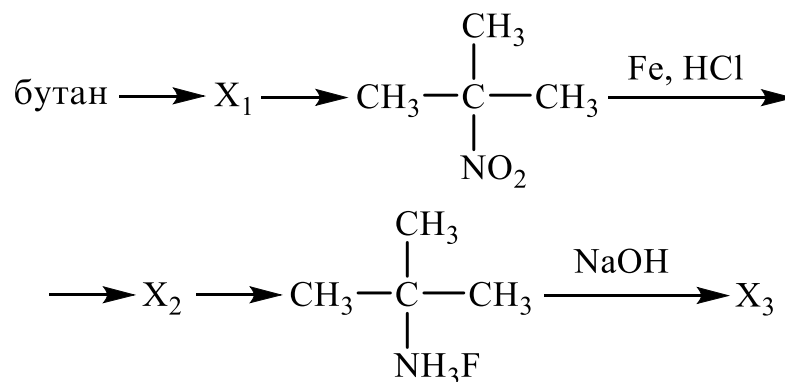
2021

1.	<p>толуол $\xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, t^\circ}$ $X_1 \xrightarrow{\text{бензол}} \text{CH}_3\text{—CH=CH}_2$</p> <p>$\longrightarrow X_2 \longrightarrow X_3 \longrightarrow$ 2,4,6-трибромфенол</p>
2.	<p>$\text{CH}_3\text{—CH=CH}_2 \xrightarrow{\text{C}_6\text{H}_6} X_1 \longrightarrow$ </p> <p>$\longrightarrow X_2 \longrightarrow$  $\xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} X_3$</p>
3.	<p>$\text{CH}_2\text{—CH}_2\text{—CH}_2\text{—CH}_3 \xrightarrow{\text{Br}} X_1 \longrightarrow \text{CH}_3\text{—CH(Br)—CH}_2\text{—CH}_3 \longrightarrow$</p> <p>$\longrightarrow X_2 \longrightarrow$  $\xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} X_3$</p>
4.	<p>циклопропан $\longrightarrow X_1 \longrightarrow$ бромид пропиламмония \longrightarrow</p> <p>$\longrightarrow X_2 \xrightarrow{\text{HNO}_2} X_3 \xrightarrow{\text{K}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4, t^\circ} \text{пропаналь}$</p>
5.	<p>$\text{NaC}\equiv\text{CNa} \longrightarrow X_1 \longrightarrow \text{CH}_3\text{—CH(Cl)—Cl} \longrightarrow$</p> <p>$\longrightarrow X_2 \longrightarrow \text{CH}_3\text{COONH}_4 \xrightarrow{\text{Ba(OH)}_2(\text{p-p})} X_3$</p>

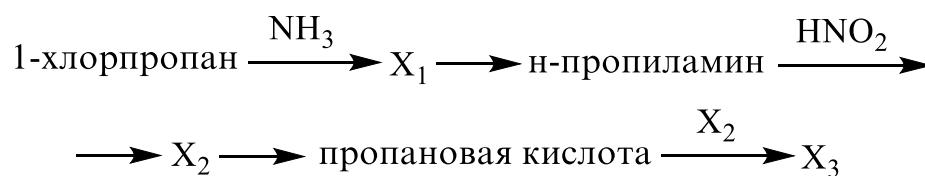
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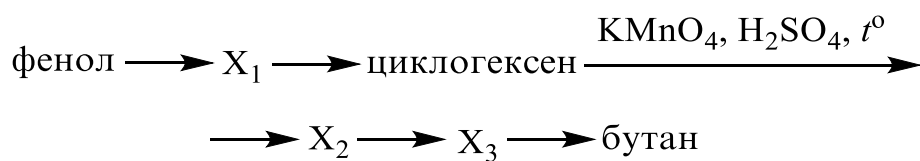
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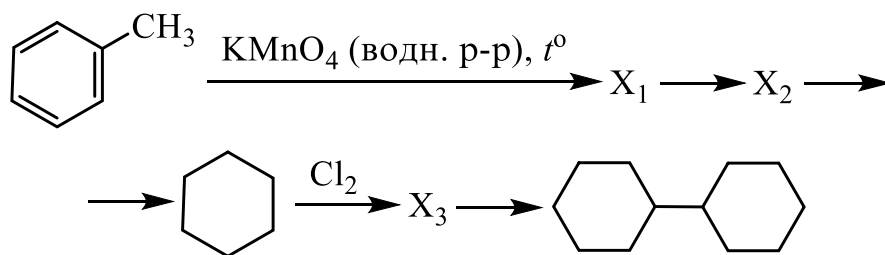
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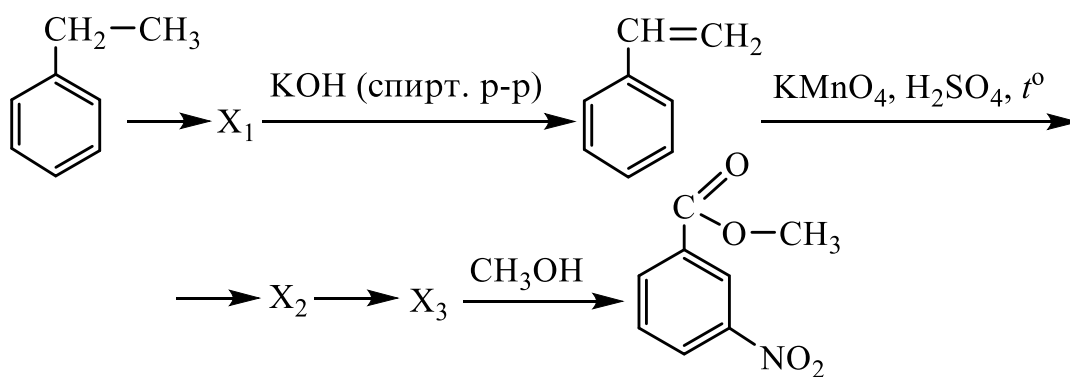
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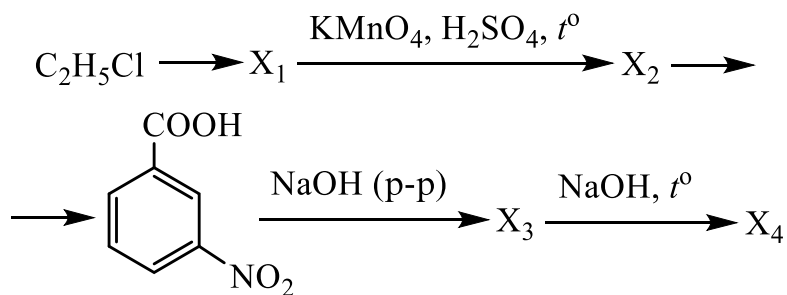
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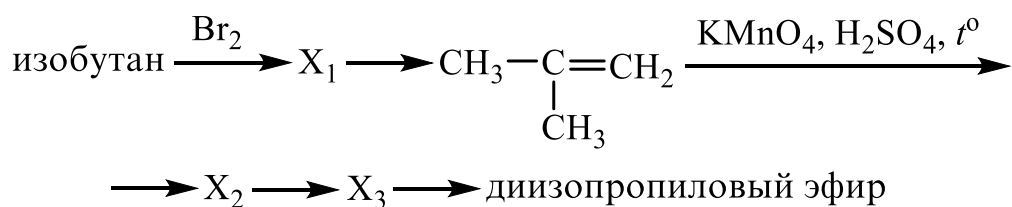
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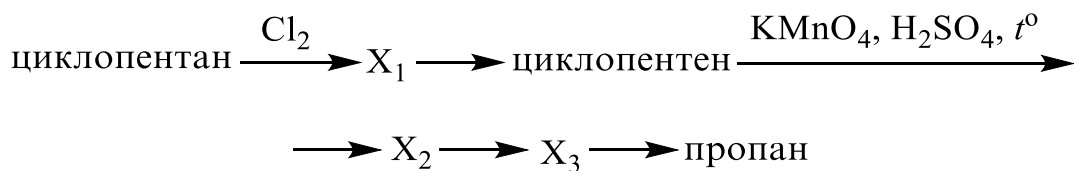
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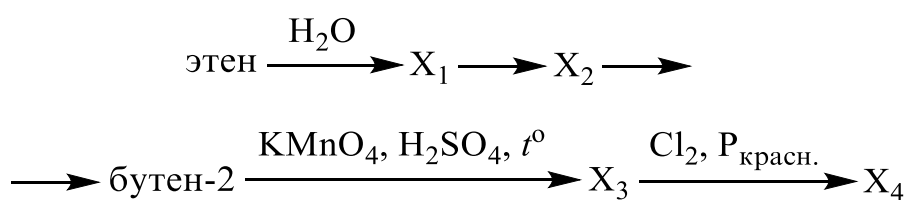
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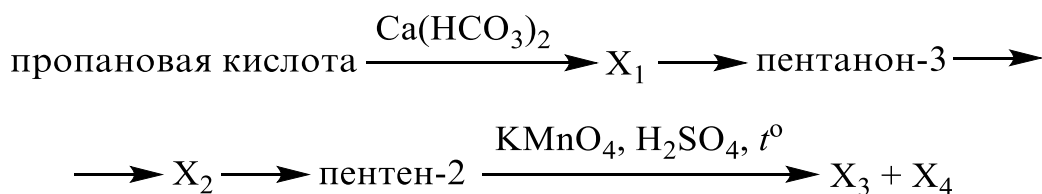
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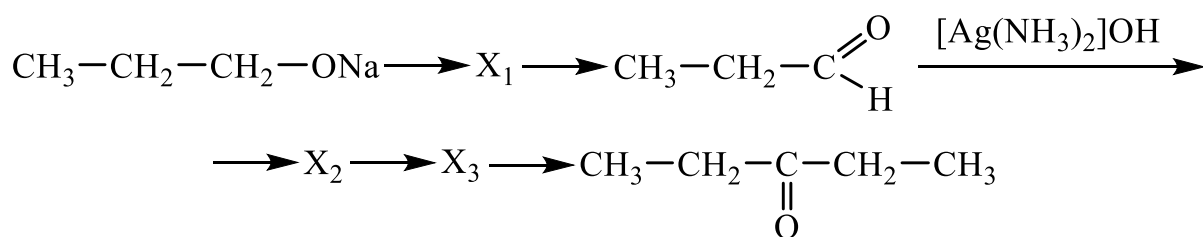
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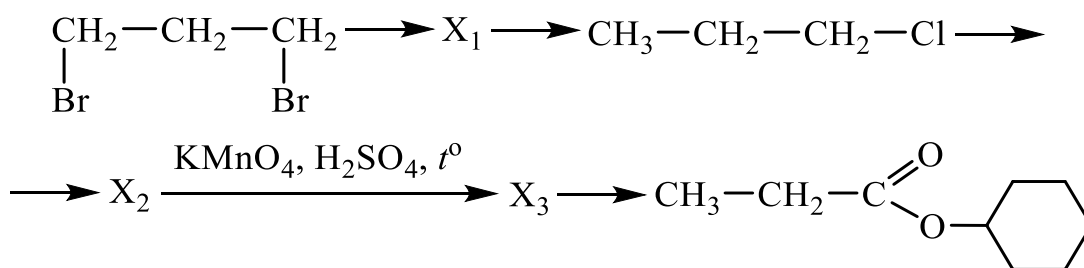
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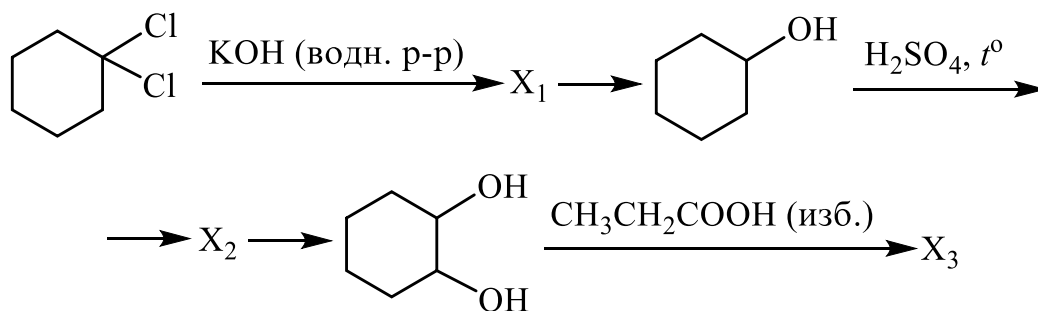
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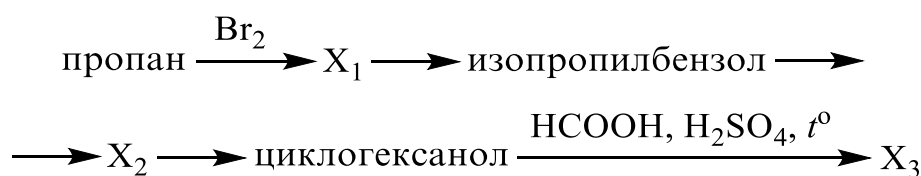
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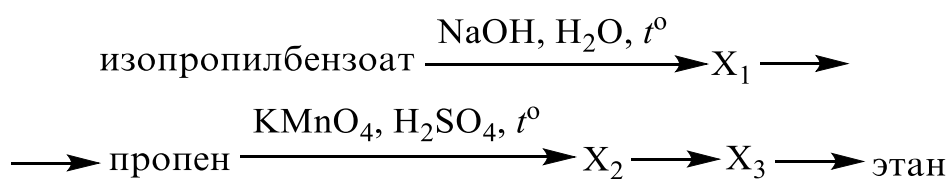
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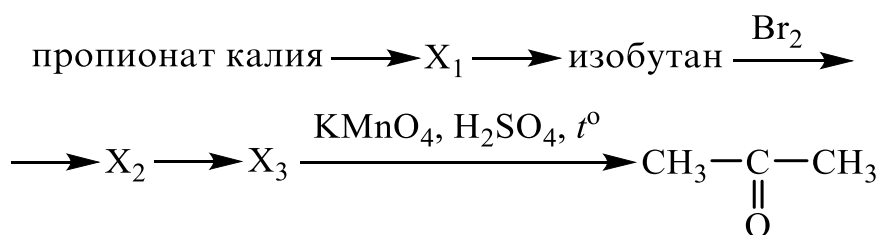
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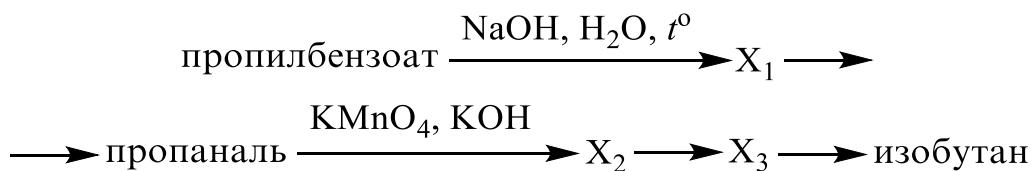
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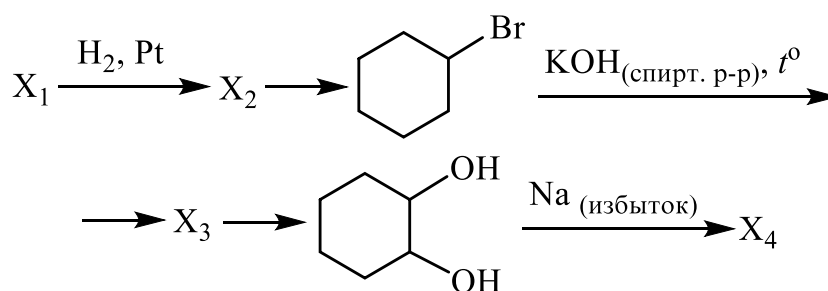
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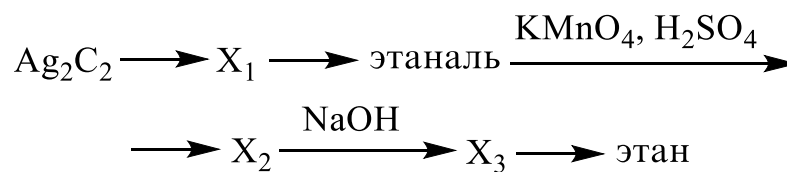
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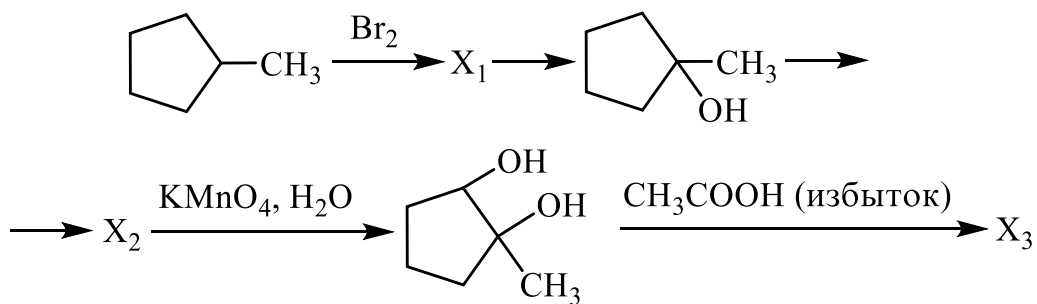
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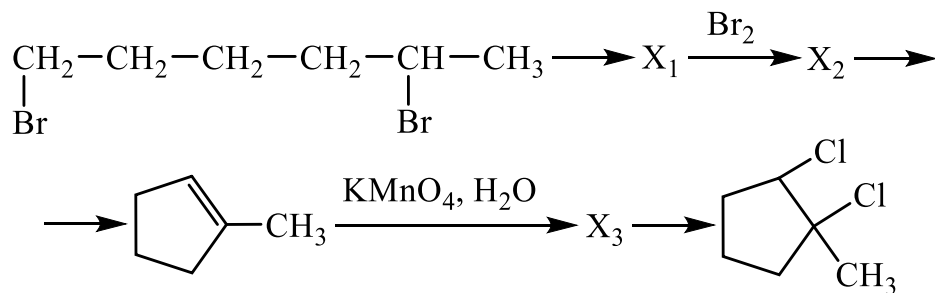
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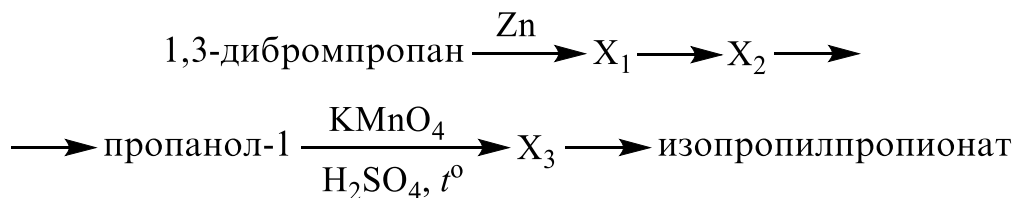
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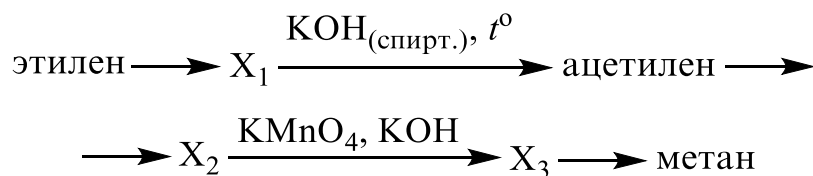


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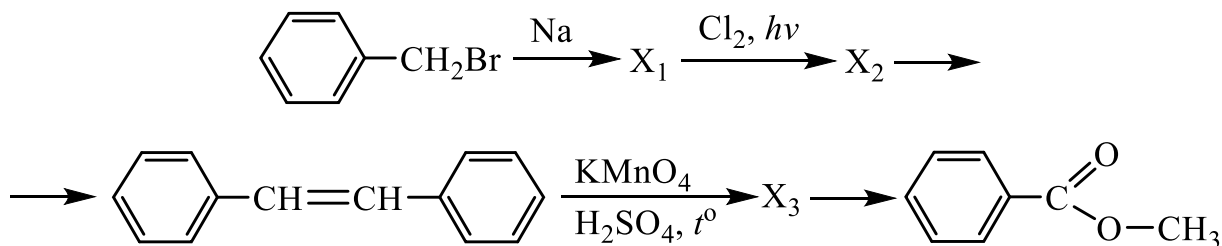


2020

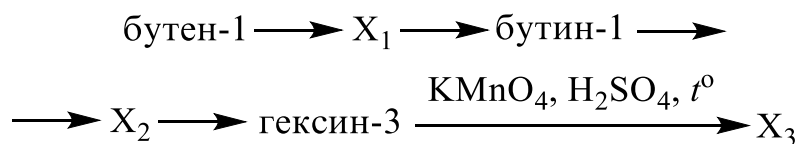
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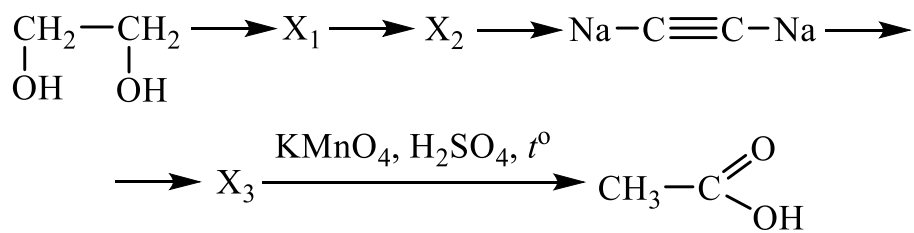
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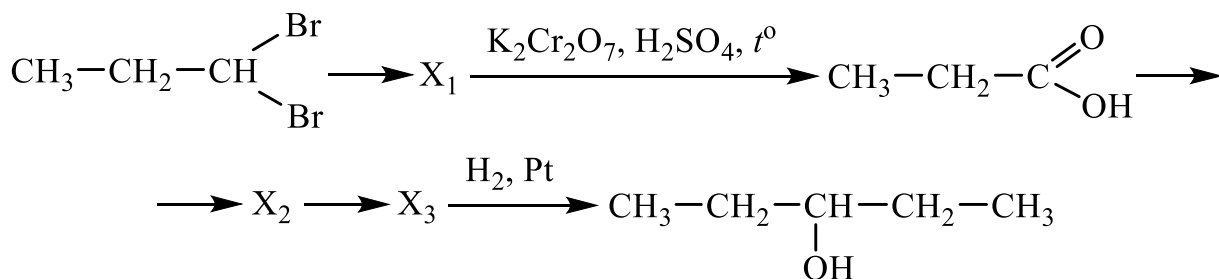
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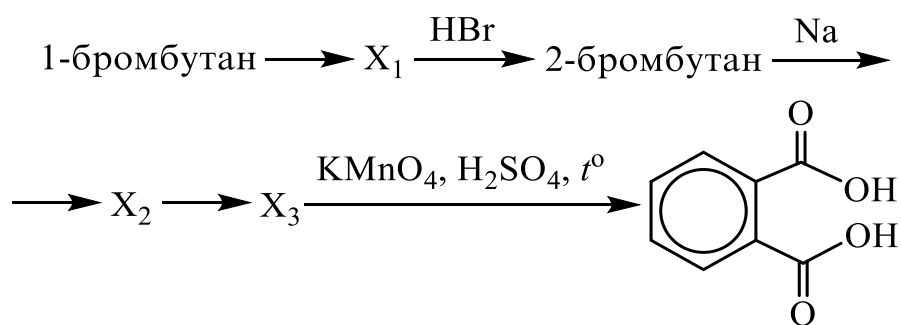
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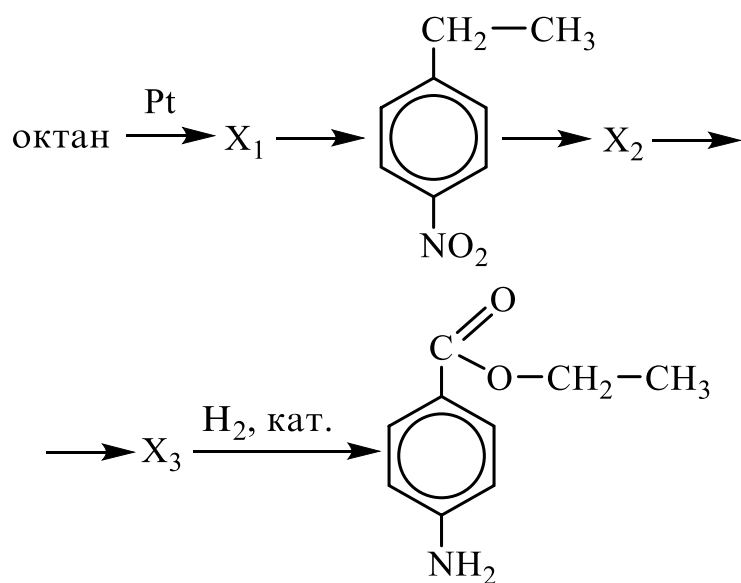
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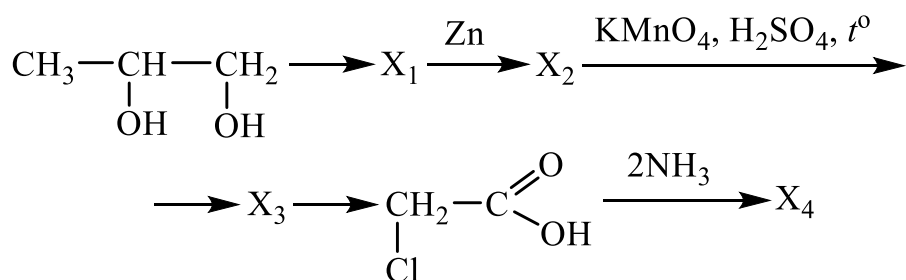
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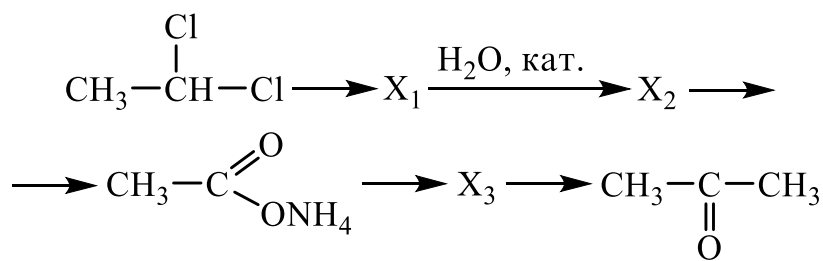
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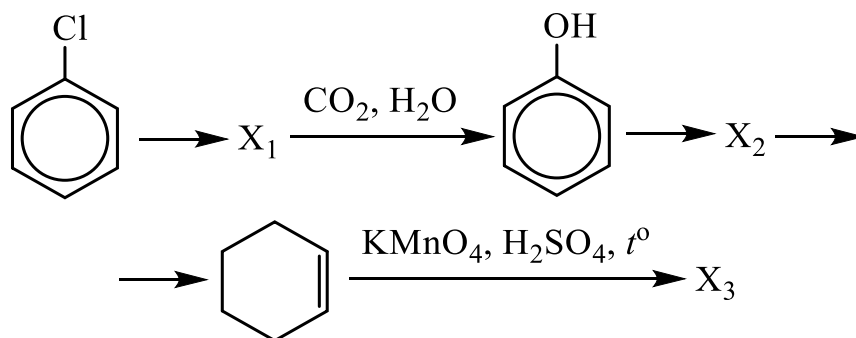
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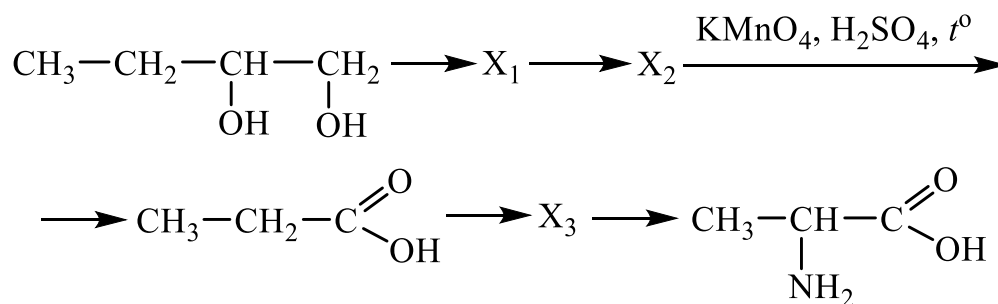
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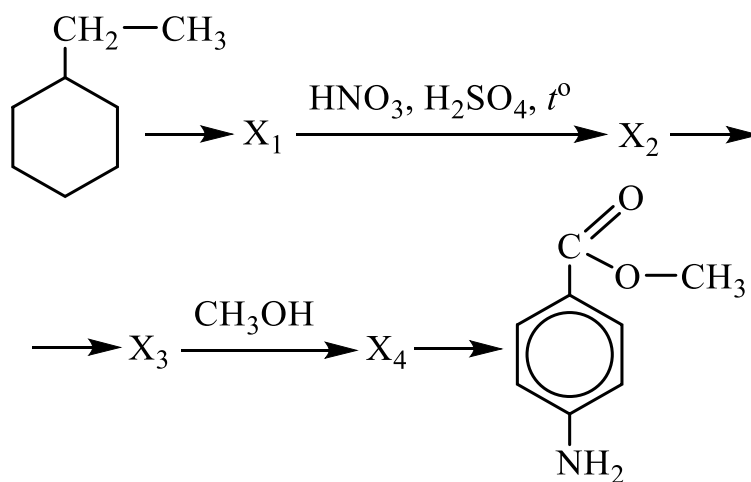
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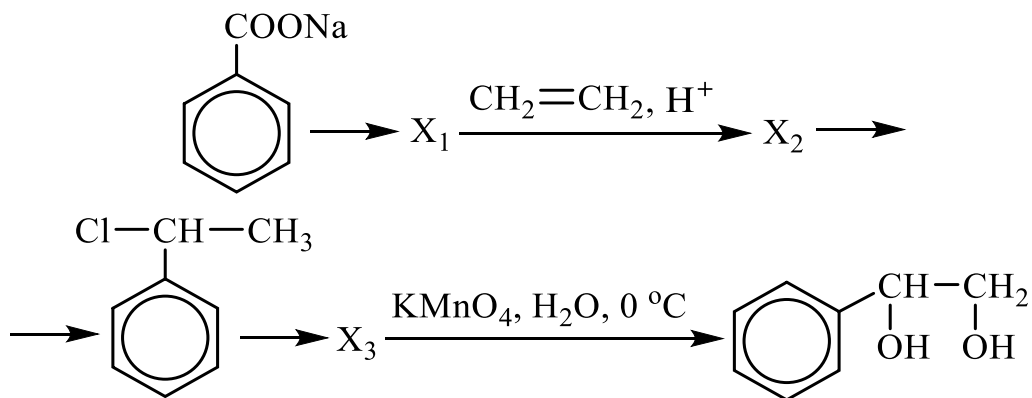
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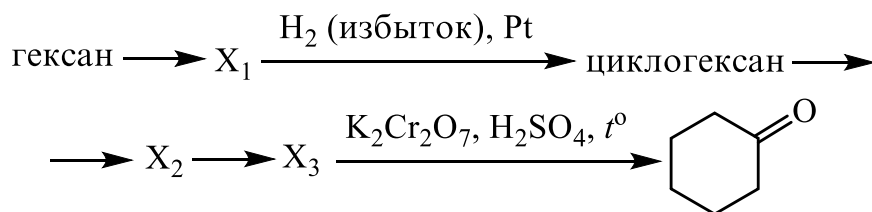
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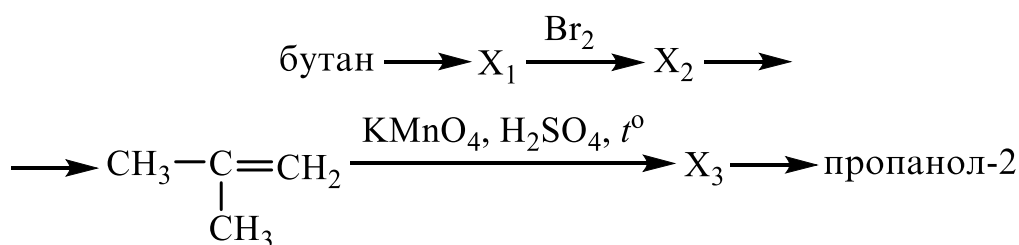
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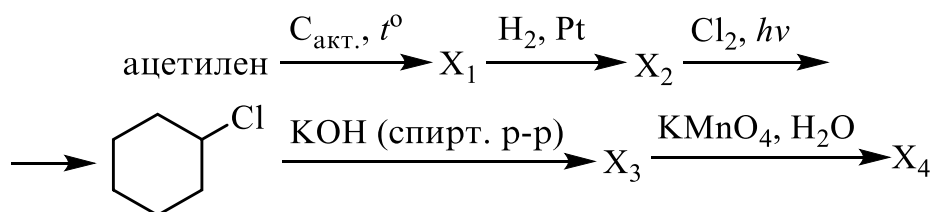
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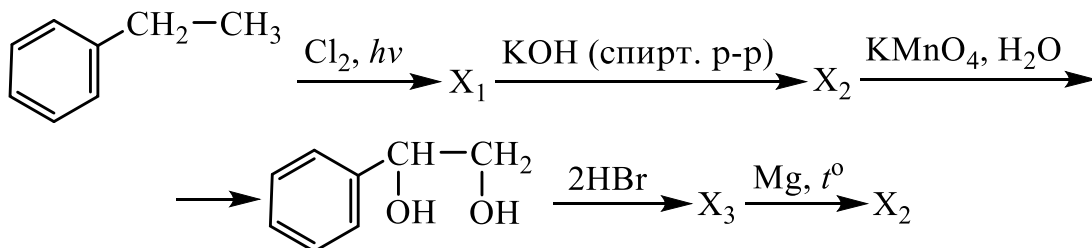
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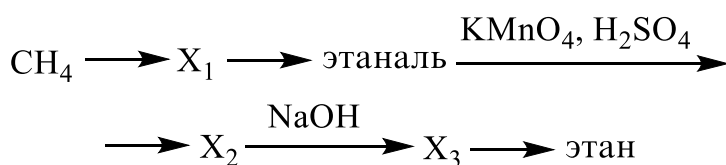
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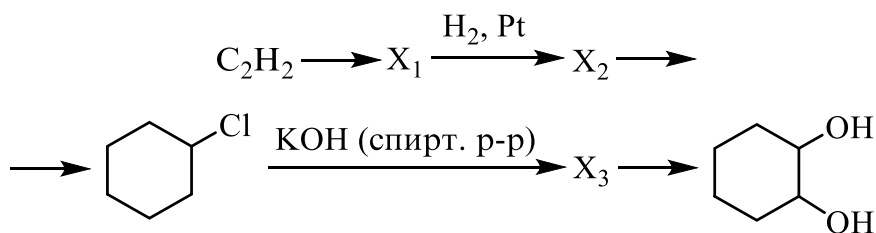
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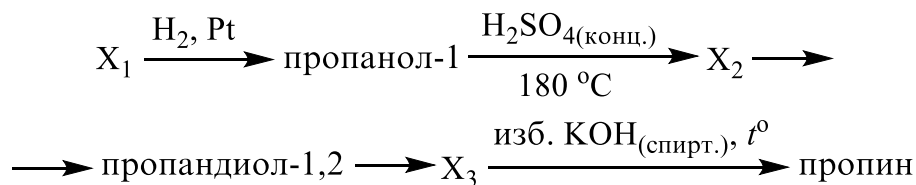
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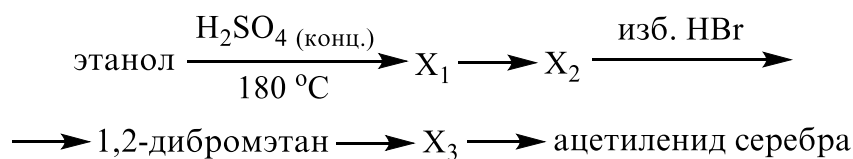
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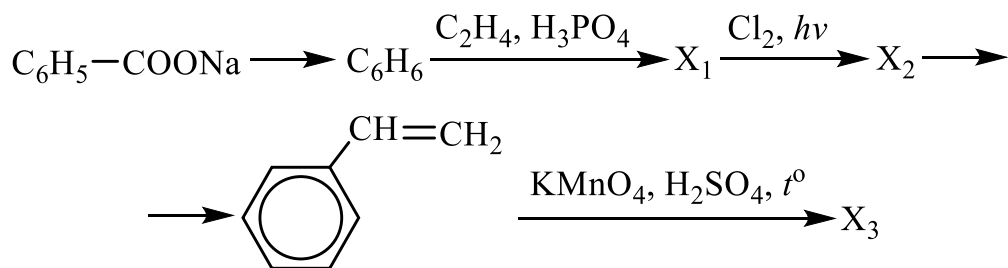
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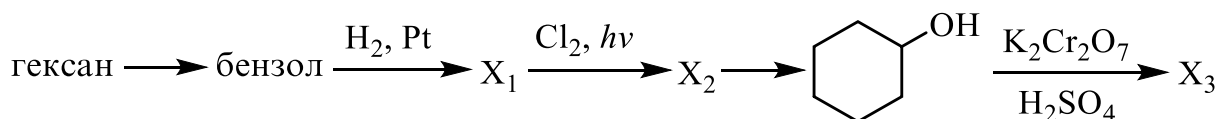
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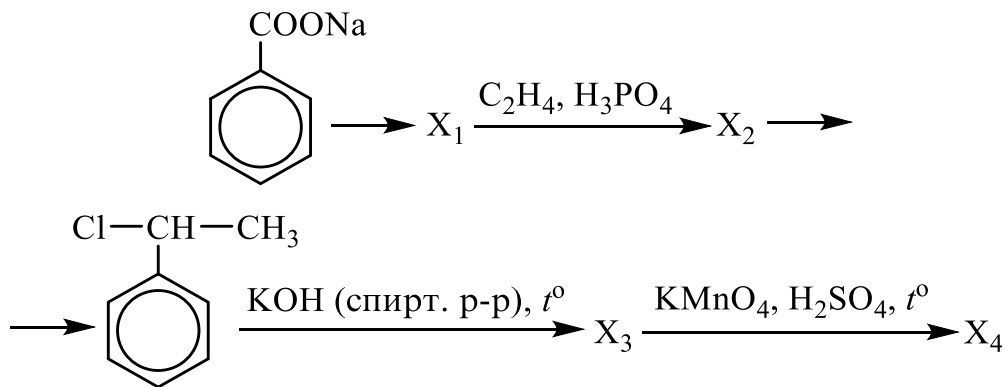
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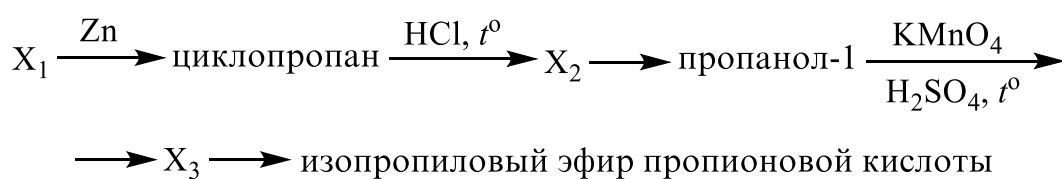
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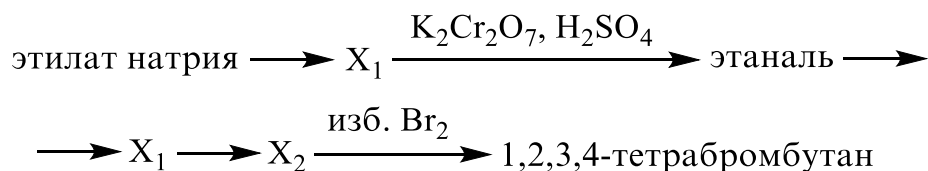
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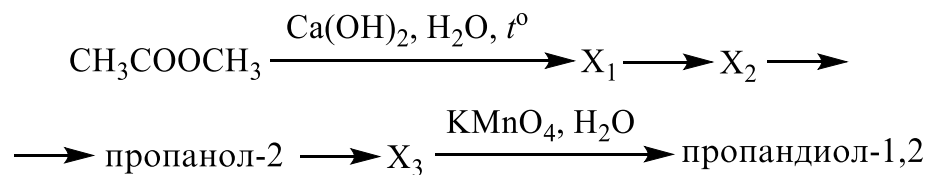
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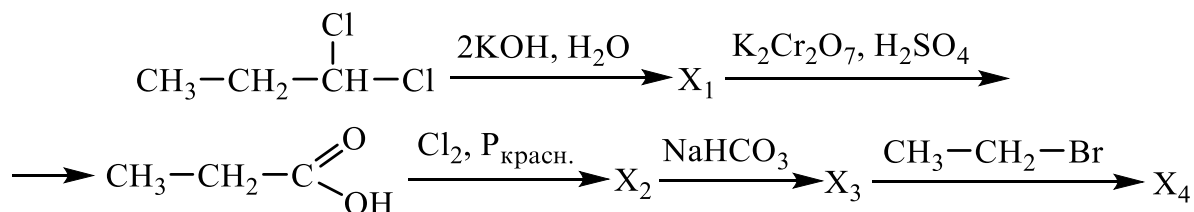
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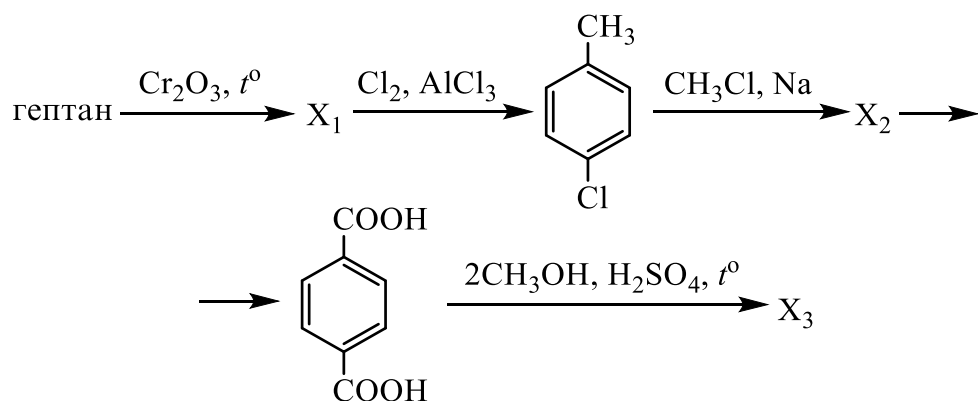
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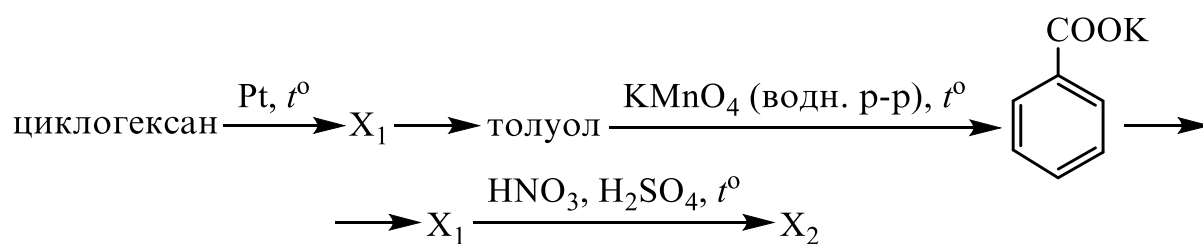
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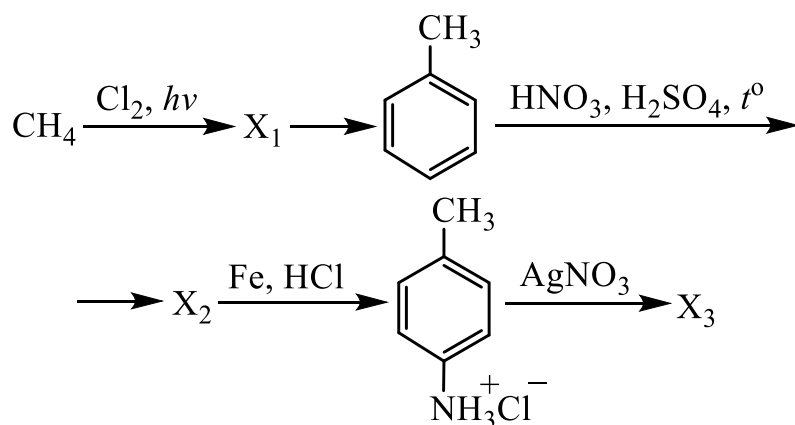
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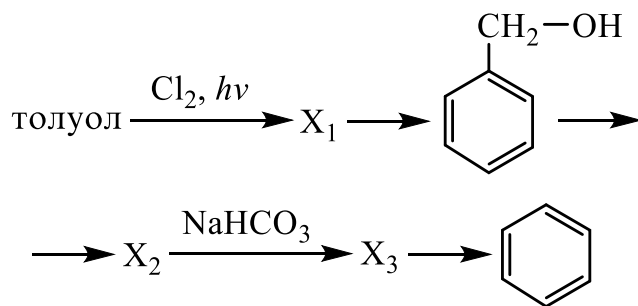
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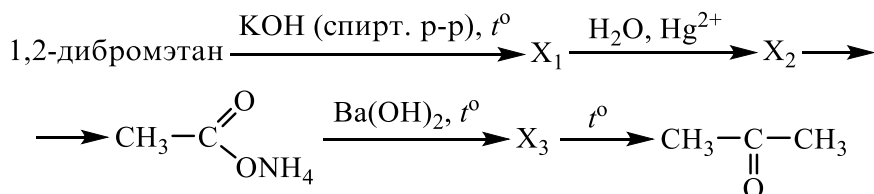
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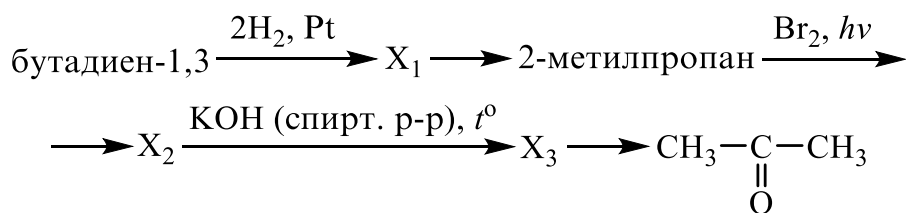
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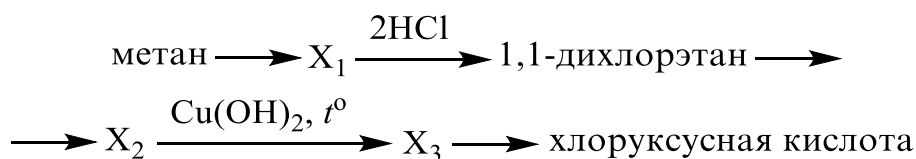
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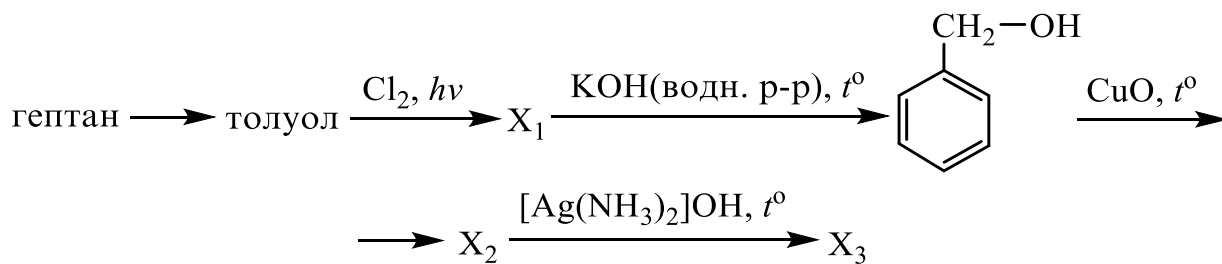


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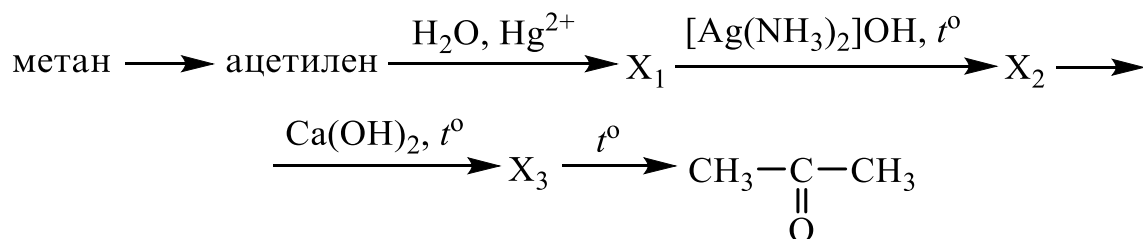


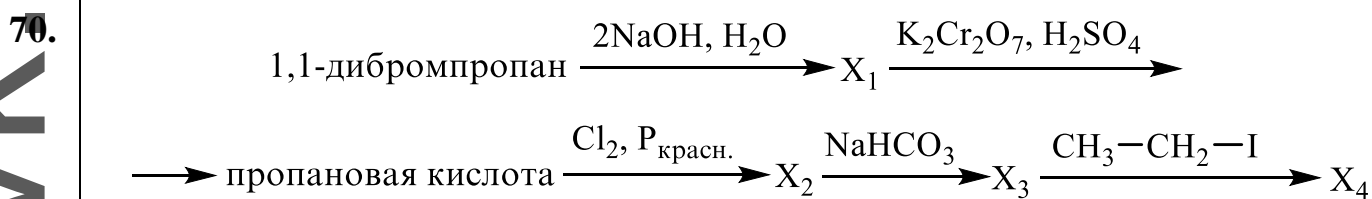
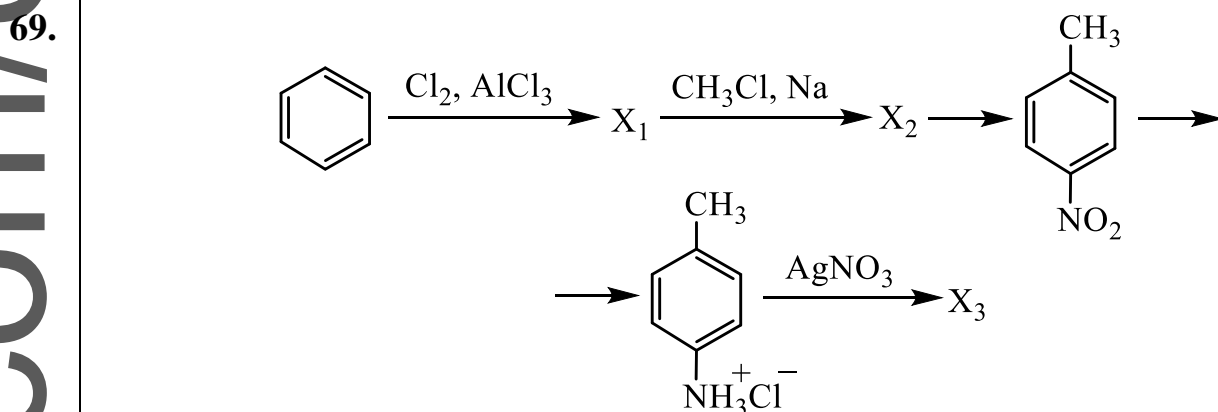
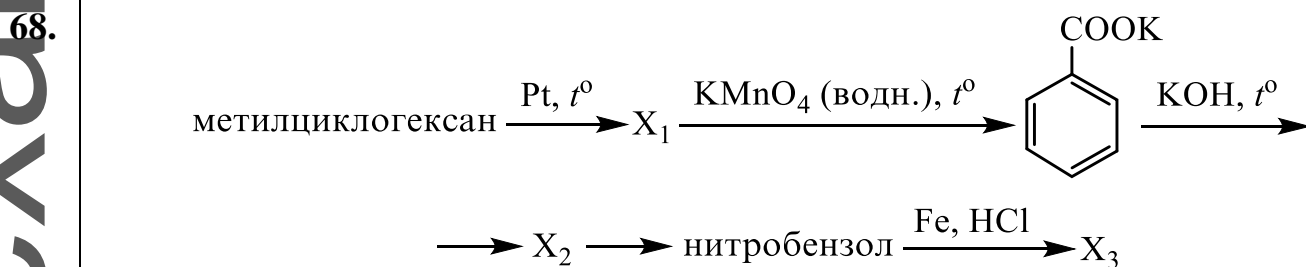
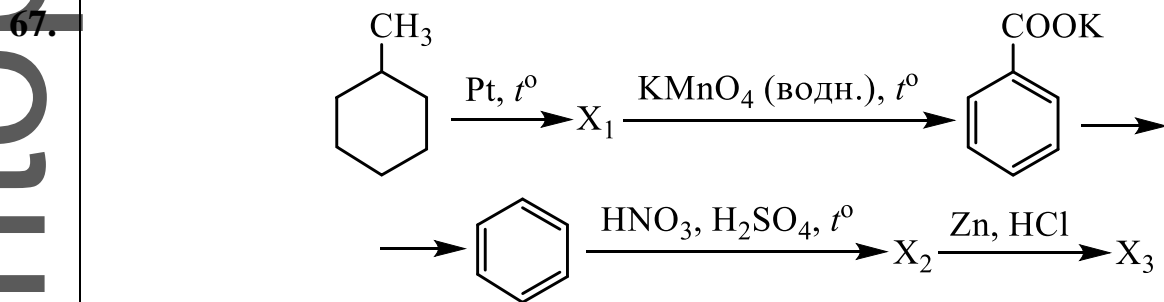
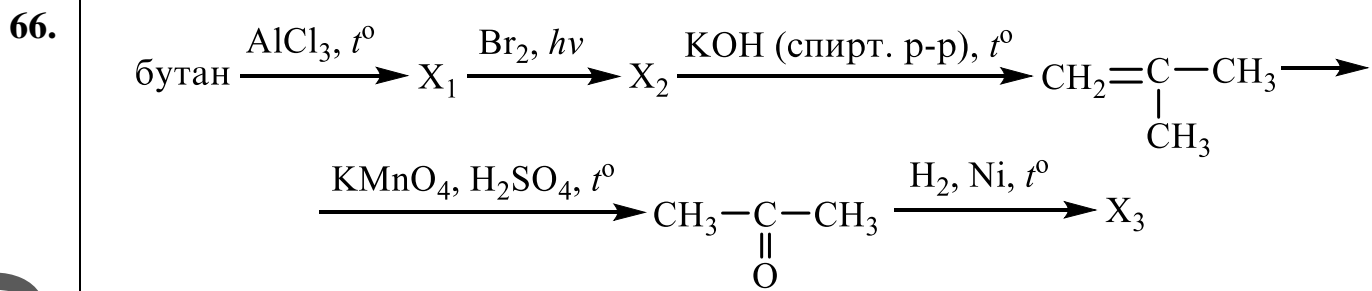
2019

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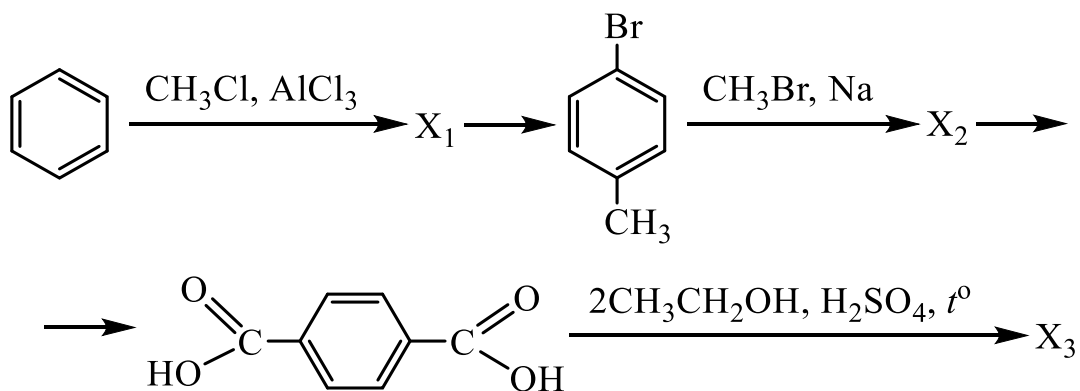


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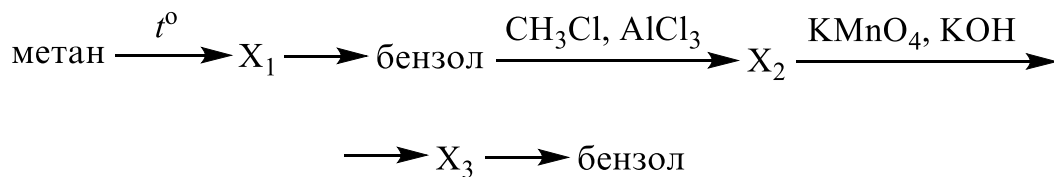




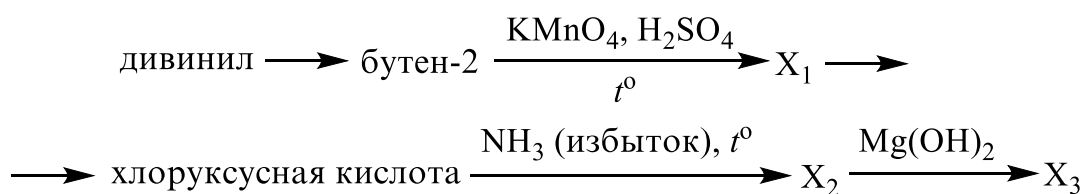
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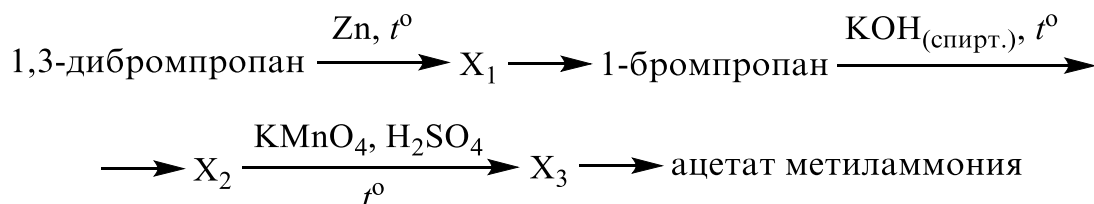
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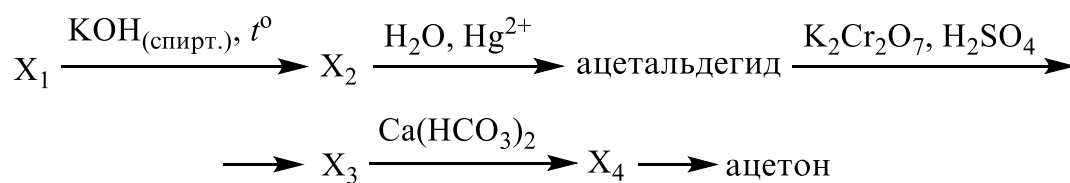
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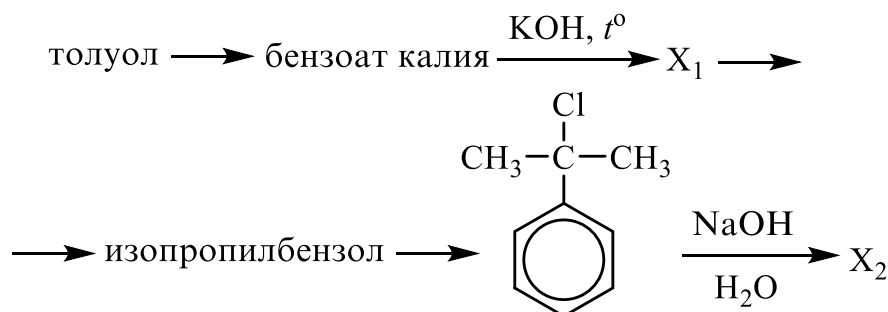
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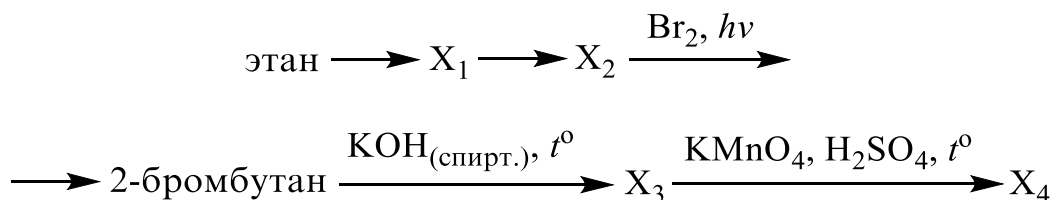
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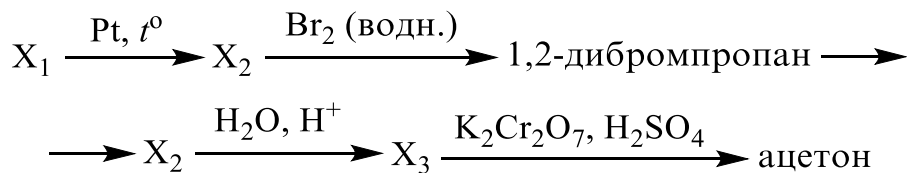
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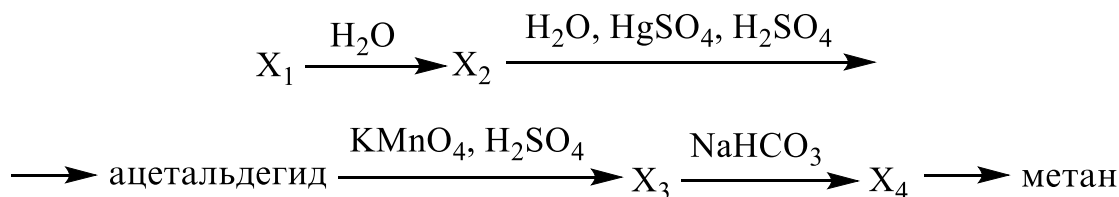
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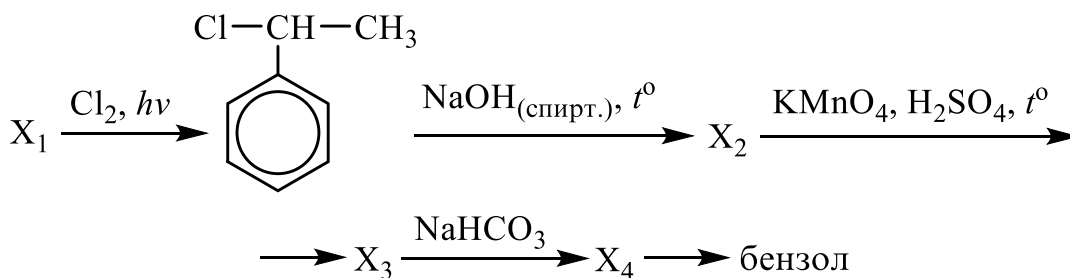
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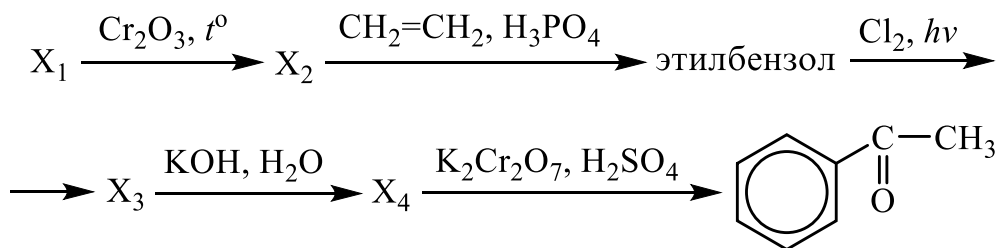
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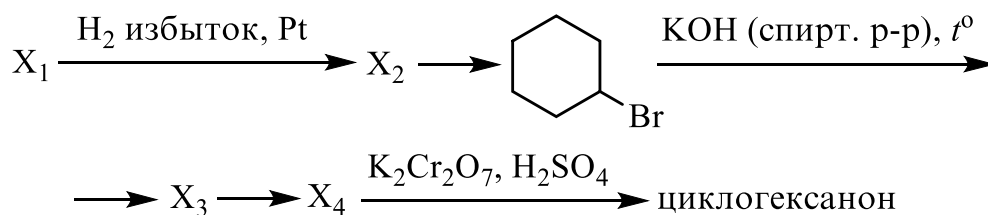
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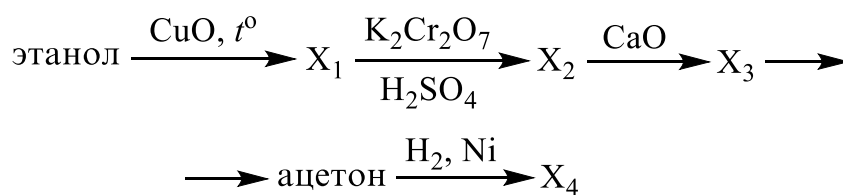
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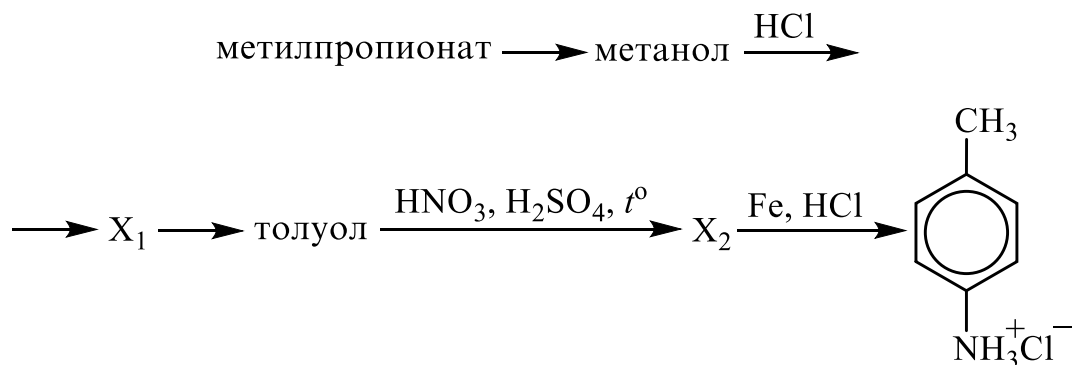
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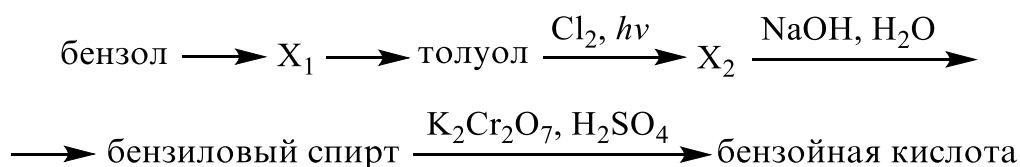
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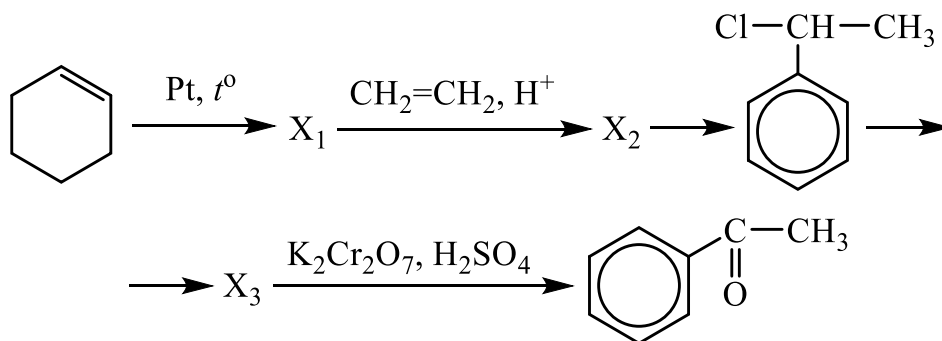
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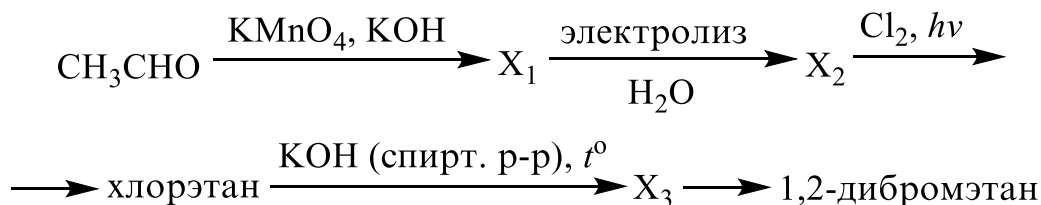
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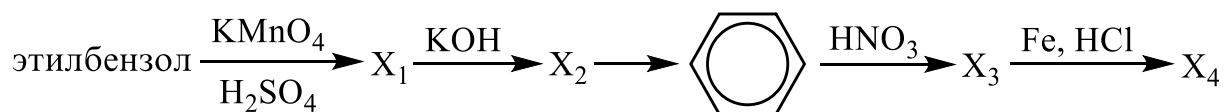
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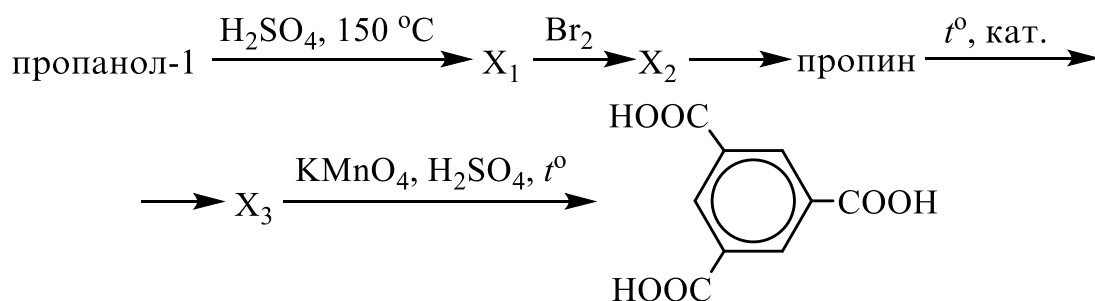
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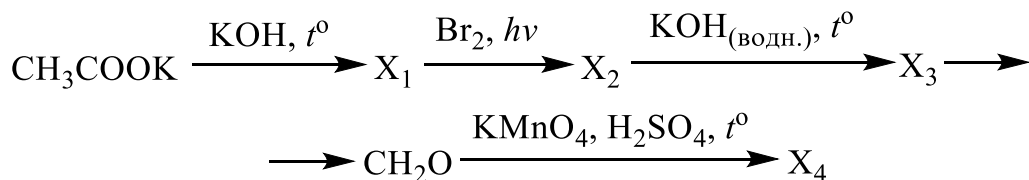
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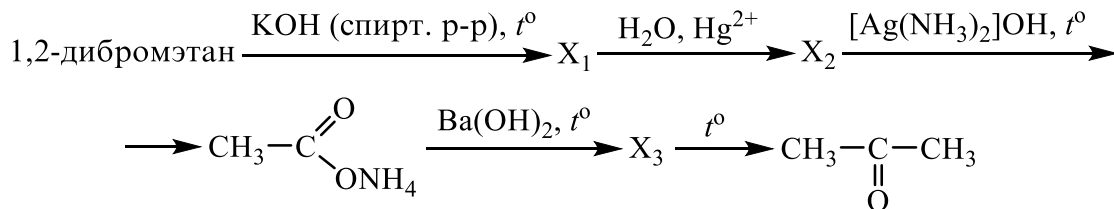
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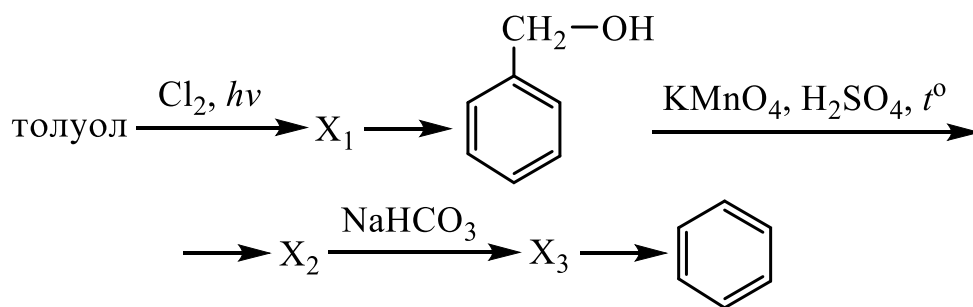
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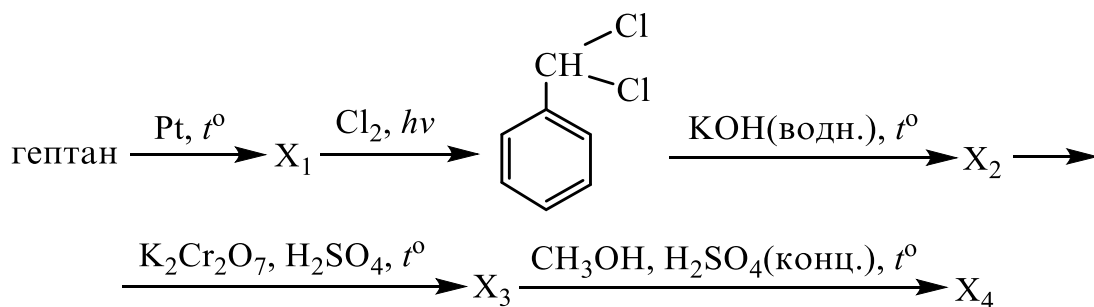
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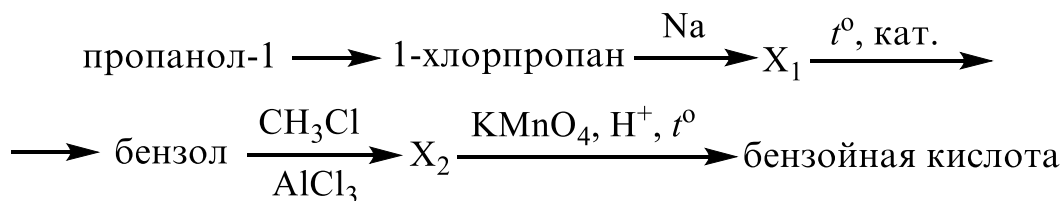
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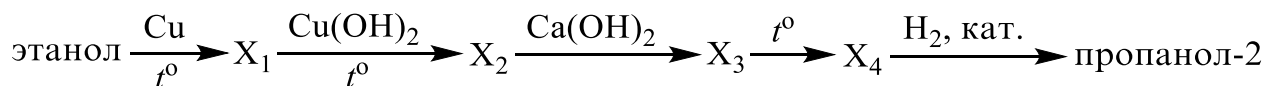


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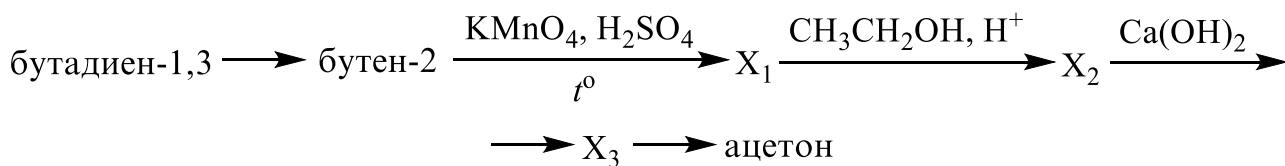


2018

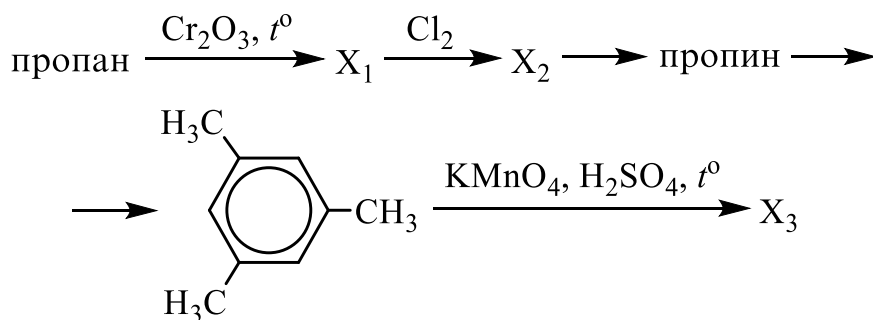
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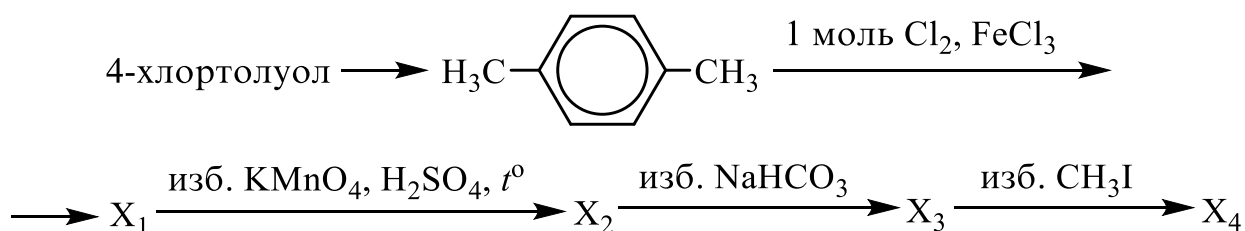
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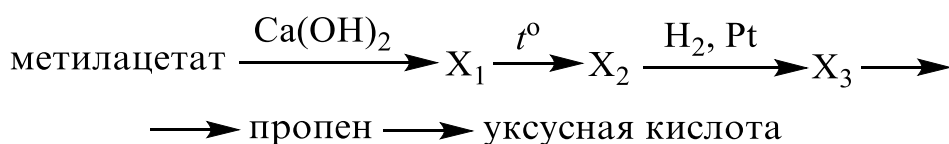
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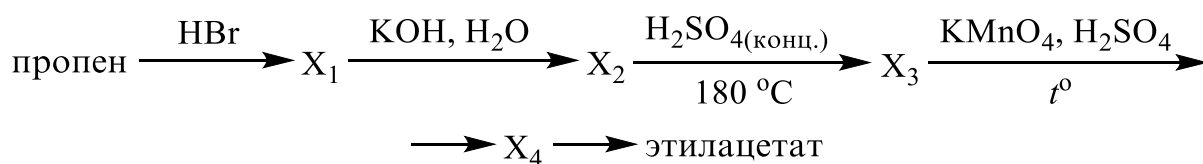
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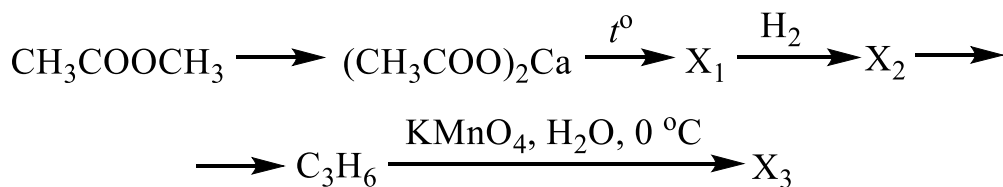
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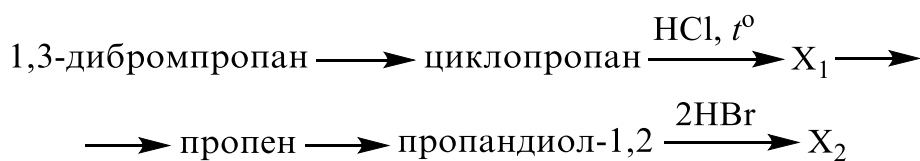
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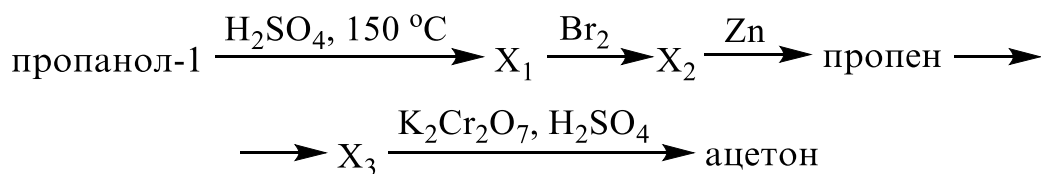
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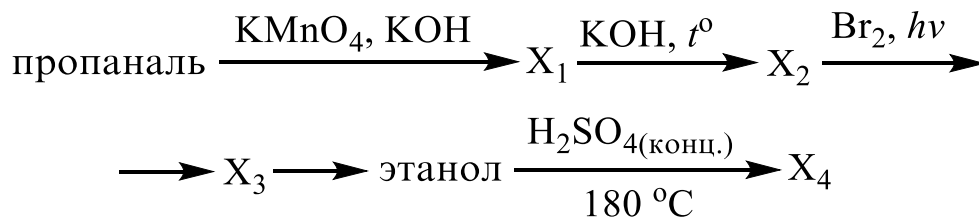
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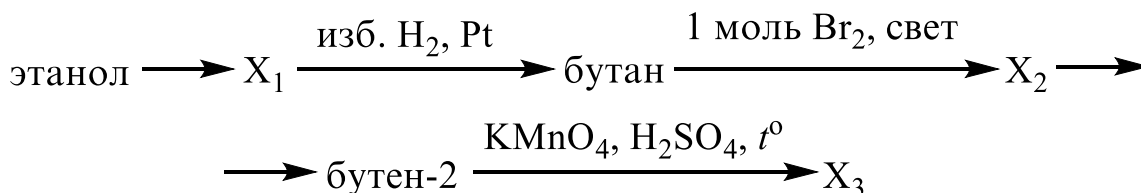
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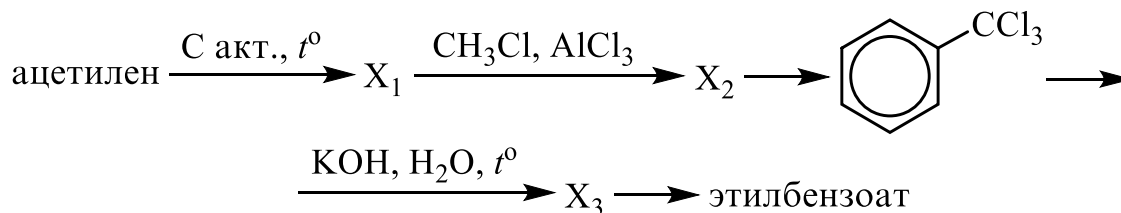
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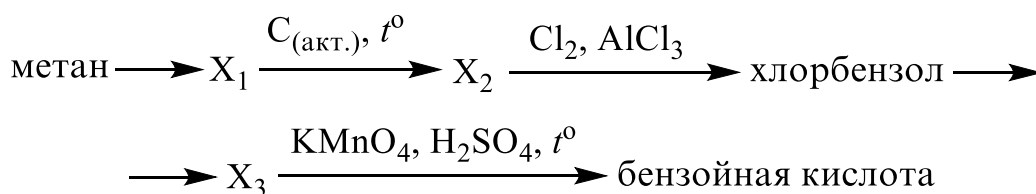
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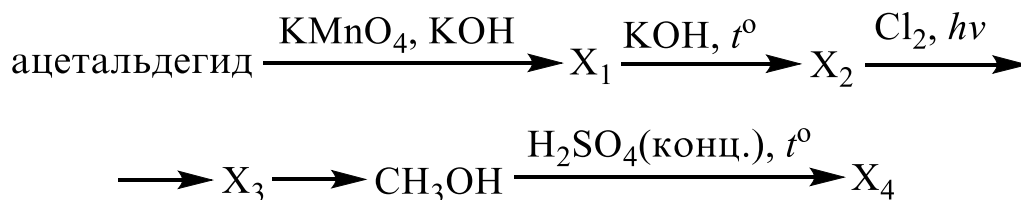
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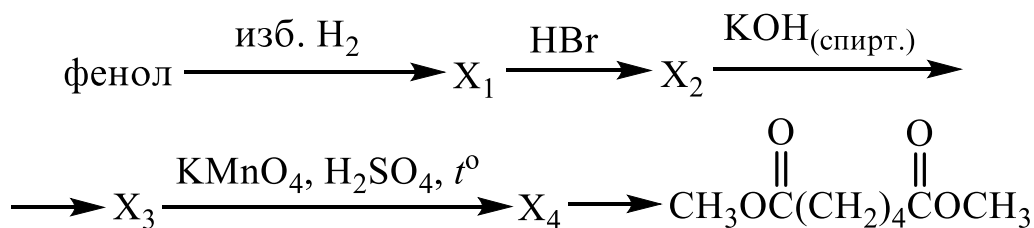
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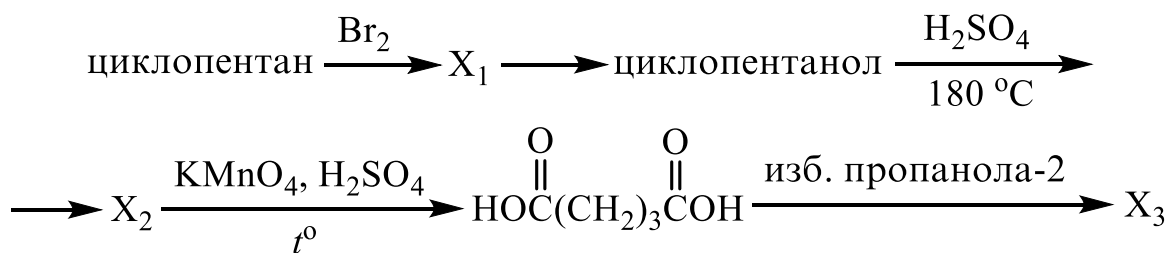
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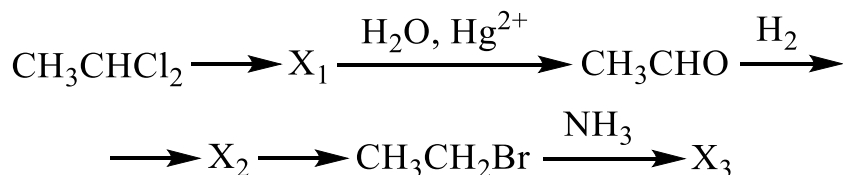


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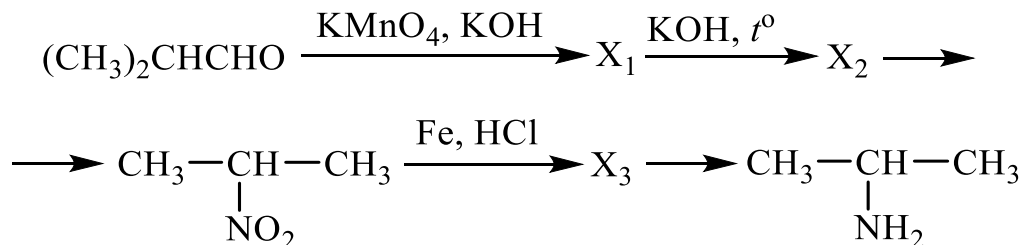


111.	$\begin{array}{l} \text{бутен-2} \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, 0^\circ\text{C}} \text{X}_1 \xrightarrow{2\text{HBr}} \text{X}_2 \xrightarrow[\text{спирт}]{2\text{KOH}} \text{X}_3 \longrightarrow \\ \longrightarrow \text{бутанон} \xrightarrow{\text{H}_2, \text{кат.}} \text{X}_4 \end{array}$
112.	$\begin{array}{l} \triangle \longrightarrow \text{C}_3\text{H}_7\text{Br} \xrightarrow{\text{KOH}_{(\text{спирт.})}, t^\circ} \text{X}_1 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \\ \longrightarrow \text{X}_2 \longrightarrow \text{ацетат бария} \xrightarrow{t^\circ} \text{X}_3 \end{array}$
113.	$\begin{array}{l} \text{C}_6\text{H}_6 \xrightarrow{\text{C}_2\text{H}_4} \text{X}_1 \xrightarrow{\text{Cl}_2, h\nu} \text{X}_2 \longrightarrow \text{стирол} \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \\ \longrightarrow \text{X}_3 \xrightarrow{\text{CH}_3\text{OH}, \text{H}^+, t^\circ} \text{X}_4 \end{array}$
114.	$\begin{array}{l} \text{X}_1 \xrightarrow{\text{C}_{(\text{акт.})}} \text{C}_6\text{H}_6 \xrightarrow{\text{CH}_3\text{Cl}, \text{AlCl}_3} \text{X}_2 \xrightarrow{\text{HNO}_3, \text{H}_2\text{SO}_4} \\ \longrightarrow \text{X}_3 \xrightarrow{2\text{Cl}_2, h\nu} \text{X}_4 \longrightarrow \textit{n}\text{-нитробензальдегид} \end{array}$
115.	$\begin{array}{l} \text{CH}_4 \xrightarrow{t^\circ} \text{X}_1 \xrightarrow{\text{C}_{(\text{акт.})}, t^\circ} \text{X}_2 \longrightarrow \text{толуол} \xrightarrow{\text{Cl}_2, h\nu} \text{X}_3 \xrightarrow{\text{Na}} \text{X}_4 \end{array}$
116.	$\begin{array}{l} \text{C}_2\text{H}_2 \xrightarrow{\text{C}_{(\text{акт.})}, t^\circ} \text{X}_1 \xrightarrow{\text{изб. H}_2, \text{кат.}} \text{X}_2 \xrightarrow{\text{Br}_2, h\nu} \text{X}_3 \longrightarrow \\ \longrightarrow \text{циклогексен} \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, 0^\circ\text{C}} \text{X}_4 \end{array}$
117.	$\begin{array}{l} \text{пропаналь} \xrightarrow{\text{H}_2, \text{кат.}} \text{X}_1 \xrightarrow{\text{HBr}} \text{X}_2 \longrightarrow \text{пропен} \xrightarrow{\text{C}_6\text{H}_6, \text{кат.}} \\ \longrightarrow \text{X}_3 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \text{X}_4 \end{array}$
118.	$\begin{array}{l} \text{бутен-2} \xrightarrow{\text{KMnO}_4 (\text{H}^+), t^\circ} \text{X}_1 \longrightarrow \text{ацетат кальция} \xrightarrow{t^\circ} \\ \longrightarrow \text{X}_2 \xrightarrow{\text{H}_2, \text{кат.}} \text{X}_3 \longrightarrow \text{C}_3\text{H}_6 \end{array}$

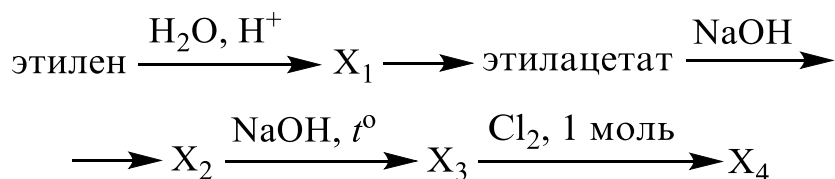
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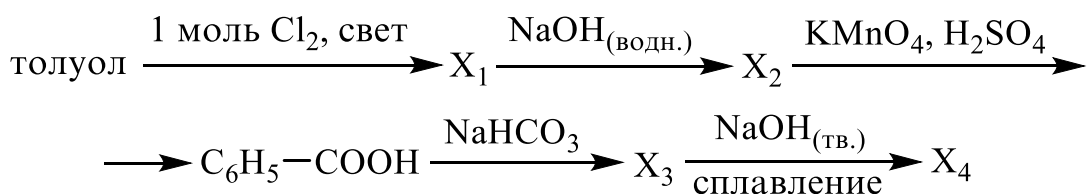
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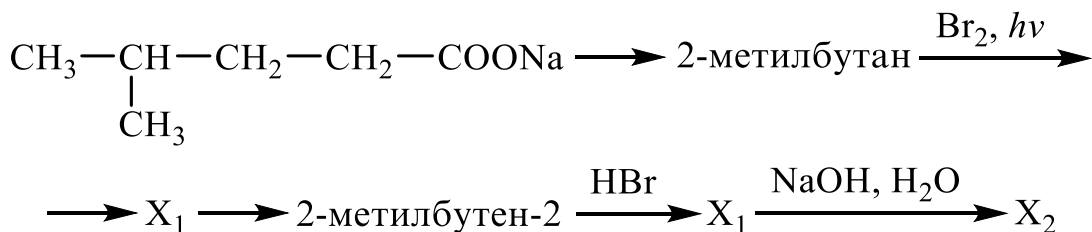
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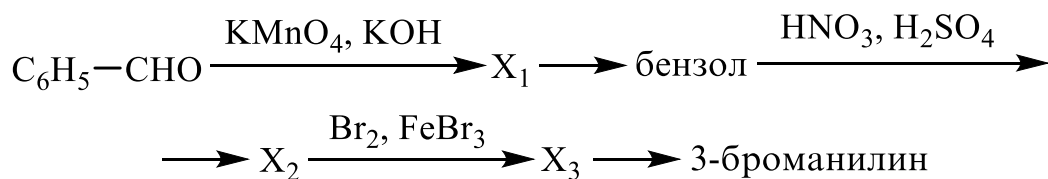
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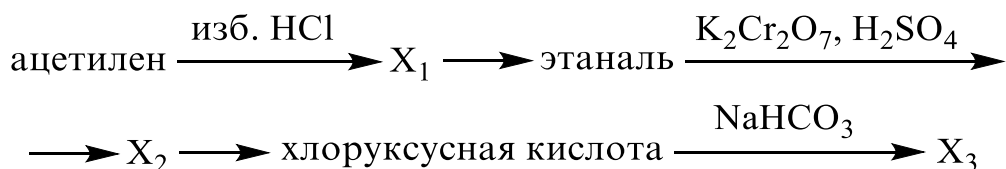
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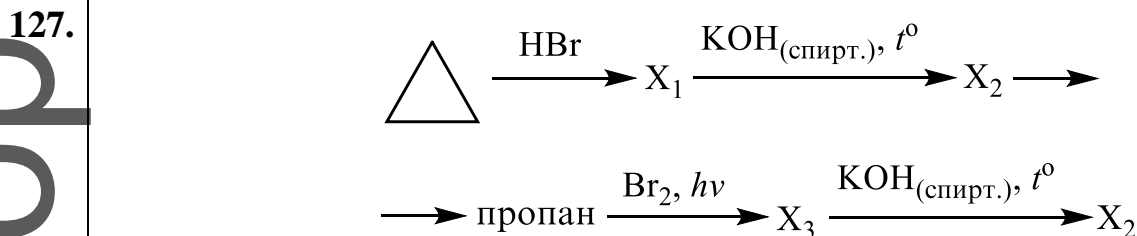
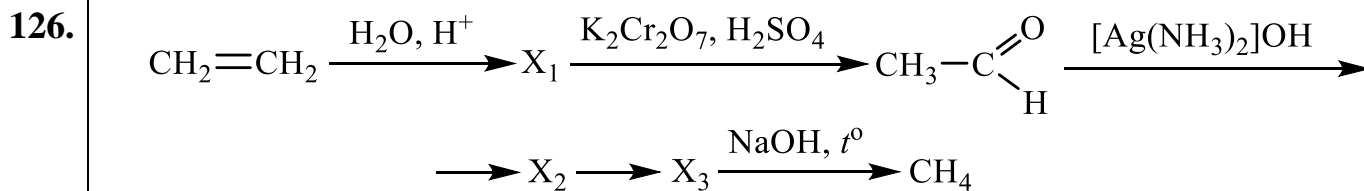


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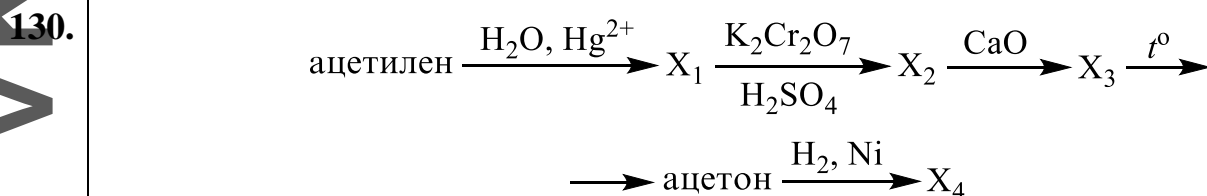
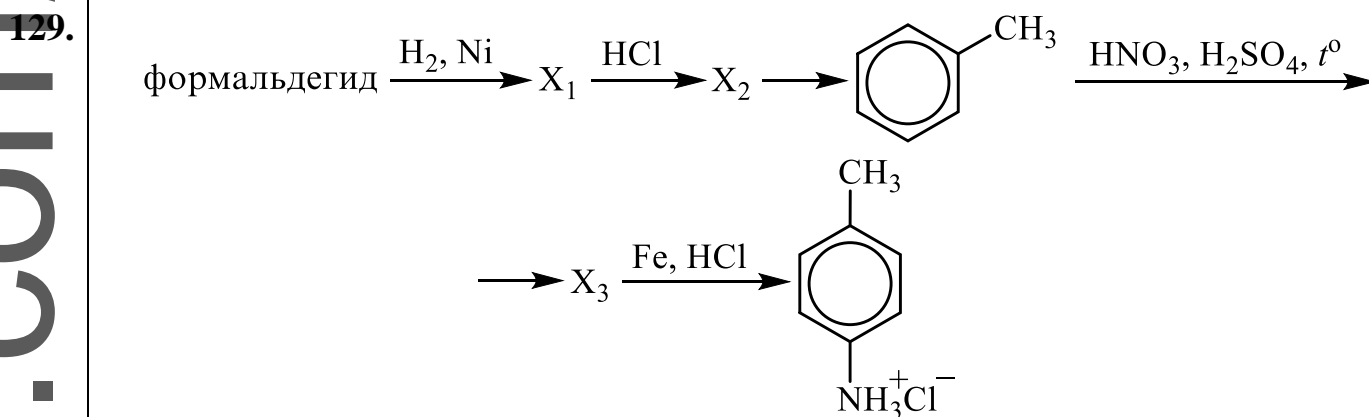
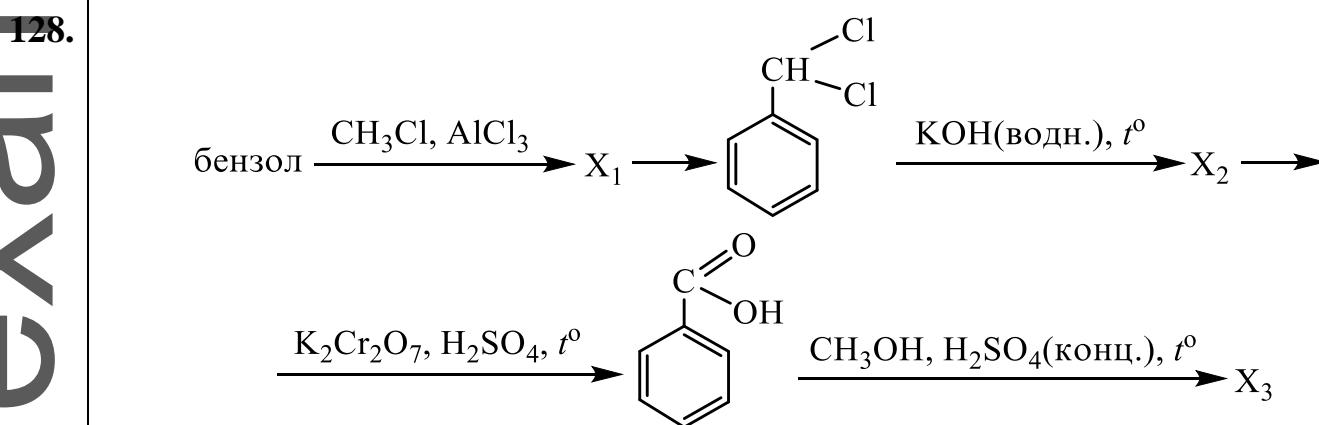


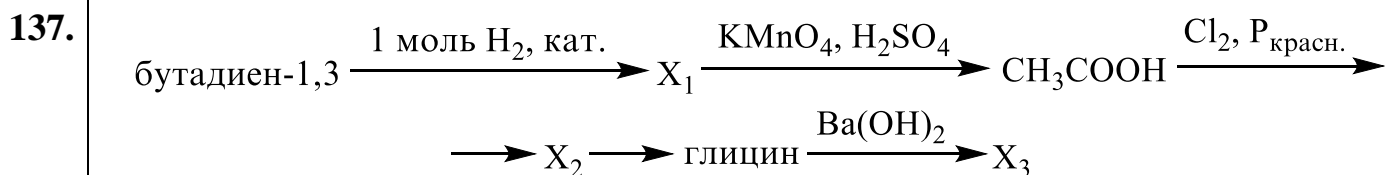
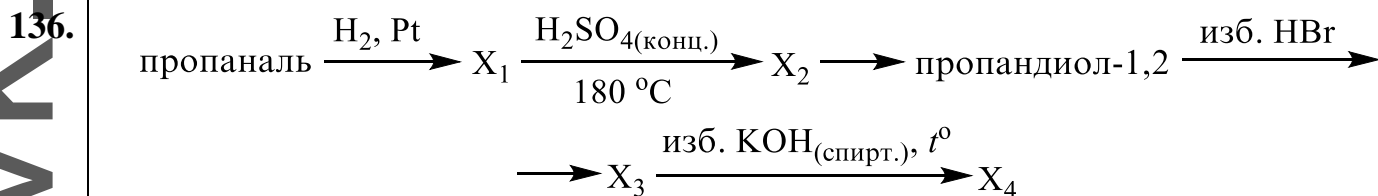
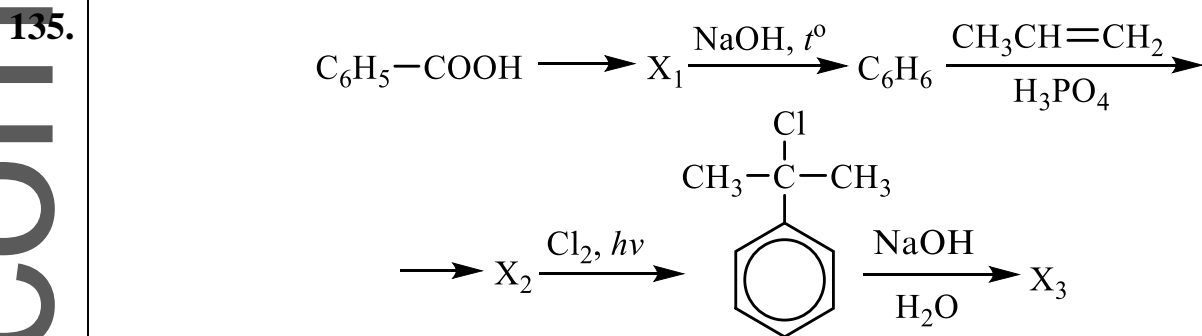
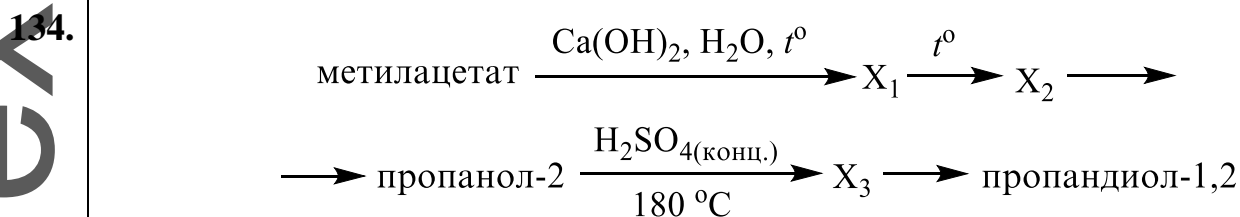
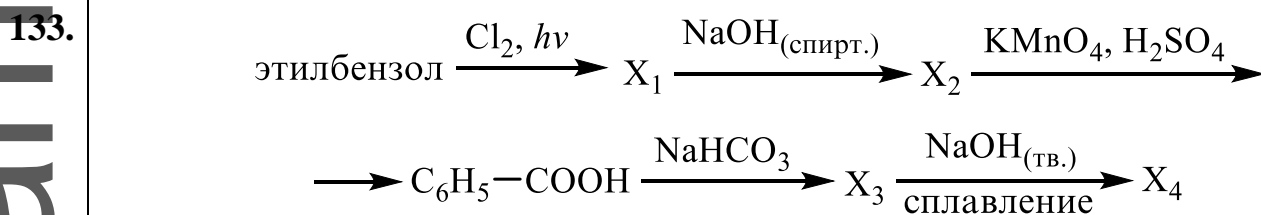
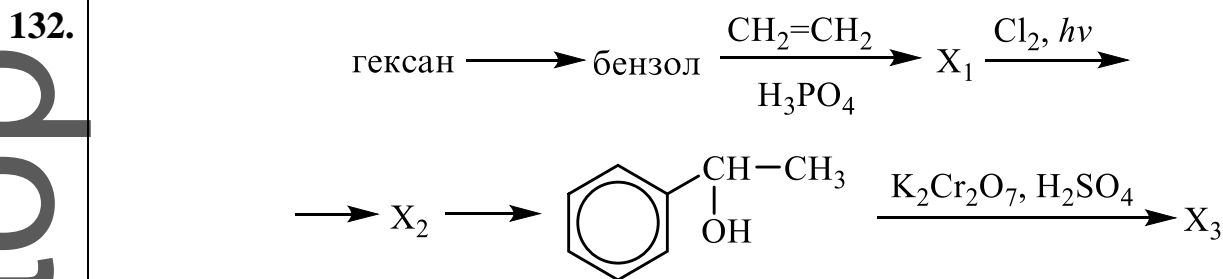
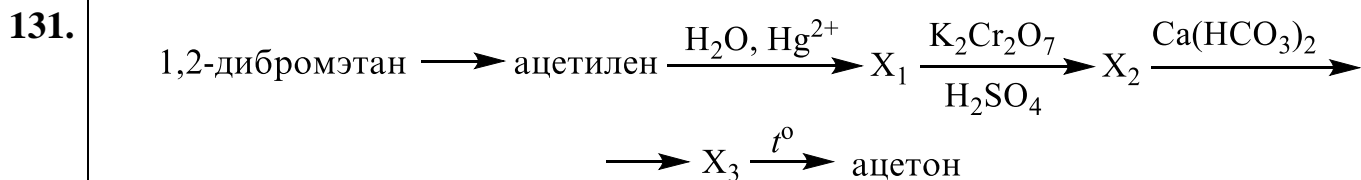
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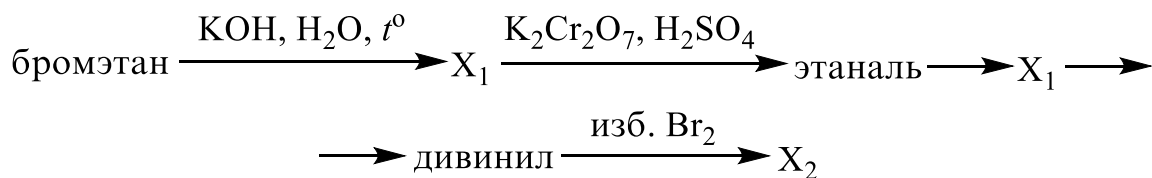


2017

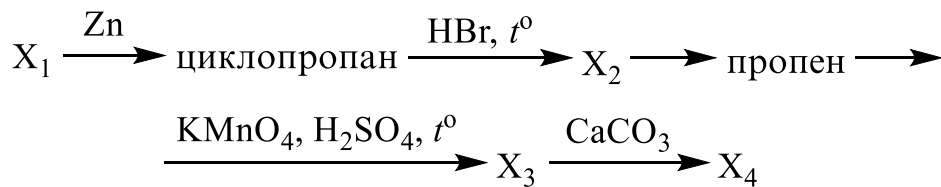




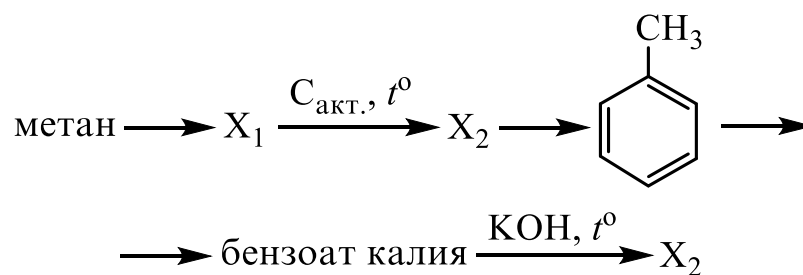
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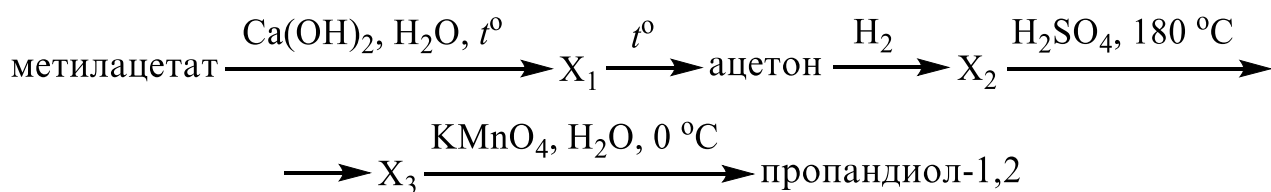
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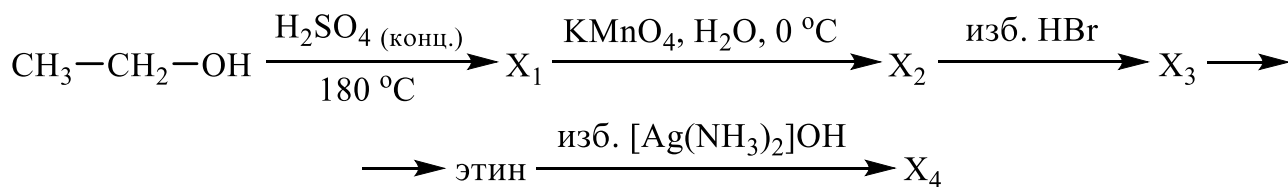
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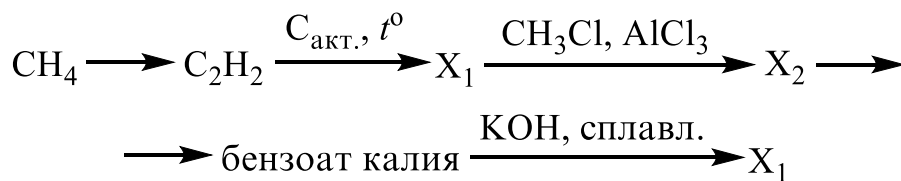
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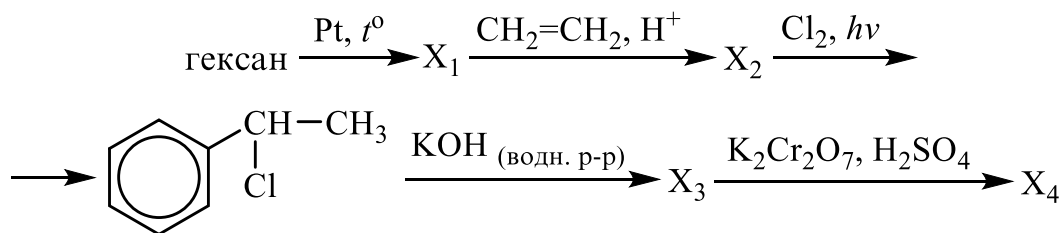
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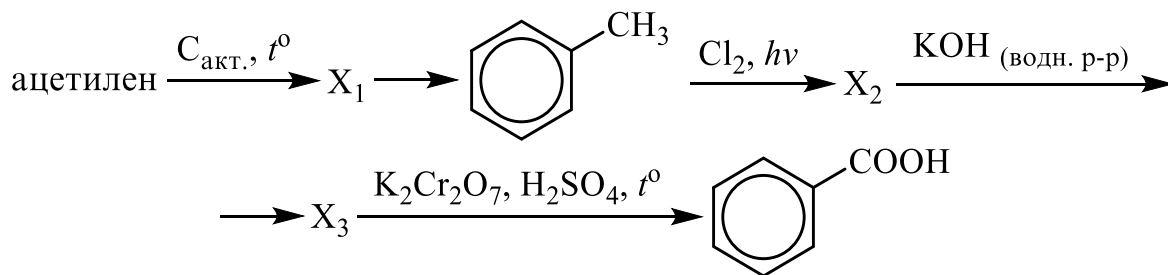
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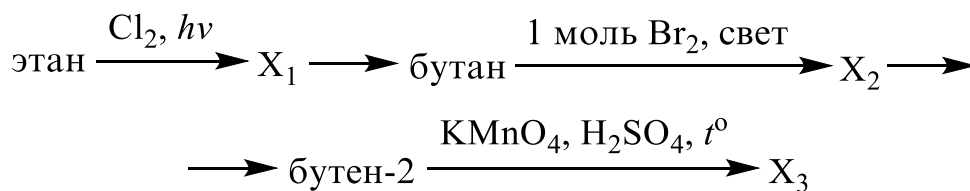
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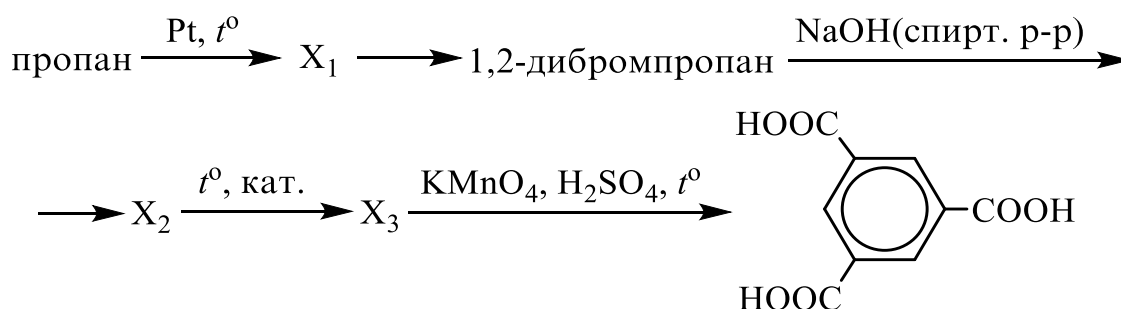
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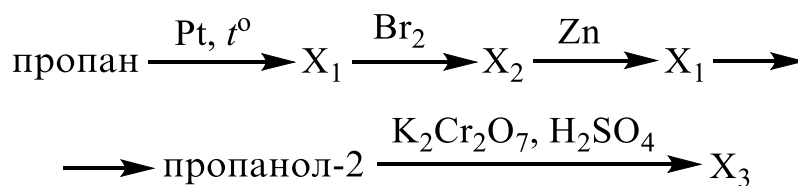
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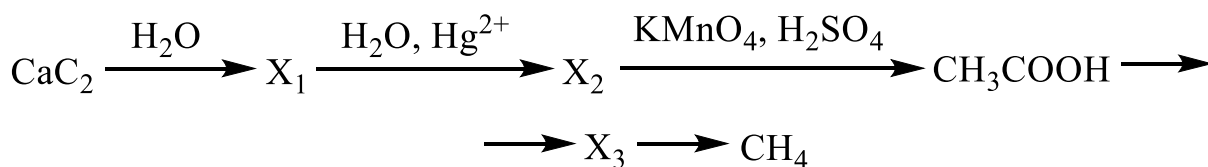
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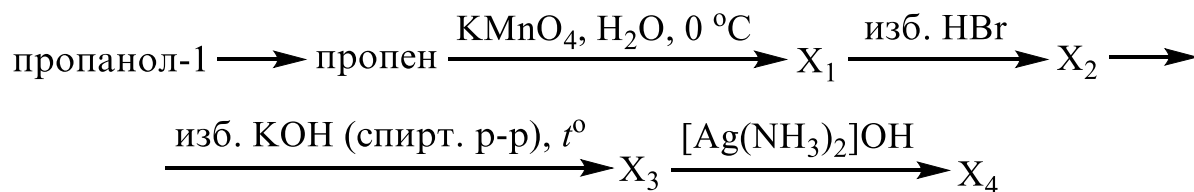
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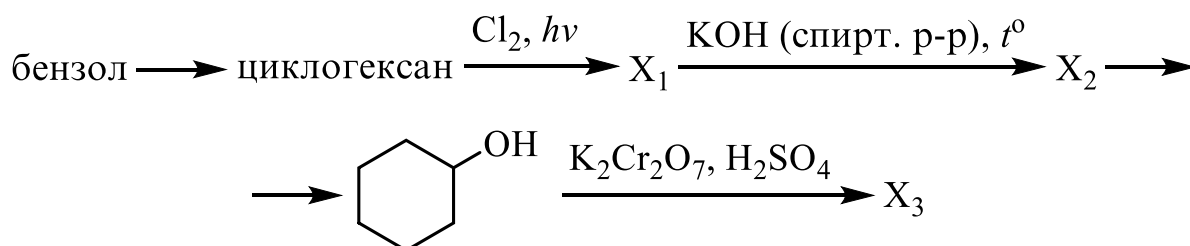
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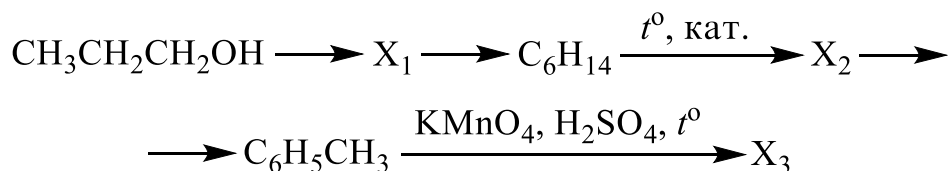
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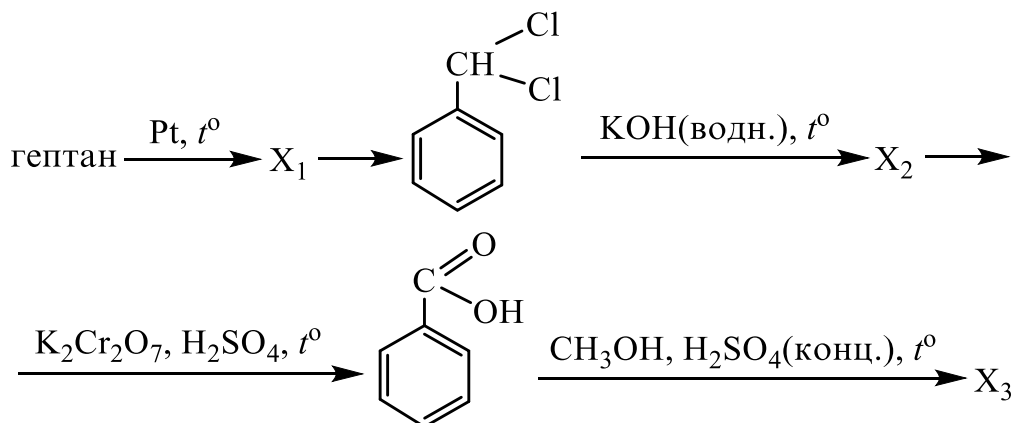
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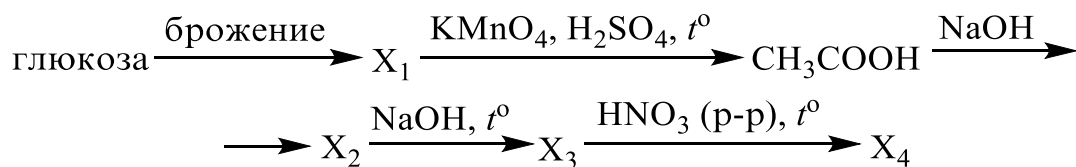


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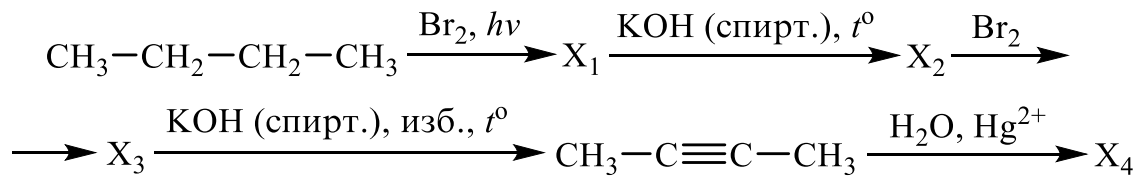


2016

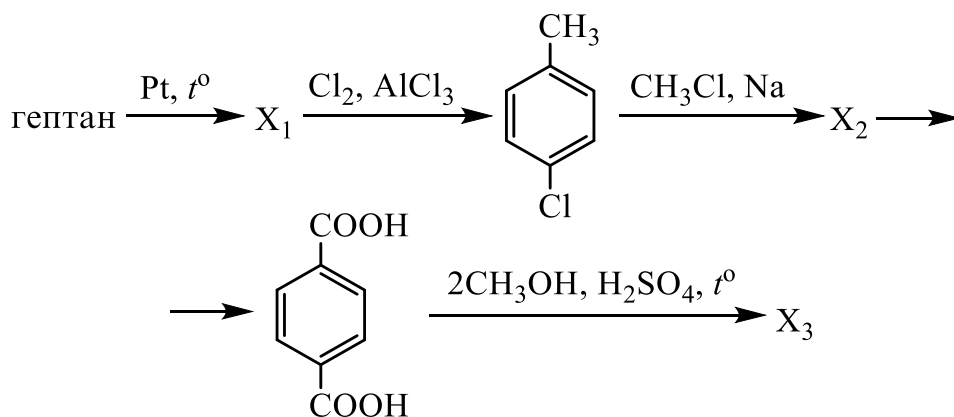
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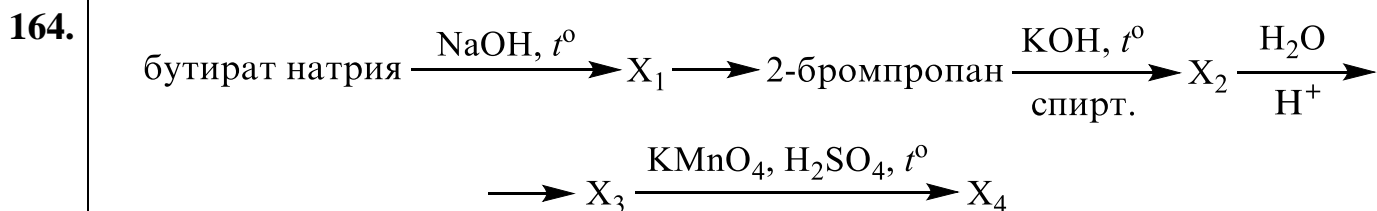
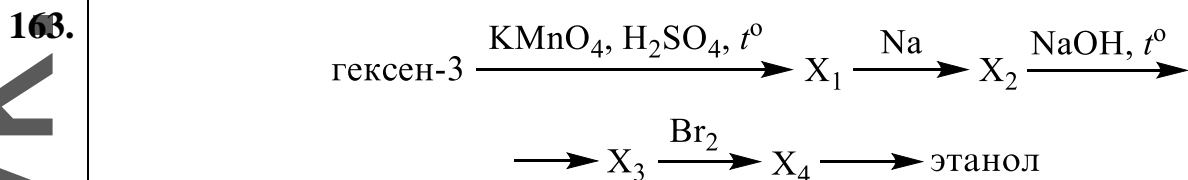
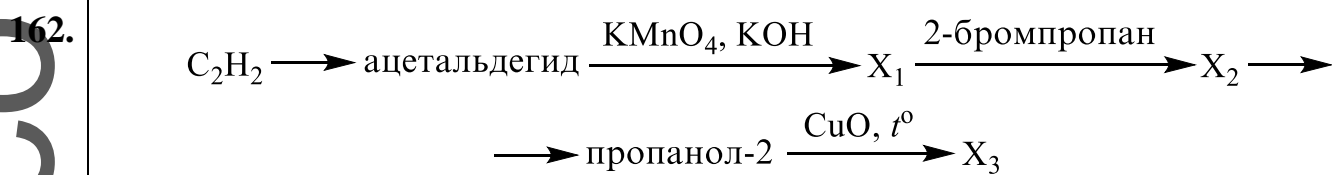
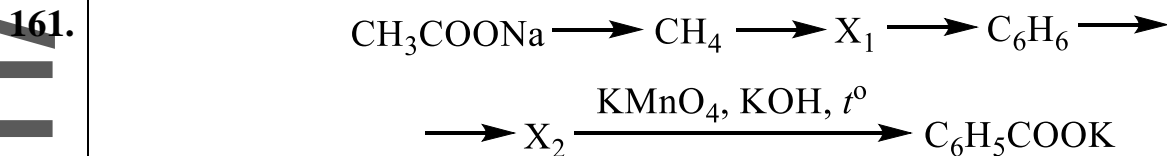
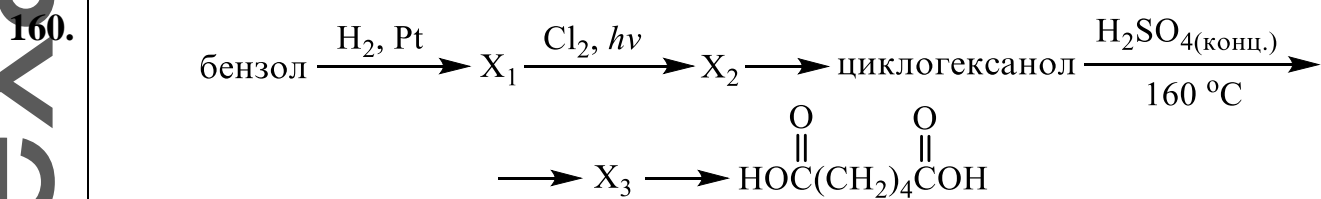
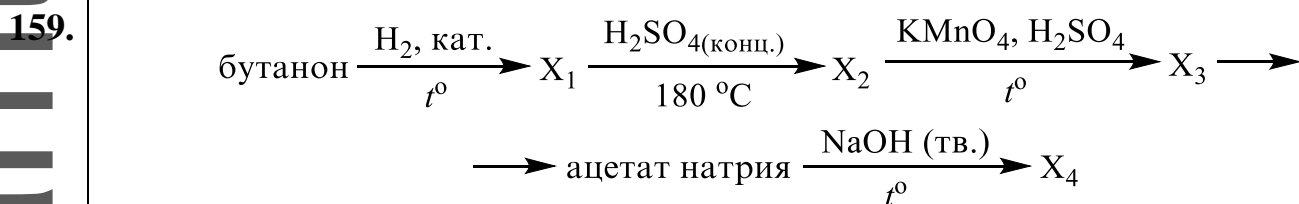
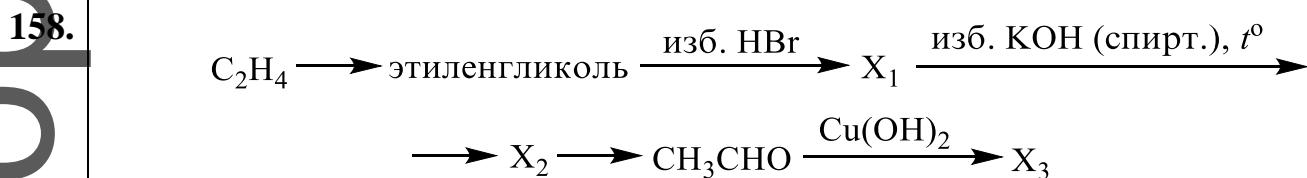
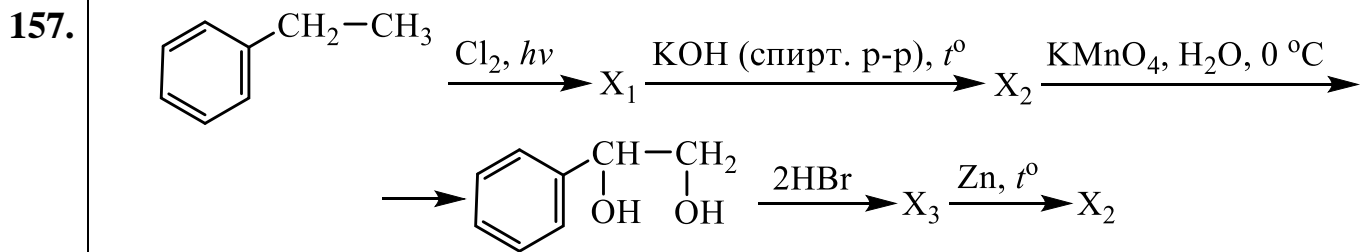


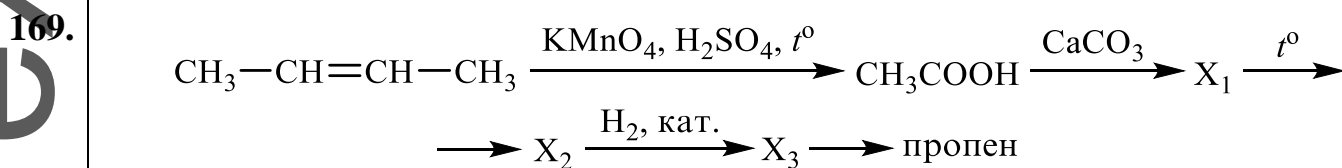
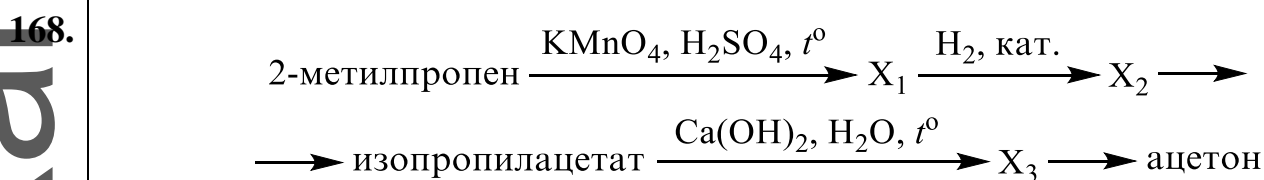
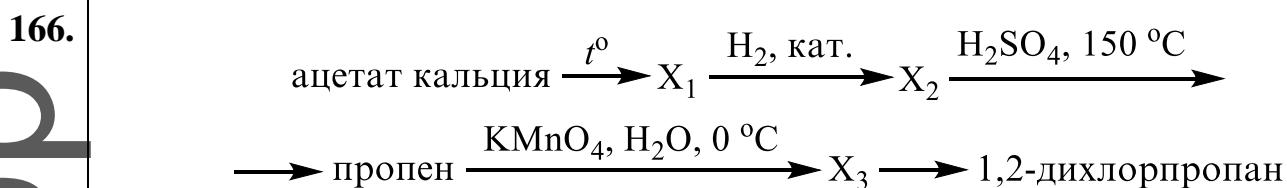
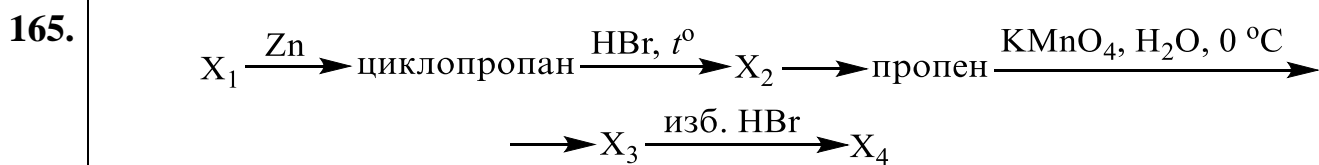
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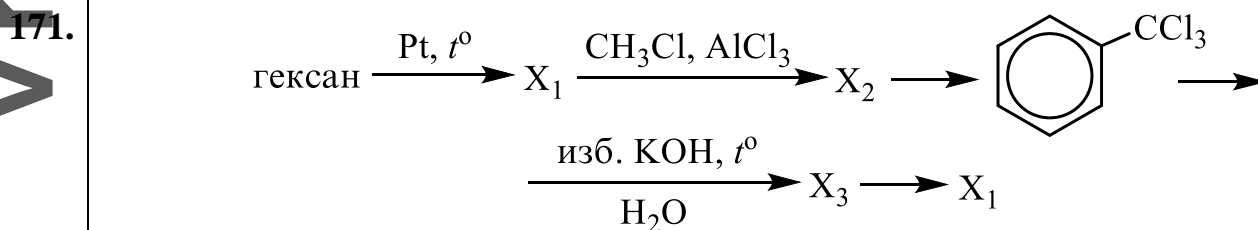
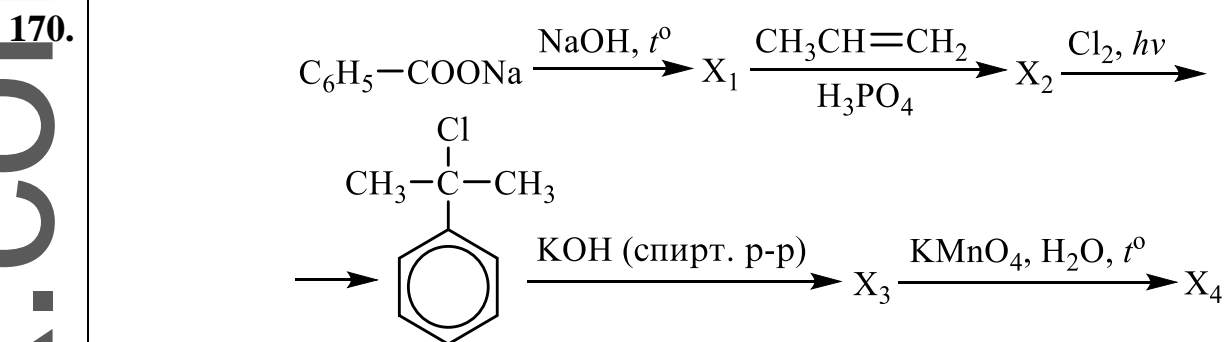
156.







2015

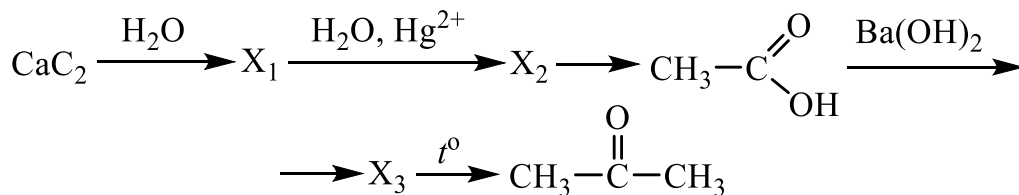


Задание 32 ЕГЭ по химии (vk.com/examtop)

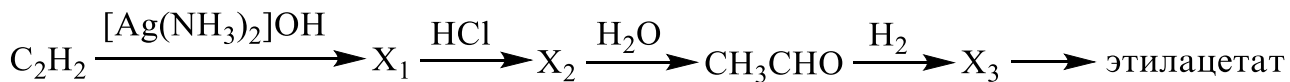
172.	$X_1 \xrightarrow{\text{Br}_2, \text{свет}} 2\text{-бромпропан} \xrightarrow{\text{Br}_2, \text{свет}} 2,3\text{-диметилбутан} \xrightarrow{\text{Br}_2, \text{свет}}$ $\xrightarrow{X_2} \xrightarrow{\text{KOH (спирт.)}} X_3 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, 0^\circ\text{C}} X_4$
173.	$\text{CH}_2\text{BrCH}_2\text{CH}_2\text{Br} \xrightarrow{\text{Zn}} X_1 \xrightarrow{\text{HCl}, t^\circ} X_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, 0^\circ\text{C}}$ $\xrightarrow{X_3} \xrightarrow{1,2\text{-дибромпропан}}$
174.	$\text{ацетат натрия} \xrightarrow{\text{метан}} \xrightarrow{1 \text{ моль Cl}_2, \text{свет}} X_1 \xrightarrow{\text{NaOH}_{(\text{водн.})}, t^\circ} X_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4} X_3$ $\xrightarrow{\text{метаналь}}$
175.	$\text{пропанол-1} \xrightarrow{\text{HBr}, t^\circ} X_1 \xrightarrow{\text{пропен}} \xrightarrow{\text{H}_2\text{O}, \text{H}^+} X_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, t^\circ} \text{ацетон} \xrightarrow{X_2}$
176.	$\text{бромэтан} \xrightarrow{\text{NaOH}, \text{H}_2\text{O}} X_1 \xrightarrow{\text{CH}_3\text{COOH}} \xrightarrow{\text{NaOH}} X_2 \xrightarrow{\text{NaOH}, t^\circ}$ $\xrightarrow{X_3} \xrightarrow{1500^\circ\text{C}} X_4$
177.	$\text{CH}_4 \xrightarrow{\text{C}_2\text{H}_2} \xrightarrow{\text{H}_2\text{O}, \text{Hg}^{2+}} X_1 \xrightarrow{\text{Cu(OH)}_2, t^\circ} X_2 \xrightarrow{\text{NaOH}} X_3 \xrightarrow{\text{CH}_4}$
178.	$\text{CH}_3\text{COOH} \xrightarrow{\text{CaCO}_3} X_1 \xrightarrow{t^\circ} X_2 \xrightarrow{\text{CH}_3\text{CH}(\text{OH})\text{CH}_3} \xrightarrow{\text{HCl}}$ $\xrightarrow{X_3} \xrightarrow{2,3\text{-диметилбутан}}$
179.	$\text{этилацетат} \xrightarrow{\text{Ca(OH)}_2, \text{H}_2\text{O}, t^\circ} X_1 \xrightarrow{t^\circ} \text{ацетон} \xrightarrow{\text{H}_2} X_2 \xrightarrow{\text{H}_2\text{SO}_4, 180^\circ\text{C}}$ $\xrightarrow{X_3} \xrightarrow{\text{KMnO}_4, \text{H}_2\text{O}, 0^\circ\text{C}} \text{пропандиол-1,2}$

Задание 32 ЕГЭ по химии (vk.com/examtop)

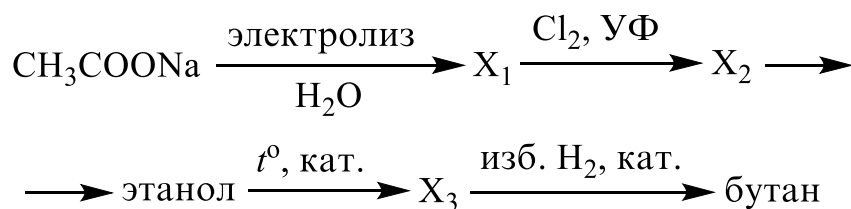
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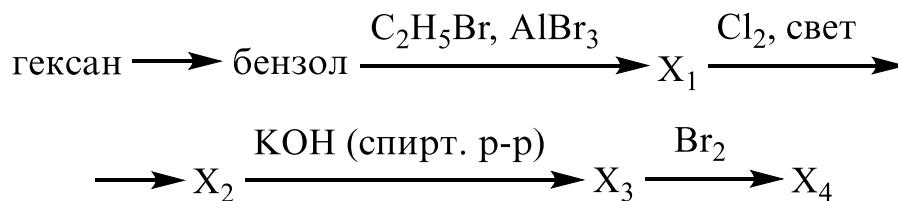
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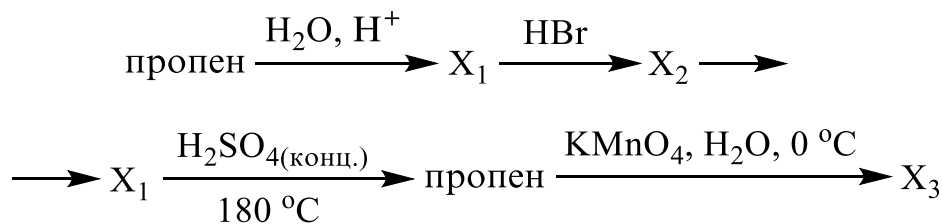
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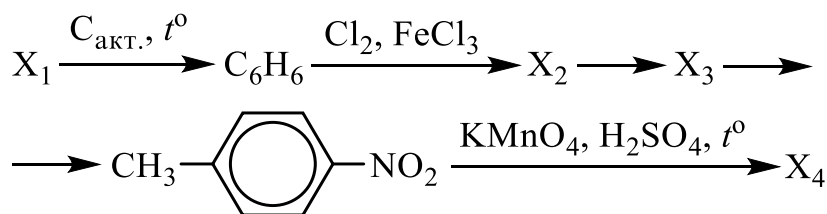


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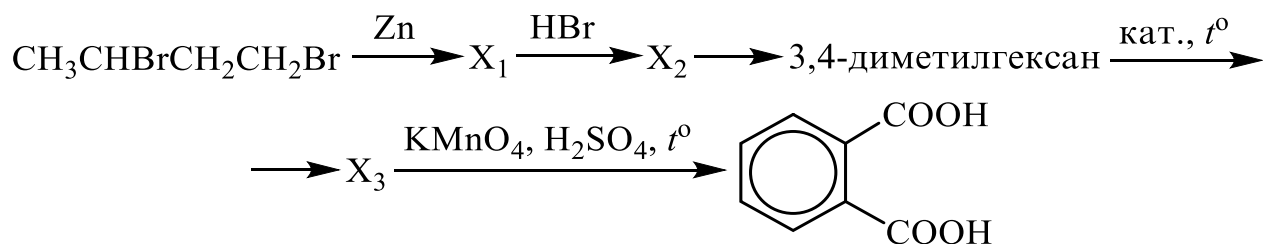


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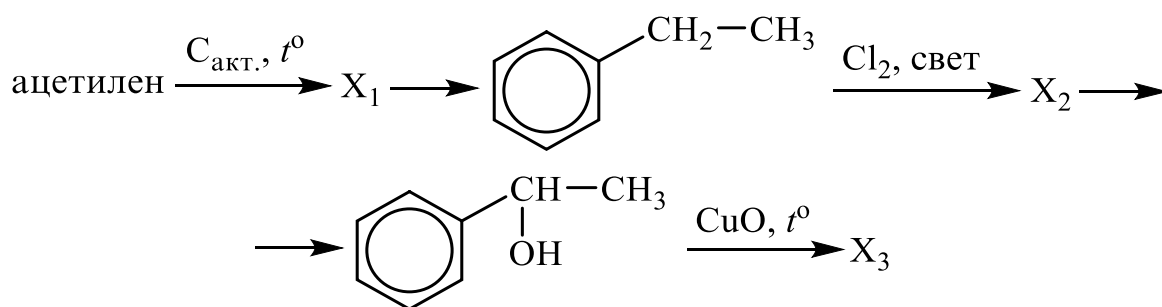
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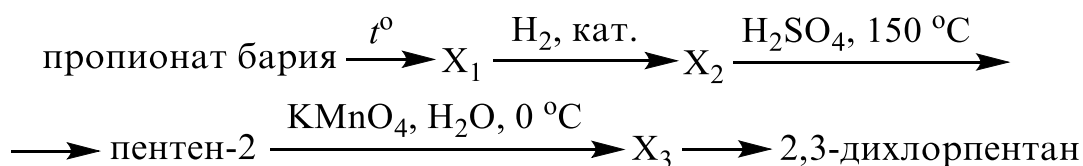
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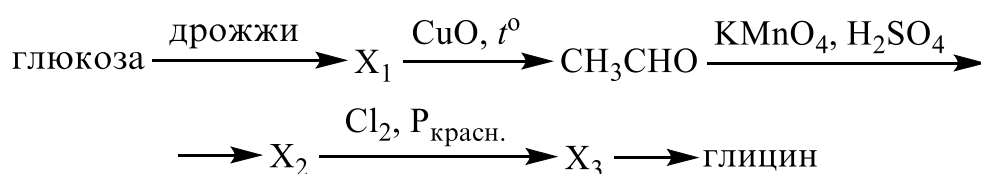
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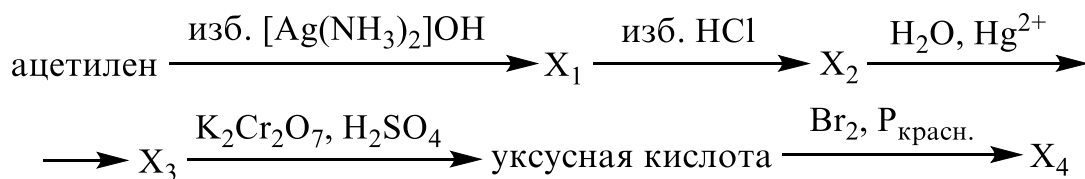
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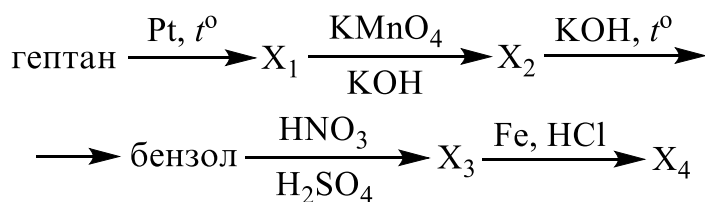
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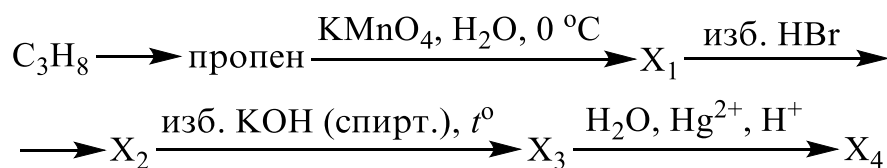
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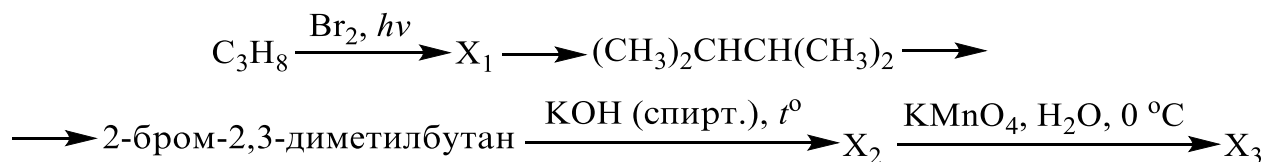
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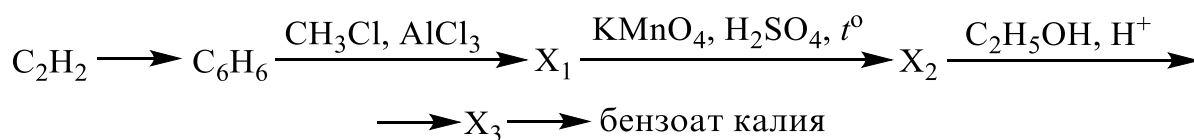
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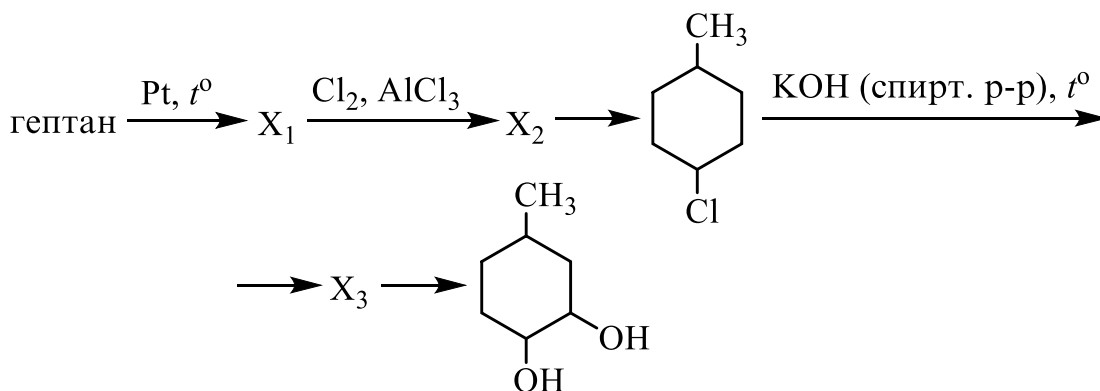
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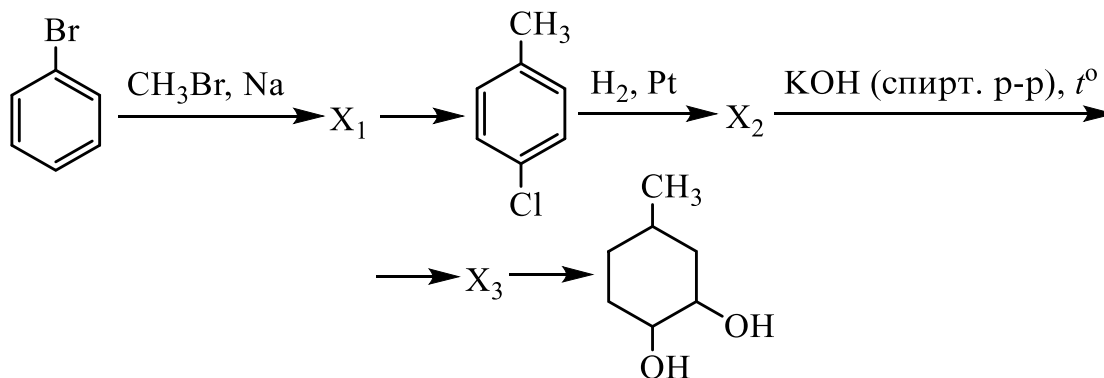
Задание 32 ЕГЭ по химии (vk.com/examtop)

195.	$\text{C}_2\text{H}_2 \longrightarrow \text{X}_1 \xrightarrow{\text{KMnO}_4, \text{H}^+} \text{CH}_3\text{COOH} \longrightarrow \text{X}_2 \longrightarrow \text{CH}_4 \xrightarrow{\text{HNO}_3, t^\circ, p} \text{X}_3$
196.	$\begin{aligned} \text{C}_3\text{H}_7\text{OH} &\xrightarrow{\text{Al}_2\text{O}_3, 400^\circ\text{C}} \text{X}_1 \longrightarrow \text{пропандиол-1,2} \xrightarrow{\text{изб. HBr}} \\ &\longrightarrow \text{X}_2 \xrightarrow{\text{изб. KOH (спирт.), } t^\circ} \text{X}_3 \longrightarrow \text{1,3,5-триметилбензол} \end{aligned}$
197.	$\begin{aligned} \text{этан} &\xrightarrow{\text{Br}_2} \text{X}_1 \xrightarrow{\text{KOH, H}_2\text{O, } t^\circ} \text{X}_2 \xrightarrow{\text{K}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4} \text{этаналь} \longrightarrow \\ &\longrightarrow \text{X}_2 \longrightarrow \text{дивинил} \end{aligned}$
198.	$\begin{aligned} \text{гексан} &\longrightarrow \text{C}_6\text{H}_6 \xrightarrow{\text{CH}_3\text{Cl, AlCl}_3} \text{X}_1 \xrightarrow{3\text{Cl}_2, h\nu} \text{X}_2 \xrightarrow{\text{KOH, H}_2\text{O, } t^\circ} \\ &\longrightarrow \text{X}_3 \longrightarrow \text{метилбензоат} \end{aligned}$
199.	$\begin{aligned} \text{1,3-дибромпропан} &\xrightarrow{\text{Zn}} \text{X}_1 \xrightarrow{\text{HCl, } t^\circ} \text{X}_2 \xrightarrow[\text{H}_2\text{O}]{\text{KOH}} \text{X}_3 \xrightarrow[\text{H}_2\text{SO}_4, t^\circ]{\text{KMnO}_4} \\ &\longrightarrow \text{пропионовая кислота} \longrightarrow \text{изопропилпропионат} \end{aligned}$
200.	$\begin{aligned} \text{бензол} &\longrightarrow \text{циклогексан} \xrightarrow{\text{Cl}_2, h\nu} \text{X}_1 \xrightarrow{\text{KOH (спирт. р-р), } t^\circ} \\ &\longrightarrow \text{циклогексен} \xrightarrow{\text{H}_2\text{O, H}_3\text{PO}_4, t^\circ} \text{X}_2 \xrightarrow{\text{CuO, } t^\circ} \text{X}_3 \end{aligned}$
201.	$\begin{aligned} \text{метилацетат} &\longrightarrow \text{Ca}(\text{CH}_3\text{COO})_2 \xrightarrow{t^\circ} \text{X}_1 \longrightarrow \\ &\longrightarrow \text{CH}_3-\text{CH}(\text{OH})-\text{CH}_3 \xrightarrow{\text{H}_2\text{SO}_4, 160^\circ\text{C}} \text{X}_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \text{X}_3 \end{aligned}$
202.	$\begin{aligned} \text{циклопропан} &\xrightarrow{\text{HBr, } t^\circ} \text{X}_1 \xrightarrow{\text{Na, } t^\circ} \text{X}_2 \xrightarrow{t^\circ, \text{кат.}} \text{C}_6\text{H}_6 \xrightarrow{\text{CH}_3\text{Br, AlBr}_3, t^\circ} \\ &\longrightarrow \text{X}_3 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \text{бензойная кислота} \end{aligned}$

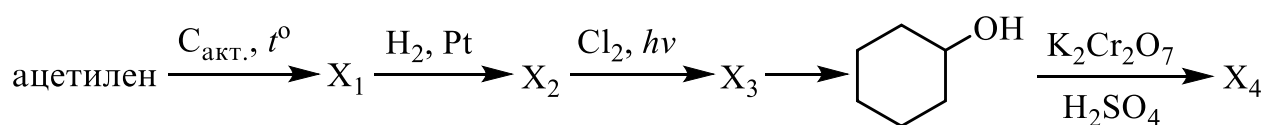
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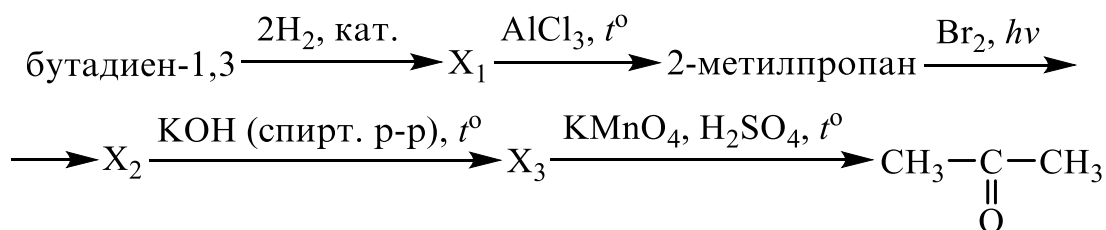


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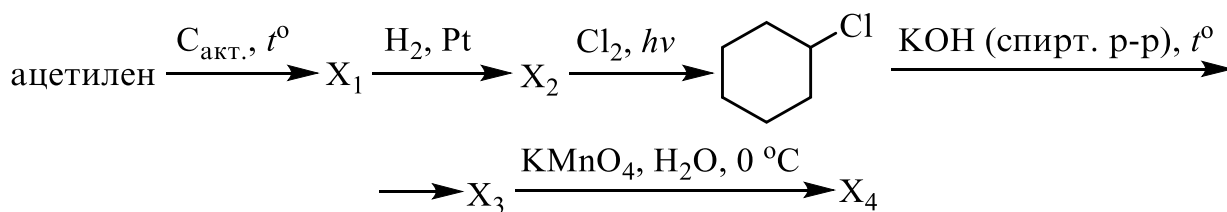


2013

206.



207.



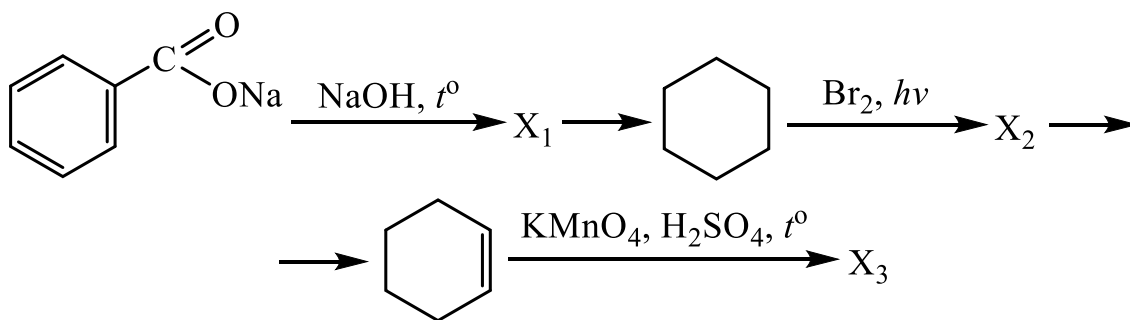
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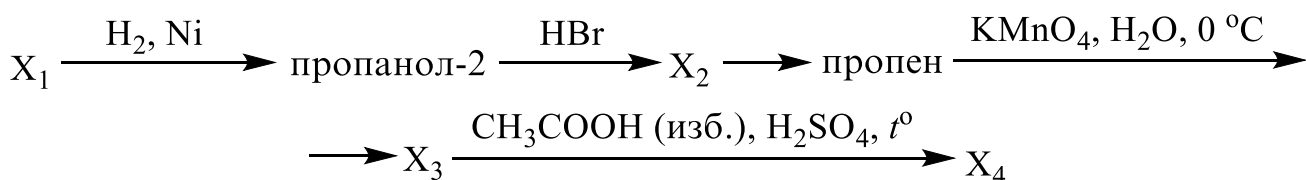
Задание 32 ЕГЭ по химии (vk.com/examtop)

209.	$\begin{array}{l} \text{этилат калия} \xrightarrow{\text{H}_2\text{O}} \text{X}_1 \longrightarrow \text{хлорэтан} \longrightarrow \text{X}_2 \longrightarrow \\ \longrightarrow \text{этиленгликоль} \xrightarrow{\text{CH}_3\text{COOH}, \text{H}^+} \text{X}_3 \end{array}$
210.	$\begin{array}{l} \text{ацетат калия} \xrightarrow[\text{раствора}]{\text{электролиз}} \text{X}_1 \xrightarrow[\text{кат.}]{t^\circ} \text{этилен} \xrightarrow{\text{H}_2\text{O}, \text{H}^+} \\ \longrightarrow \text{X}_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4} \text{X}_3 \xrightarrow{\text{X}_2, \text{H}^+} \text{X}_4 \end{array}$
211.	$\begin{array}{l} \text{HC}\equiv\text{CH} \xrightarrow{\text{H}_2\text{O} (\text{Hg}^{2+})} \text{X}_1 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4, t^\circ} \text{CH}_3\text{COOH} \xrightarrow{\text{NaOH}} \\ \longrightarrow \text{X}_2 \xrightarrow{\text{CH}_3\text{I}} \text{X}_3 \xrightarrow{\text{H}_2\text{O} (\text{H}^+)} \text{уксусная кислота} \end{array}$
212.	$\begin{array}{l} \text{1-бромпропан} \xrightarrow{\text{Na}} \text{X}_1 \xrightarrow[\text{Pt}]{t^\circ} \text{X}_2 \xrightarrow{\text{CH}_3\text{Cl}, \text{AlCl}_3} \text{X}_3 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4} \\ \longrightarrow \text{C}_6\text{H}_5\text{COOH} \xrightarrow{\text{NaOH}} \text{X}_4 \end{array}$
213.	$\begin{array}{l} \text{толуол} \xrightarrow{\text{Cl}_2, \text{свет}} \text{X}_1 \xrightarrow{\text{NaOH}_{(\text{водн.})}} \text{X}_2 \xrightarrow{\text{KMnO}_4, \text{H}_2\text{SO}_4} \\ \longrightarrow \text{C}_6\text{H}_5\text{COOH} \xrightarrow{\text{NaHCO}_3} \text{X}_3 \xrightarrow[\text{сплавление}]{\text{NaOH}_{(\text{тв.})}} \text{X}_4 \end{array}$
214.	$\begin{array}{l} \text{ацетальдегид} \xrightarrow{\text{KMnO}_4, \text{KOH}} \text{ацетат калия} \xrightarrow{\text{H}_2\text{SO}_4} \text{X}_1 \xrightarrow{\text{C}_2\text{H}_5\text{OH}, t^\circ, \text{H}^+} \\ \longrightarrow \text{X}_2 \longrightarrow \text{ацетат кальция} \xrightarrow{t^\circ} \text{X}_3 \end{array}$
215.	$\begin{array}{l} \text{CH}_4 \xrightarrow{t^\circ} \text{X}_1 \xrightarrow{\text{H}_2\text{O}, \text{Hg}^{2+}} \text{CH}_3\text{C} \begin{array}{l} \text{=O} \\ \text{< H} \end{array} \xrightarrow{\text{K}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4} \text{X}_2 \xrightarrow{\text{Ba}(\text{OH})_2} \\ \longrightarrow \text{X}_3 \xrightarrow{t^\circ} \text{CH}_3\text{C} \begin{array}{l} \text{O} \\ \text{ } \end{array} \text{CH}_3 \end{array}$

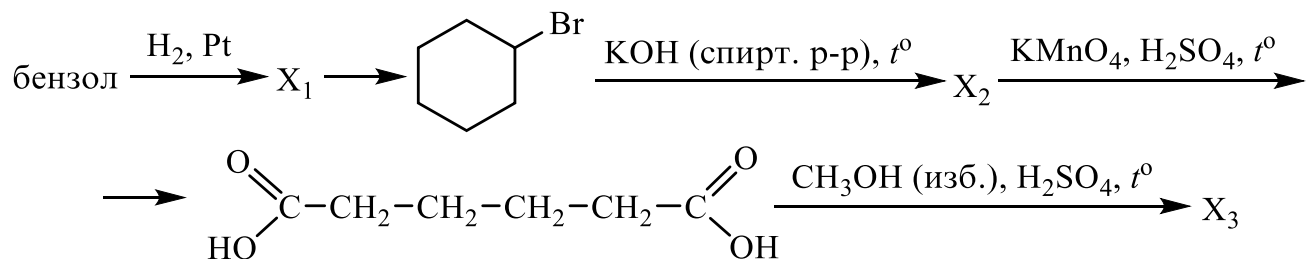
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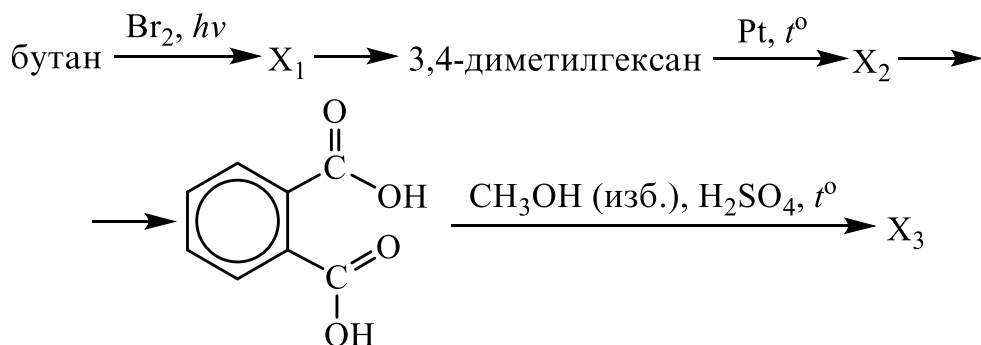
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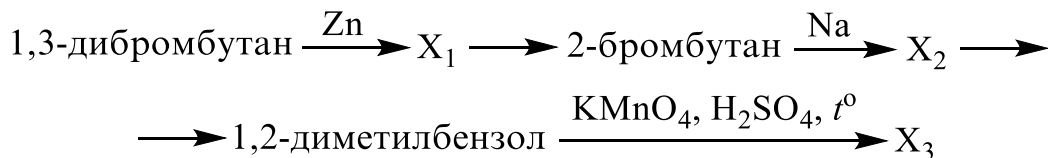


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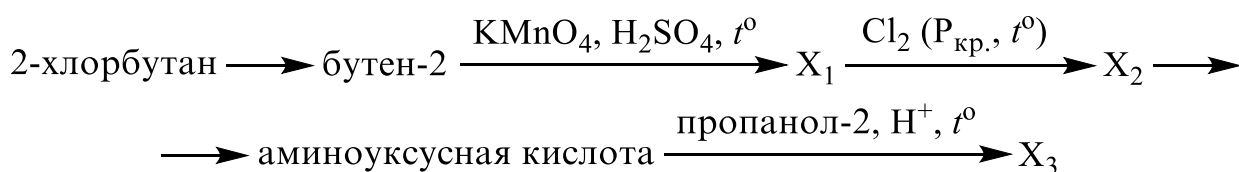


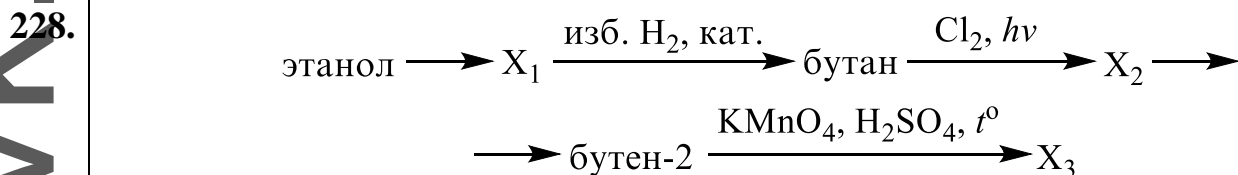
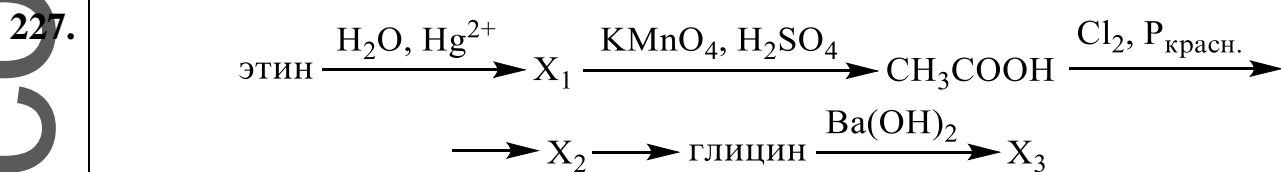
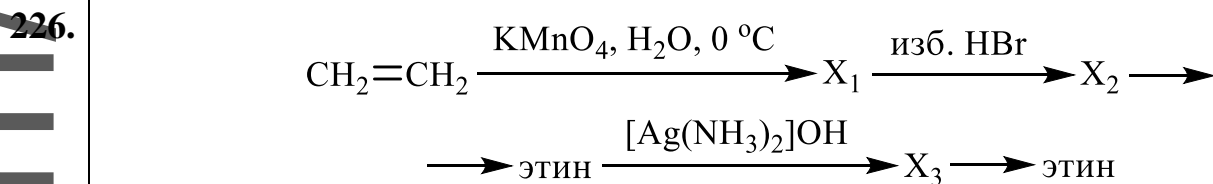
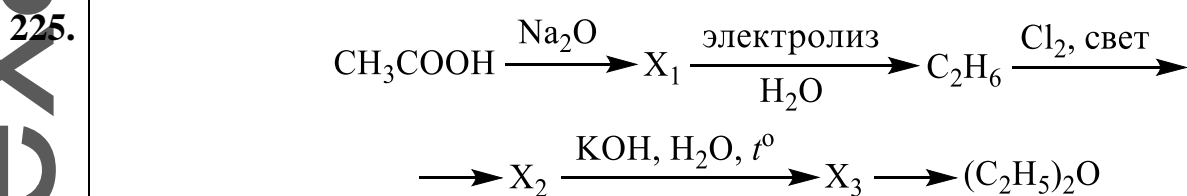
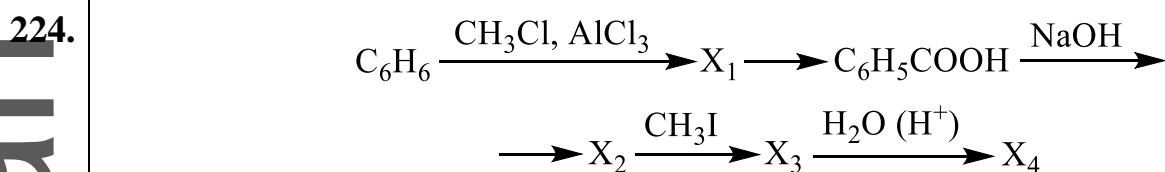
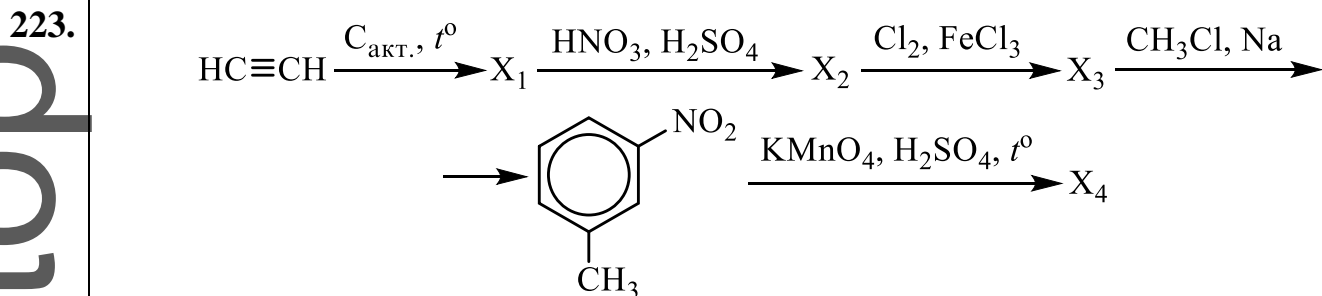
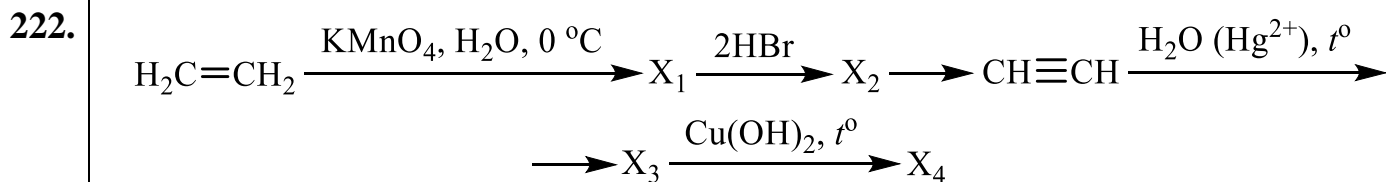
2012

220.



221.





229.

