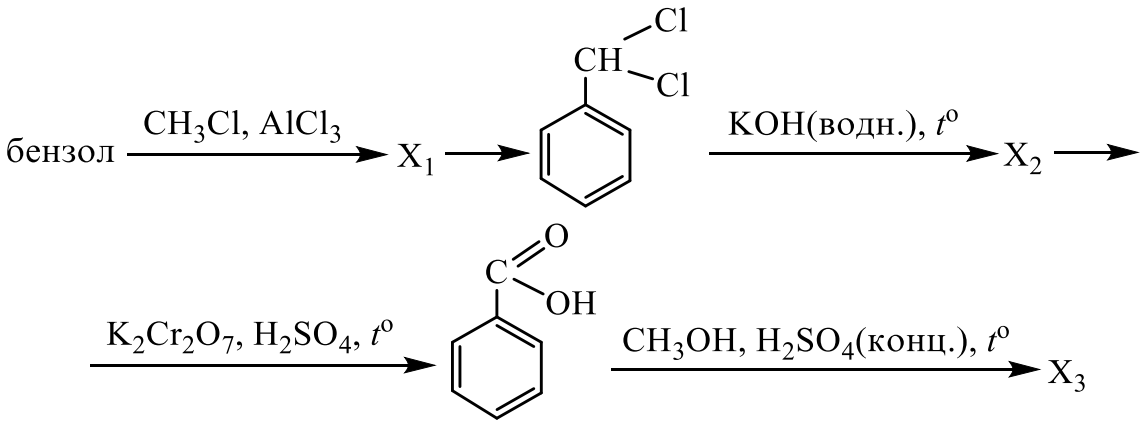
Формулировка задания: «Напишите уравнения реакций, с помощью которых можно осуществить следующие превращения. При написании уравнений реакций используйте структурные формулы органических веществ.»

2017

1.



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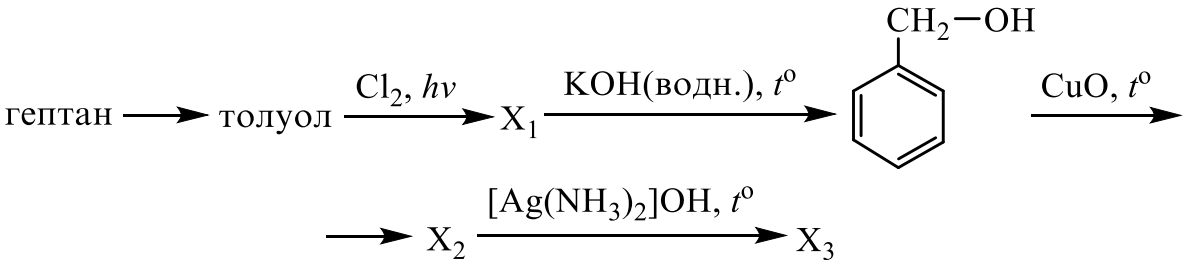

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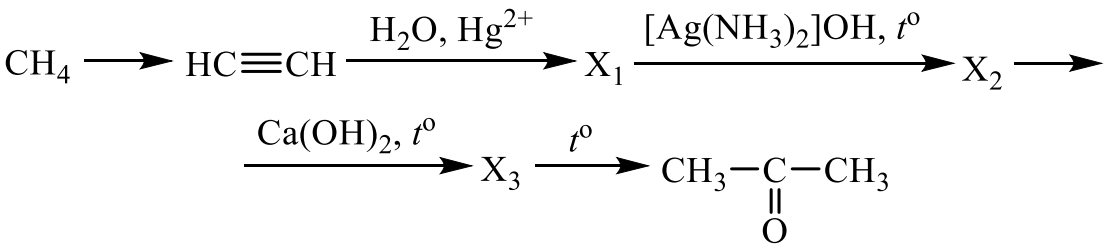

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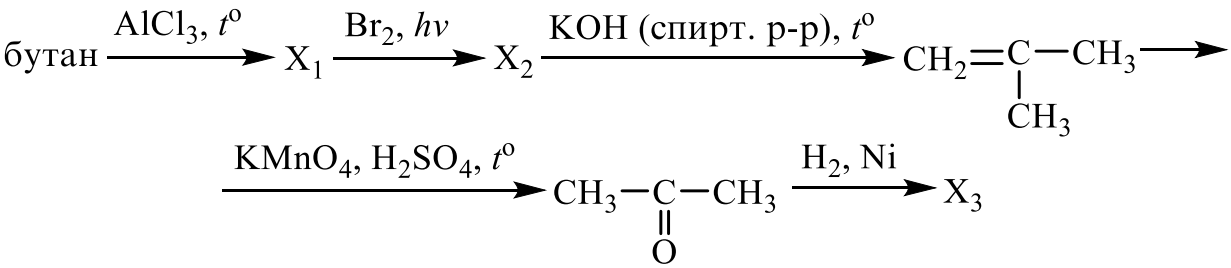

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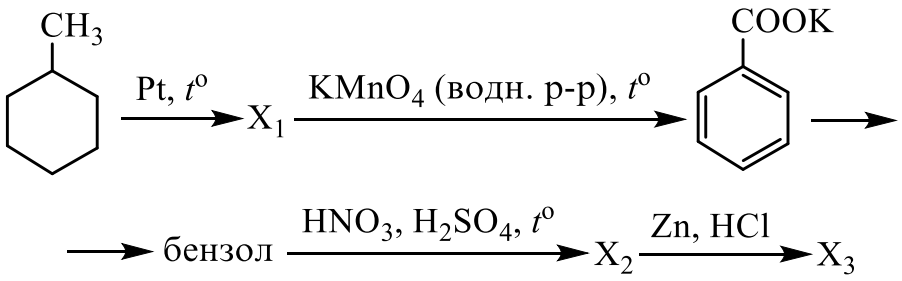
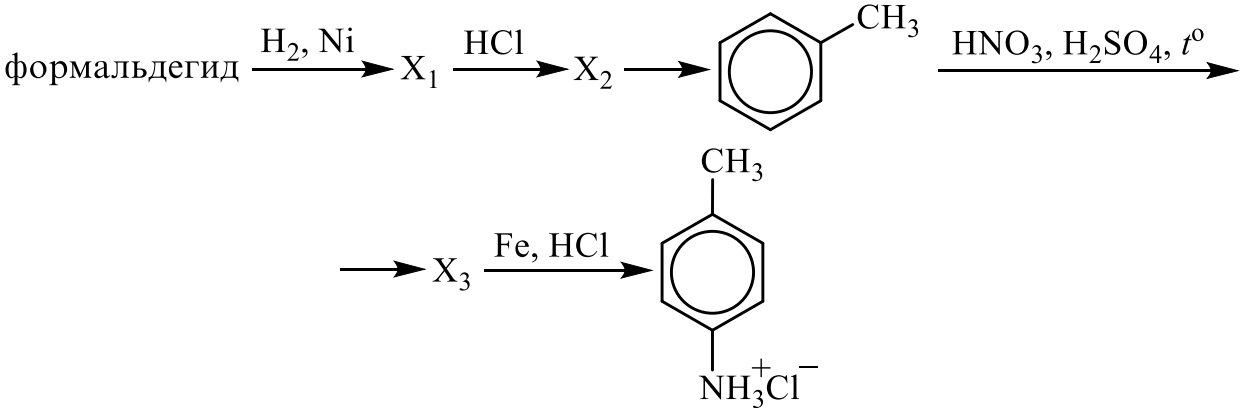
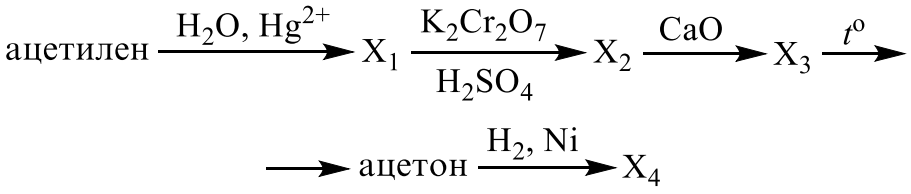

CH3
Pt, t°
X1
KMnO4 (водн. р-р), t°
COOK
бензол
HNO3, H2SO4, t°
X2
Zn, HCl
X3

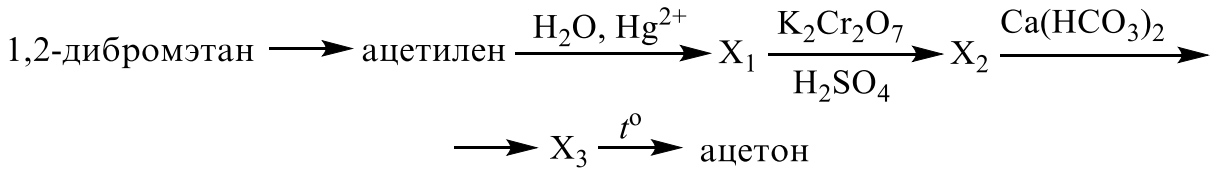
6.


формальдегид
H2, Ni
X1
HCl
X2
CH3
HNO3, H2SO4, t°
X3
Fe, HCl
CH3
NH3+Cl−

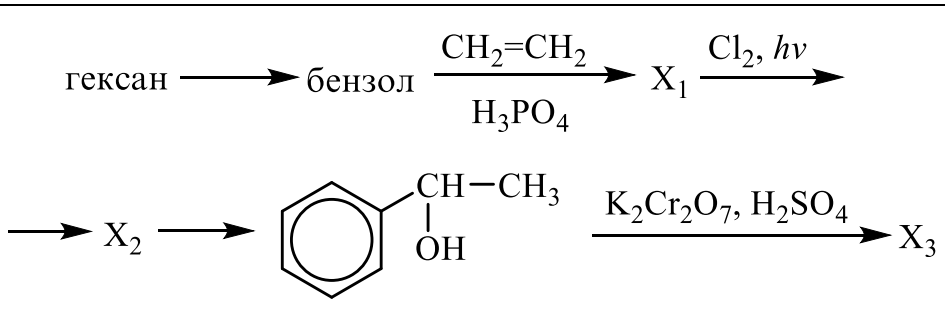
7.


ацетилен
H2O, Hg2+
X1
K2Cr2O7
H2SO4
X2
CaO
X3
t°
ацетон
H2, Ni
X4

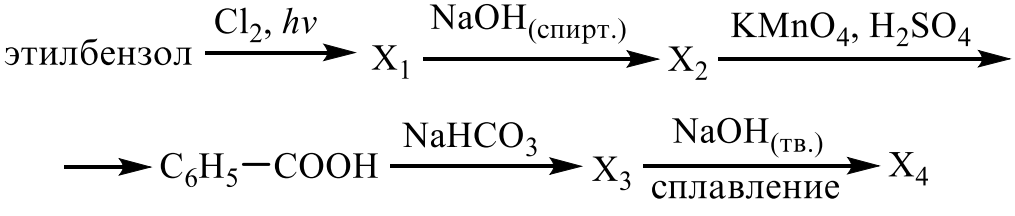
8.


1,2-дибромэтан
ацетилен
H2O, Hg2+
X1
K2Cr2O7
H2SO4
X2
Ca(HCO3)2
X3
t°
ацетон

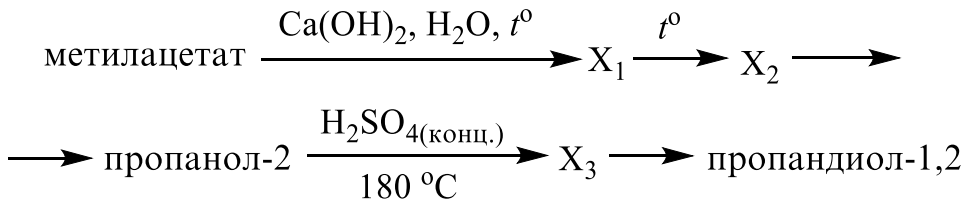
9.


гексан
бензол
CH2=CH2
H3PO4
X1
Cl2, hv
X2
CH−CH3
OH
K2Cr2O7, H2SO4
X3

10.


этилбензол
Cl2, hv
X1
NaOH(спирт.)
X2
KMnO4, H2SO4
C6H5−COOH
NaHCO3
X3
NaOH(тв.)
сплавление
X4

11.



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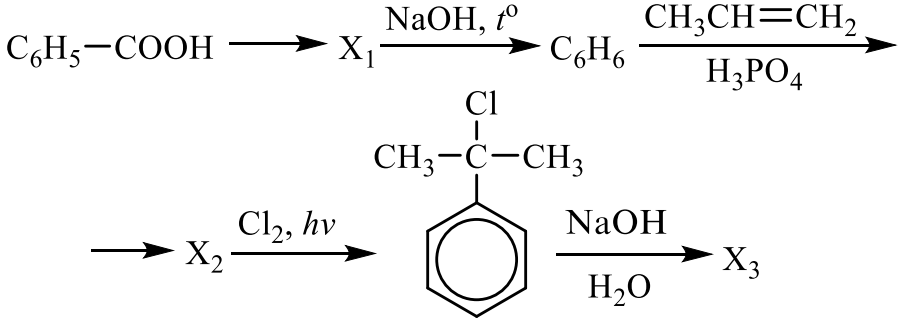

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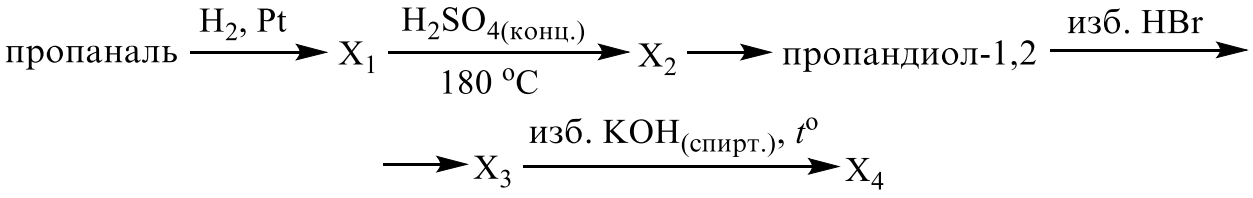

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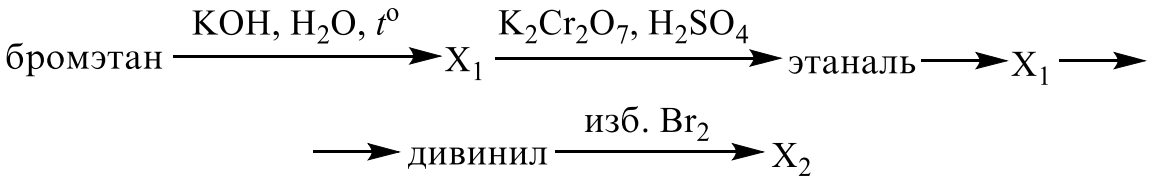

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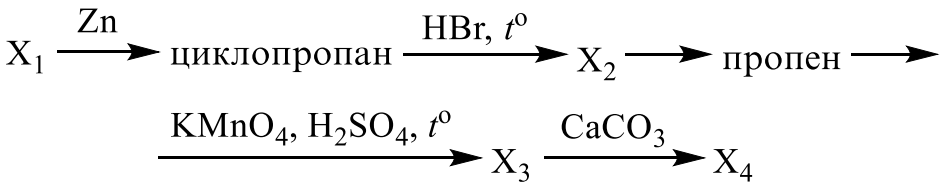

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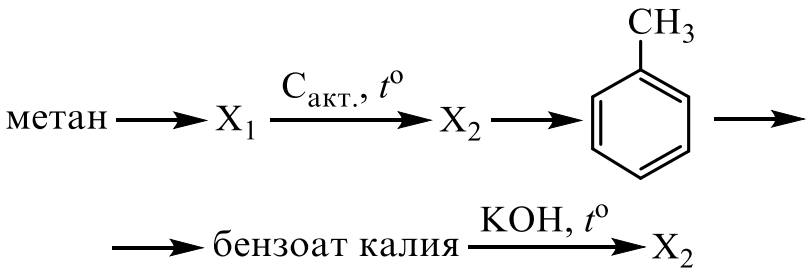

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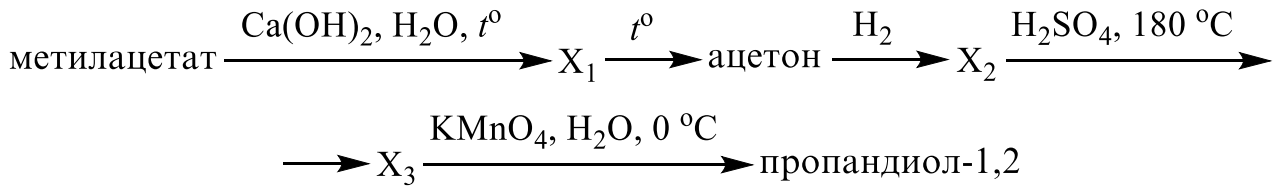

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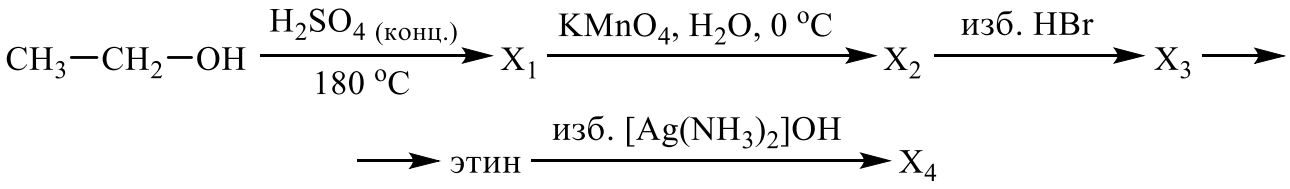

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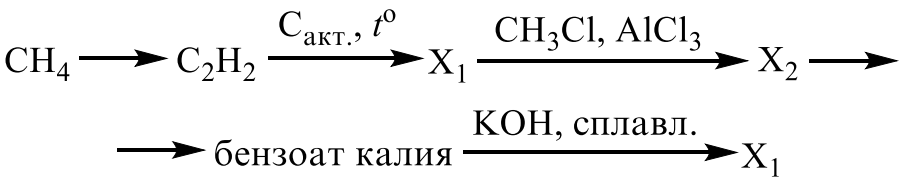

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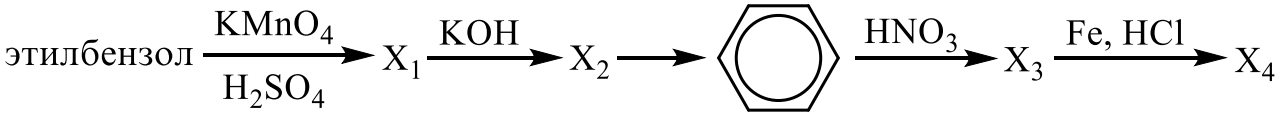

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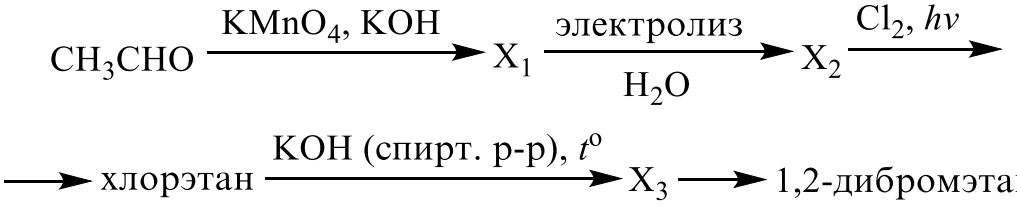

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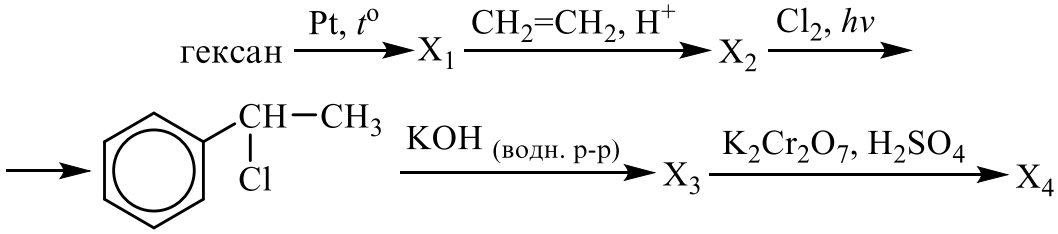

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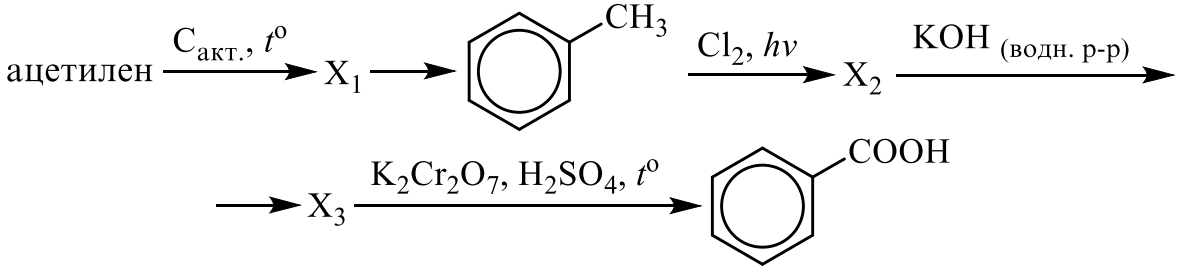

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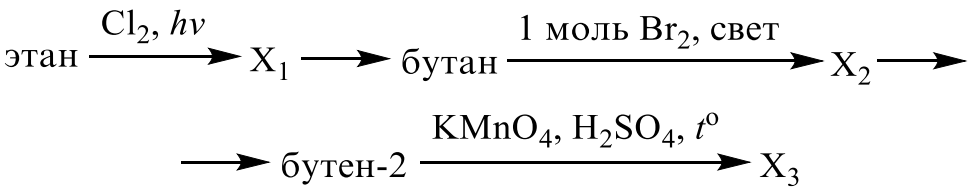

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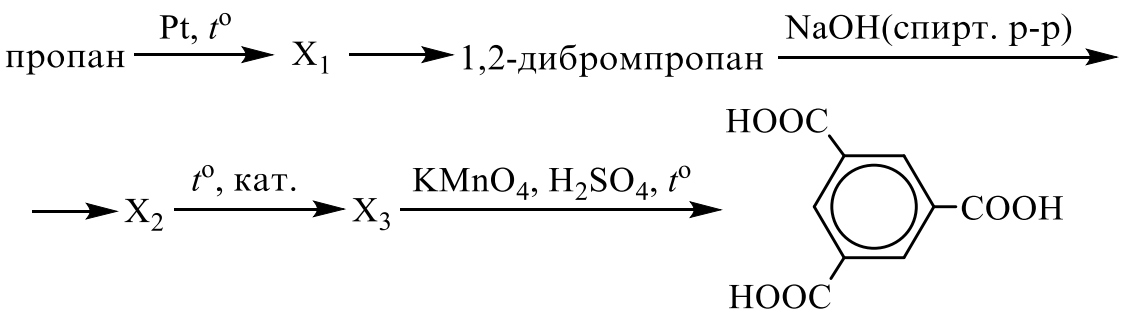

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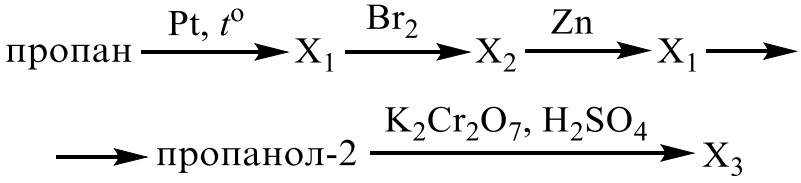

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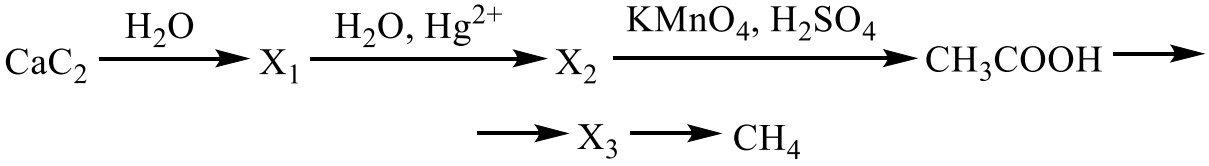

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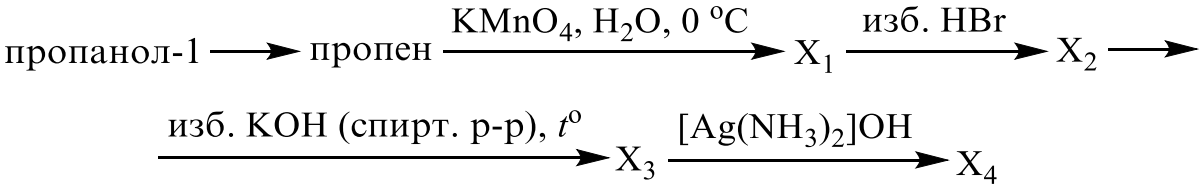

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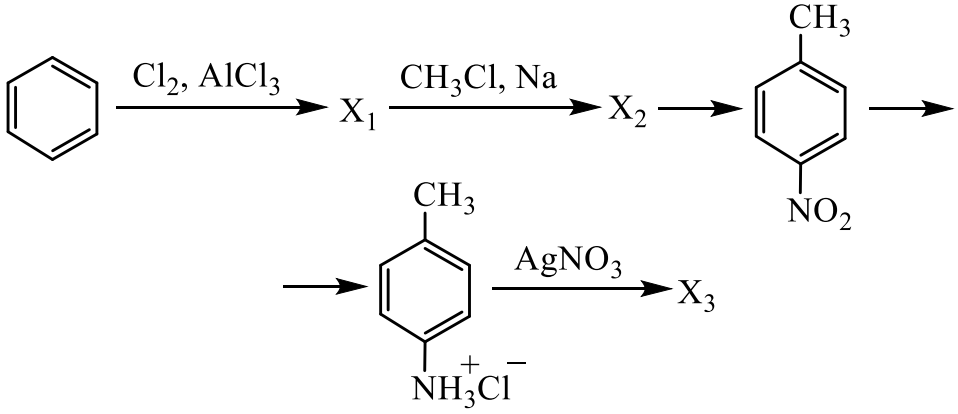

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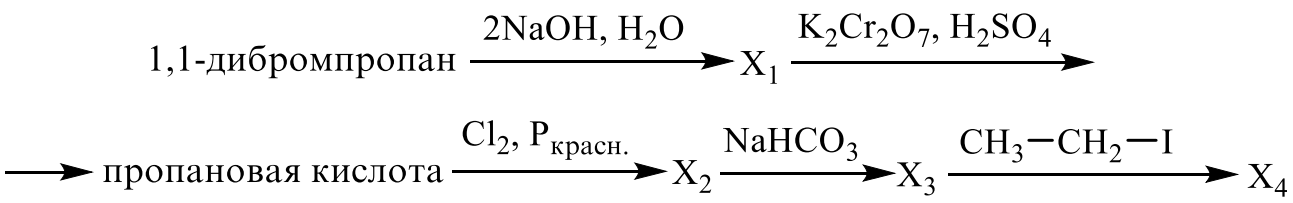
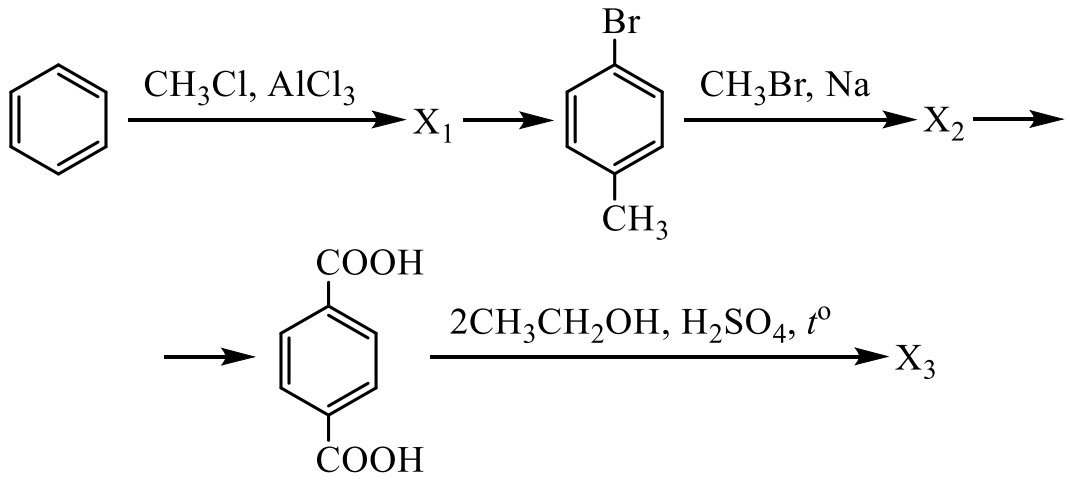
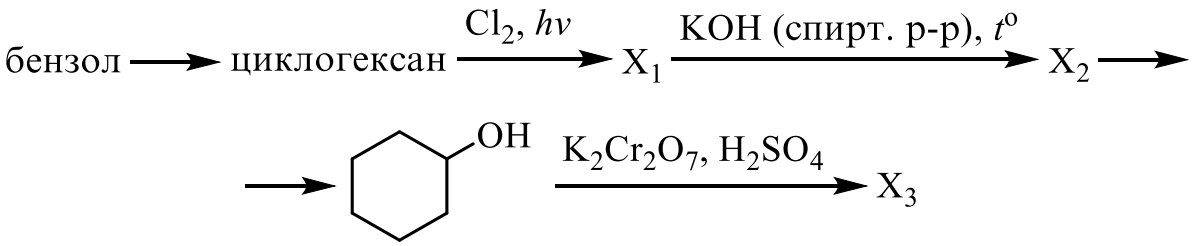

1,1-дибромпропан
2NaOH, H2O
X1
K2Cr2O7, H2SO4
пропановая кислота
Cl2, Pкрасн.
X2
NaHCO3
X3
CH3—CH2—I
X4

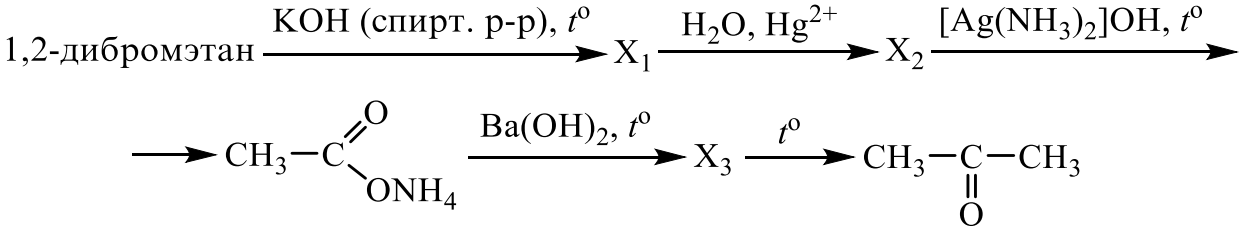
32.


CH3Cl, AlCl3
X1
Br
CH3
CH3Br, Na
X2
COOH
COOH
2CH3CH2OH, H2SO4, t°
X3

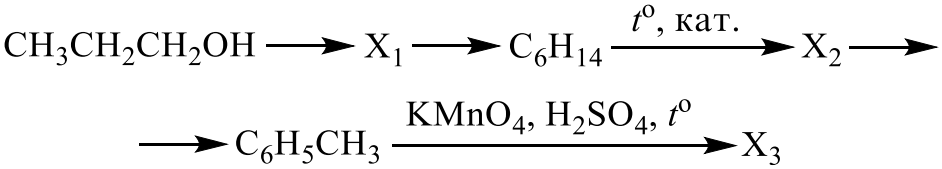
33.


бензол
циклогексан
Cl2, hv
X1
KOH (спирт. р-р), t°
X2
OH
K2Cr2O7, H2SO4
X3

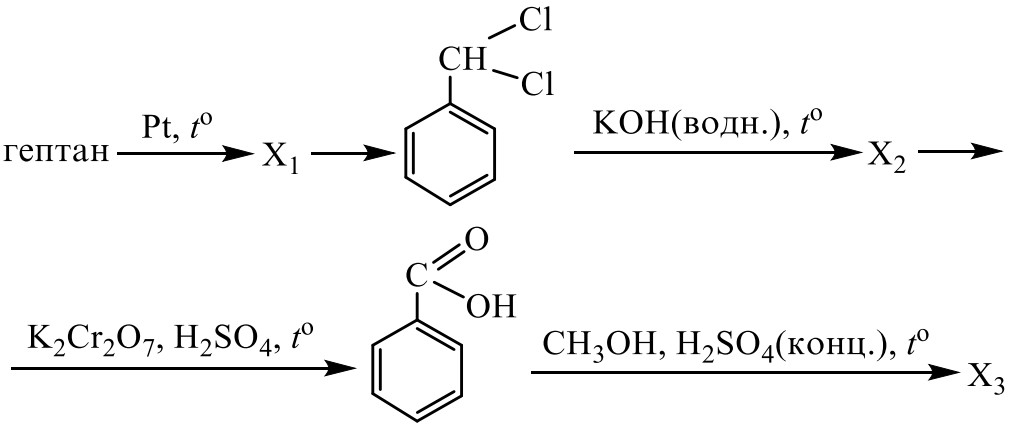
34.


1,2-дибромэтан
KOH (спирт. р-р), t°
X1
H2O, Hg2+
X2
[Ag(NH3)2]OH, t°
CH3—C
O
ONH4
Ba(OH)2, t°
X3
t°
CH3—C—CH3
O

35.


CH3CH2CH2OH
X1
C6H14
t°, кат.
X2
C6H5CH3
KMnO4, H2SO4, t°
X3

36.



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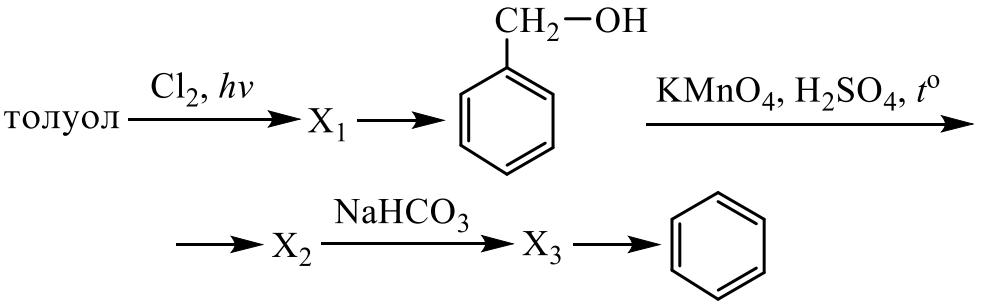
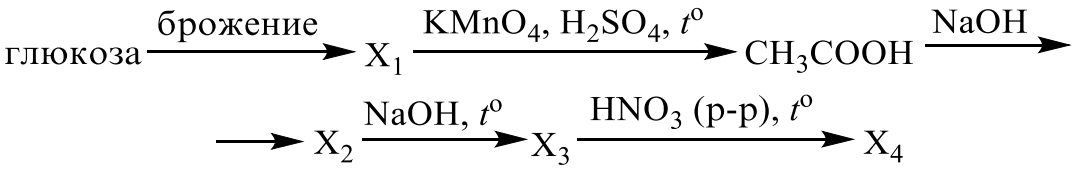


2016

38.



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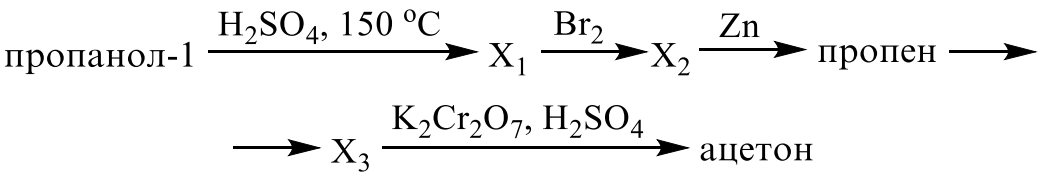

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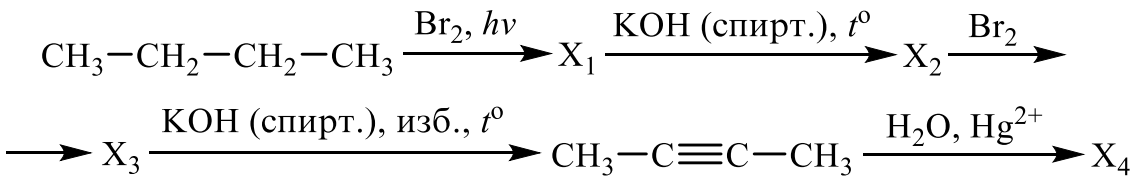

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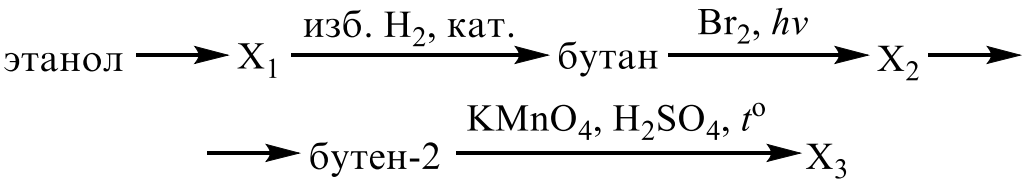

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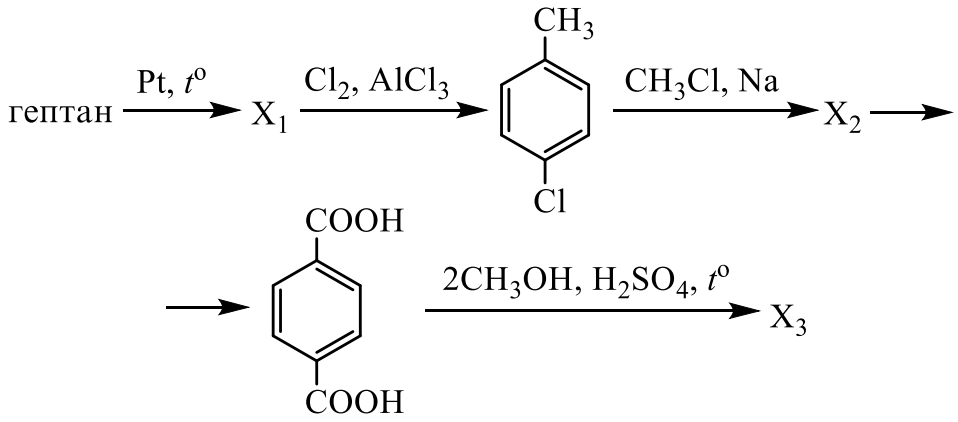

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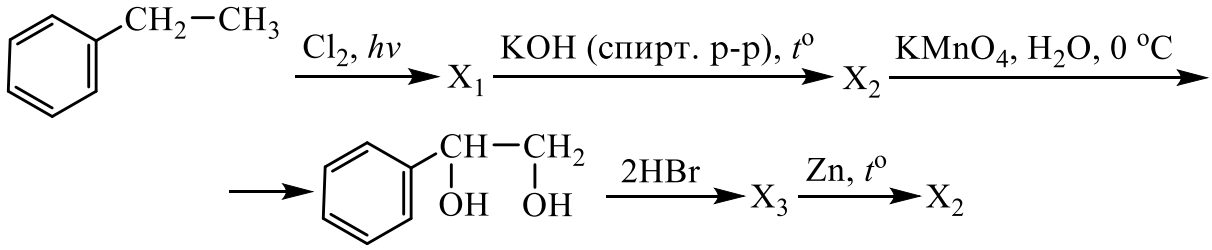

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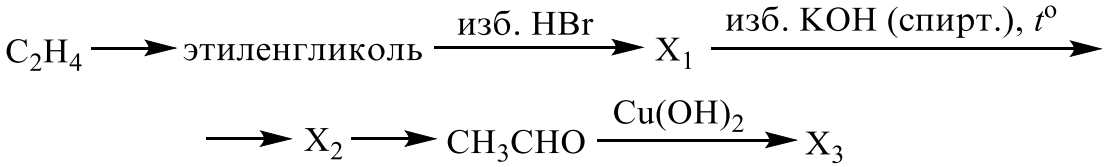

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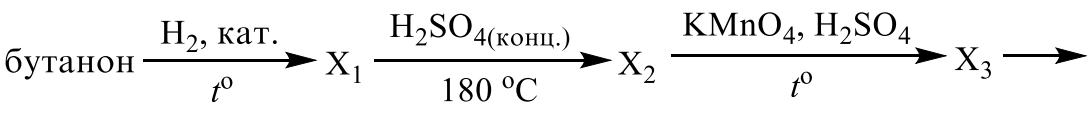

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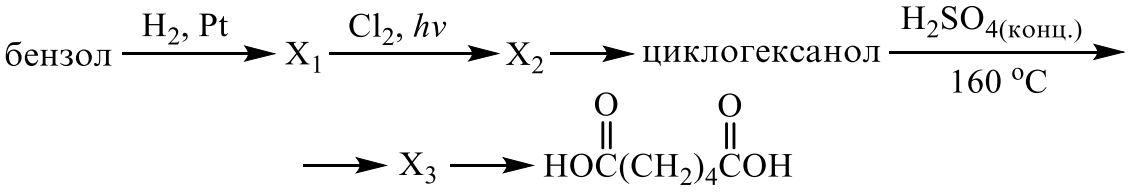

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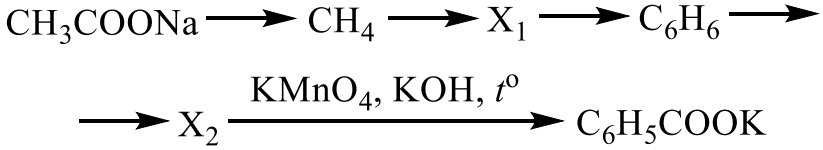

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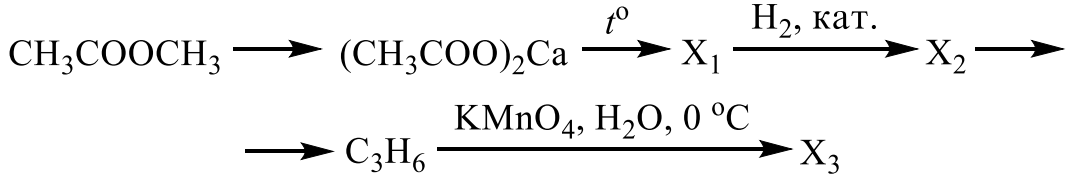

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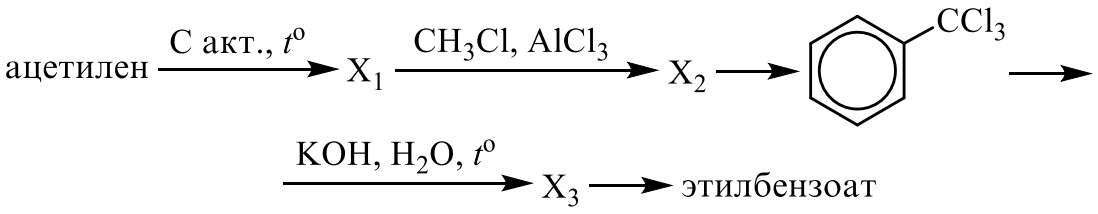

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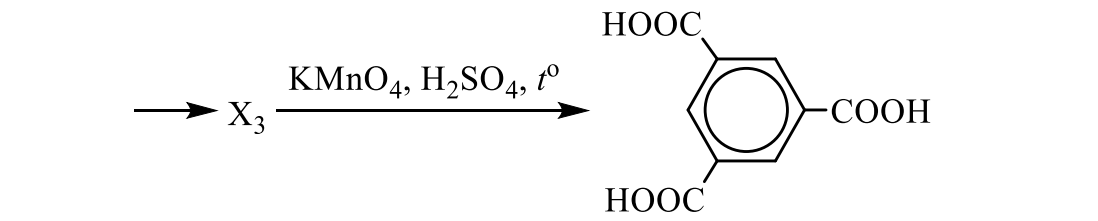

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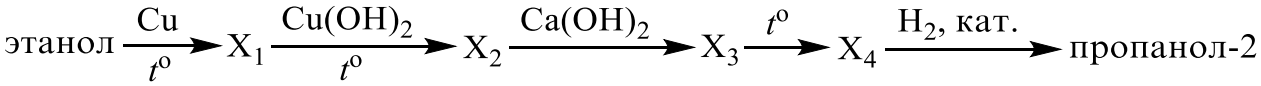

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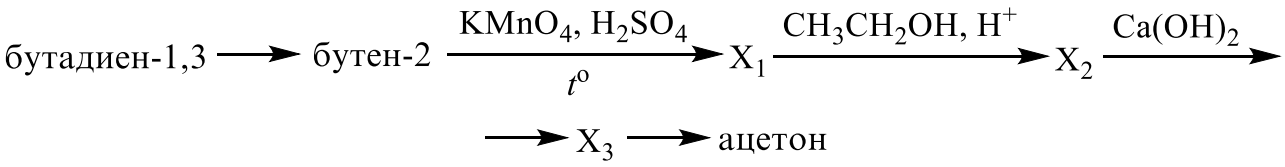

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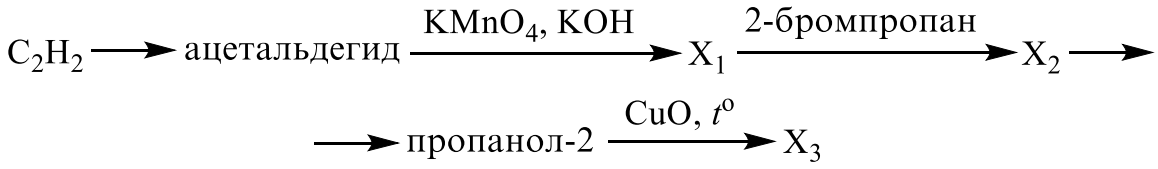

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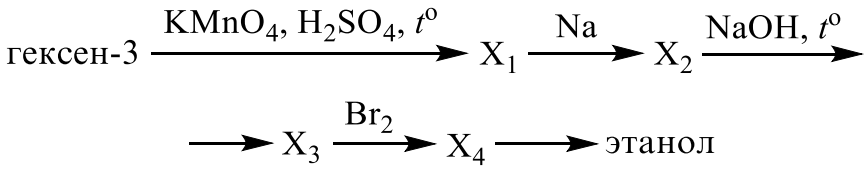

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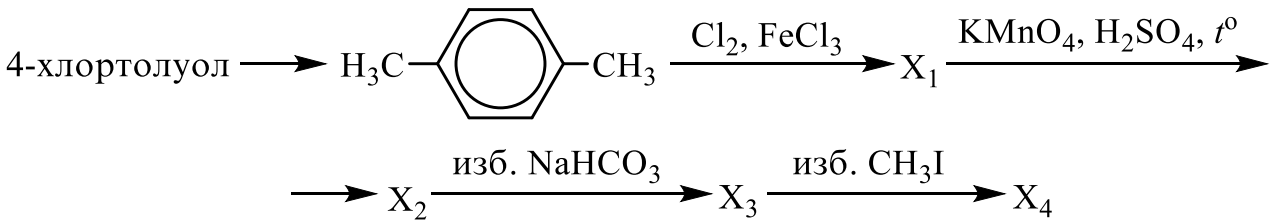

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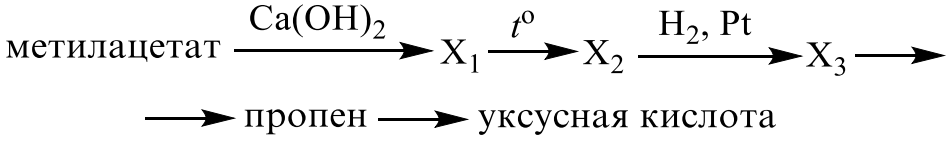

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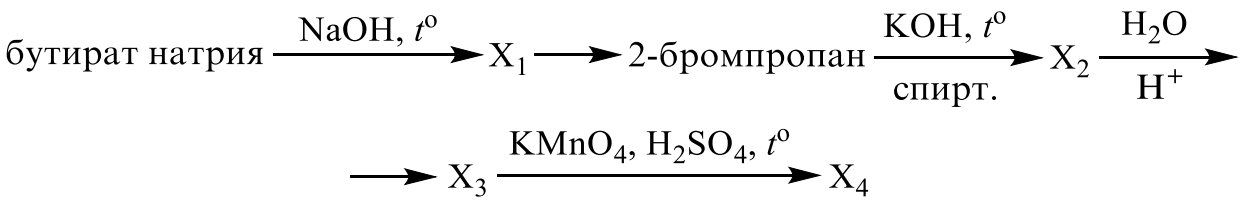

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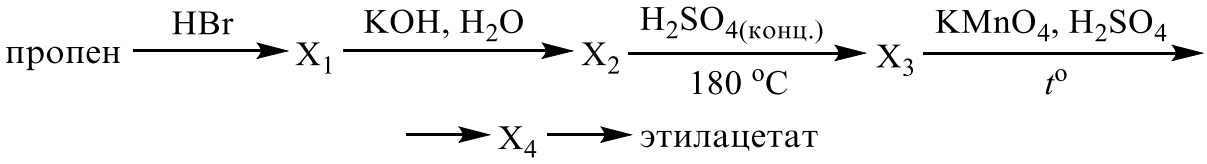

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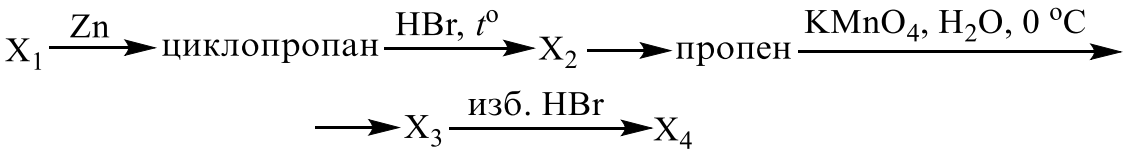

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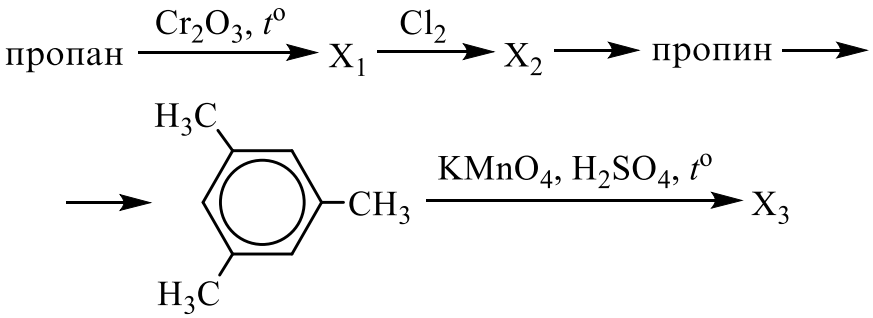

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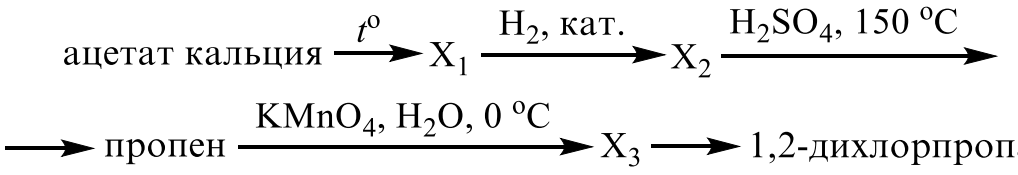

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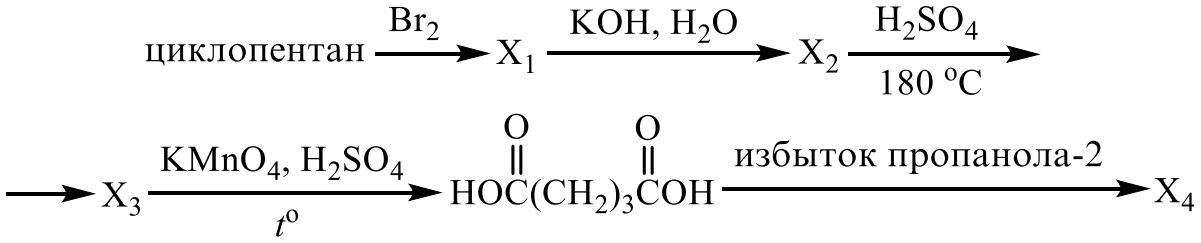

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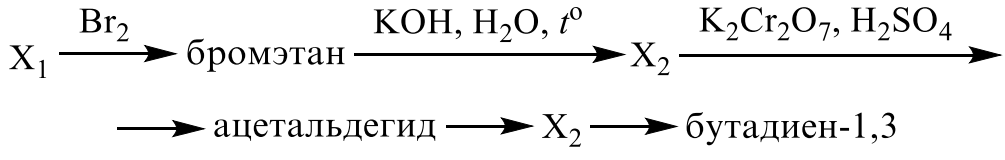

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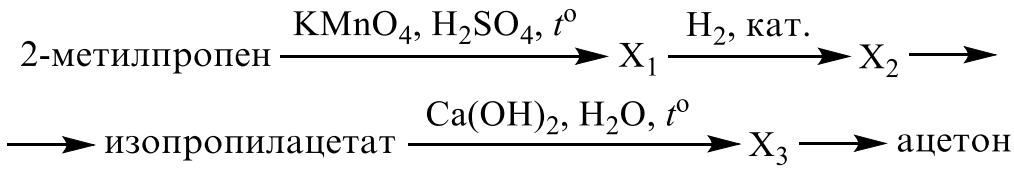

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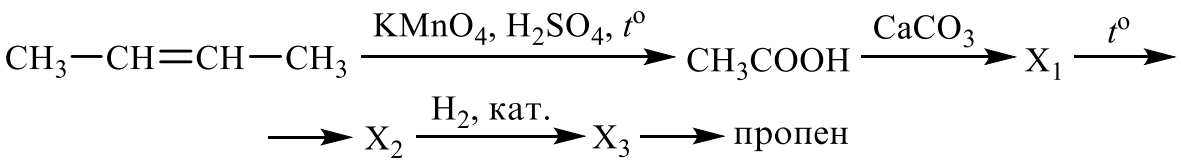

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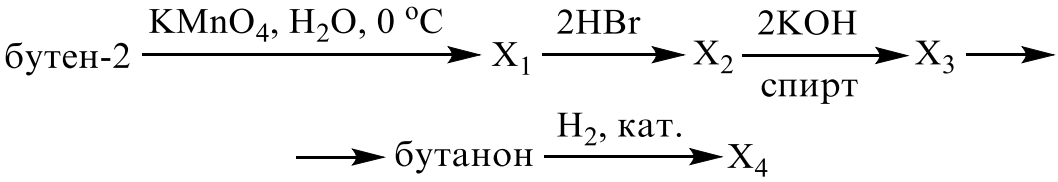

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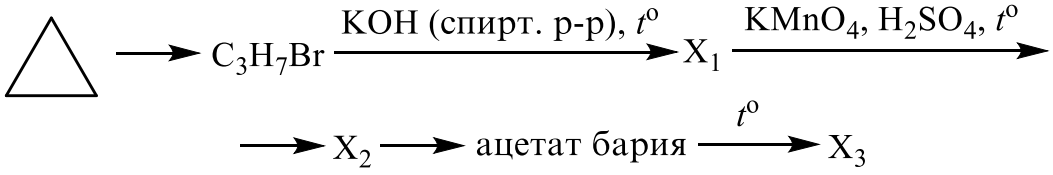

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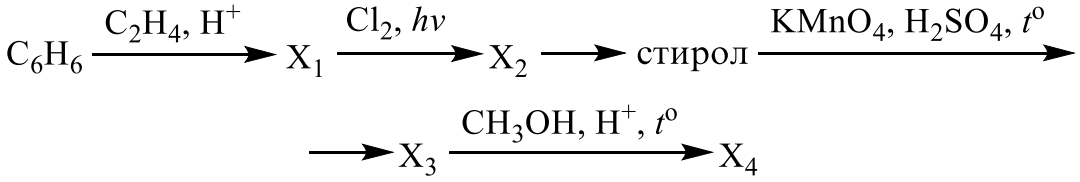

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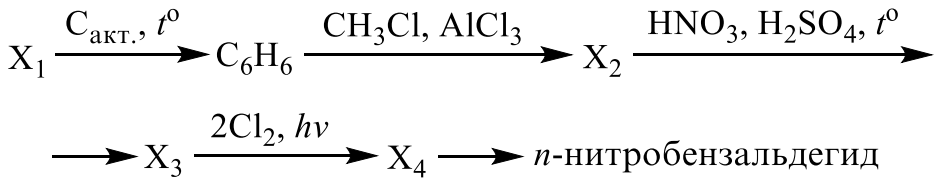

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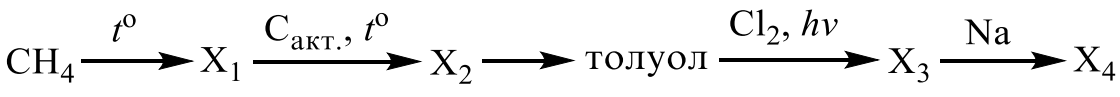

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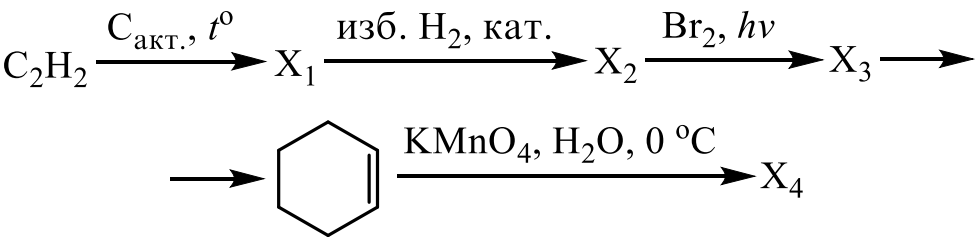

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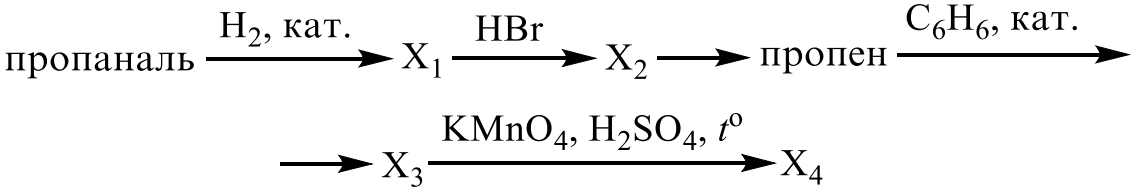

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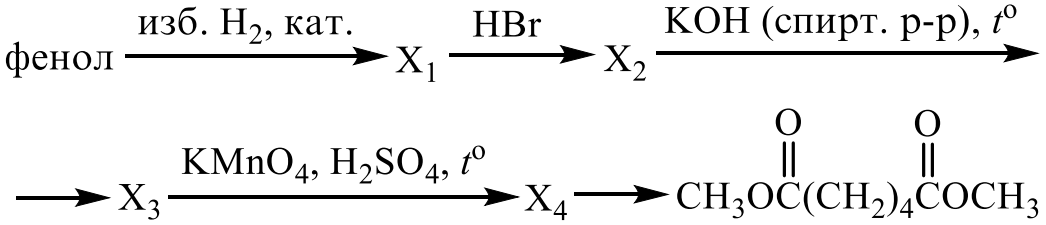

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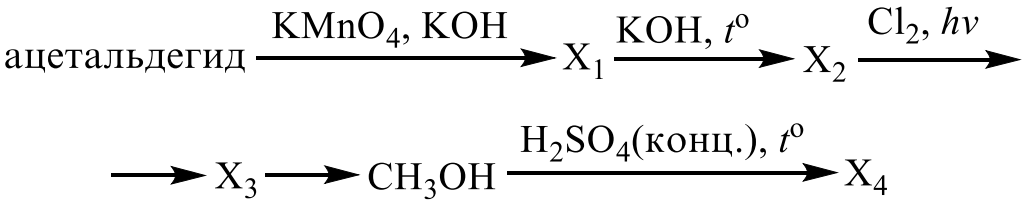

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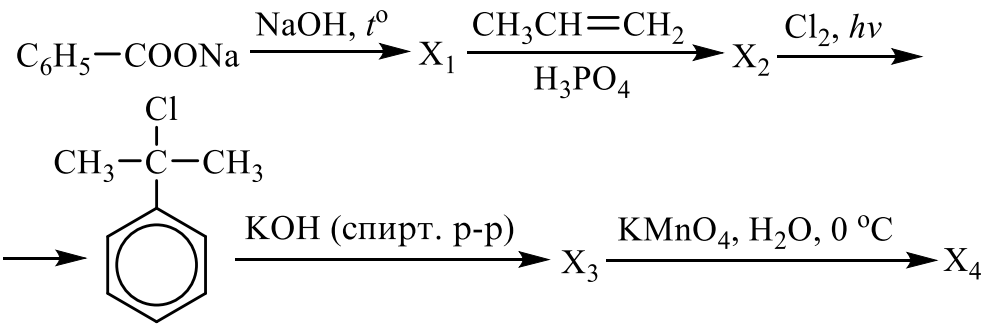

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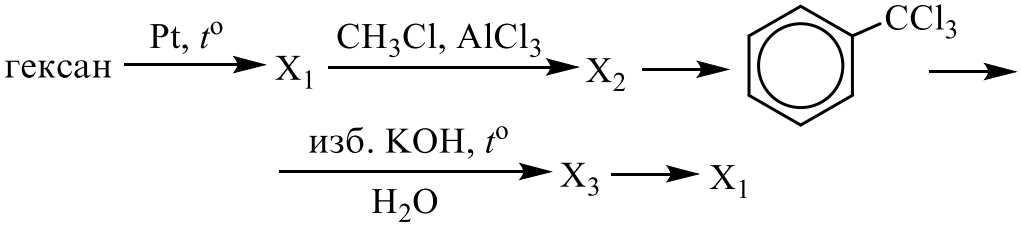

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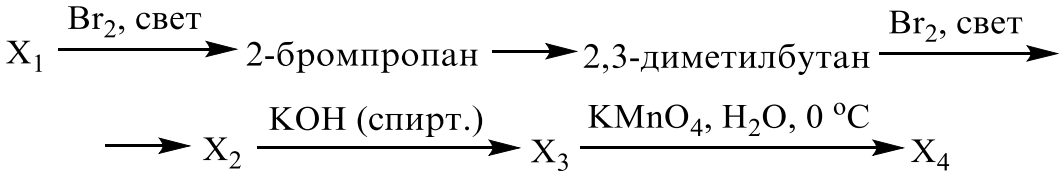

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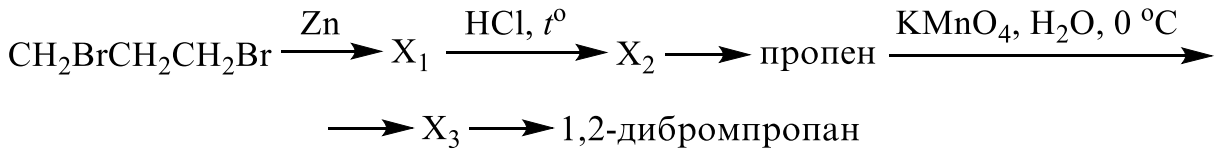

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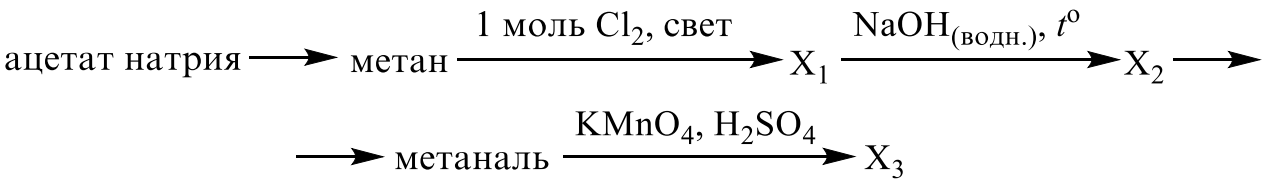

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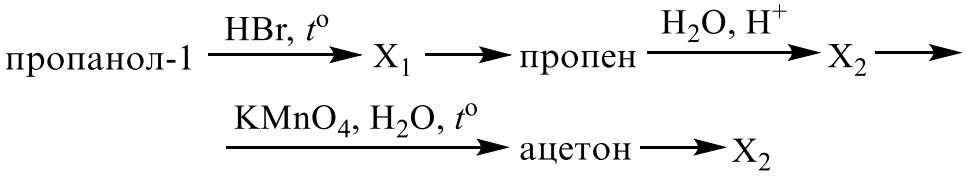

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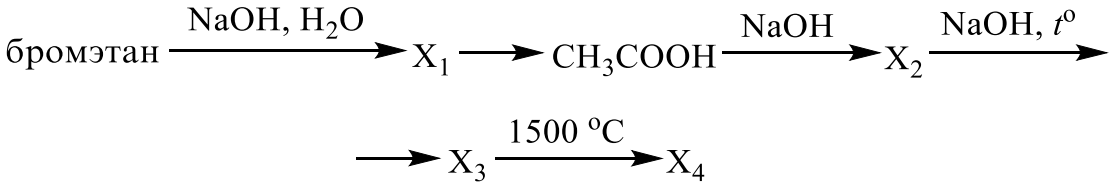

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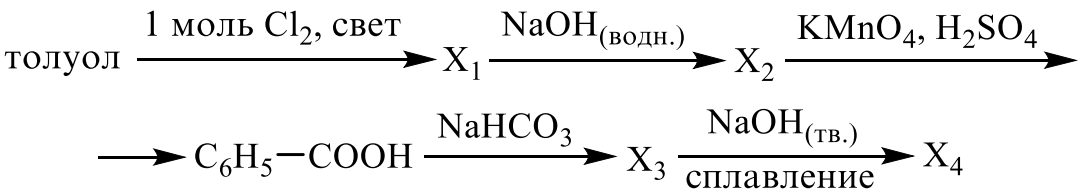

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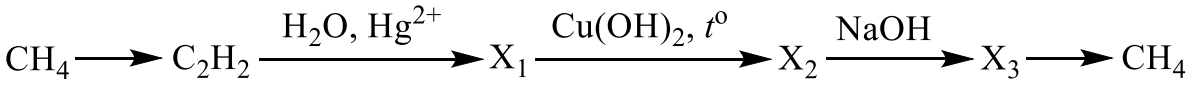

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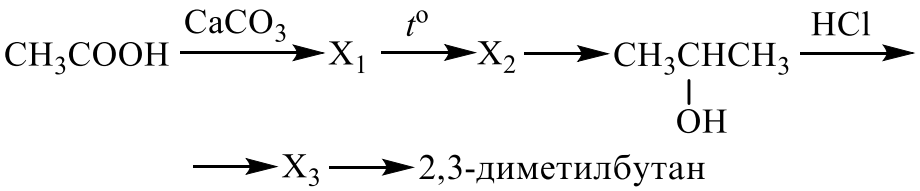

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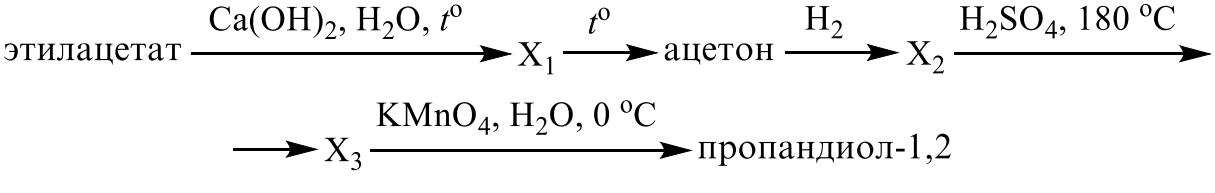

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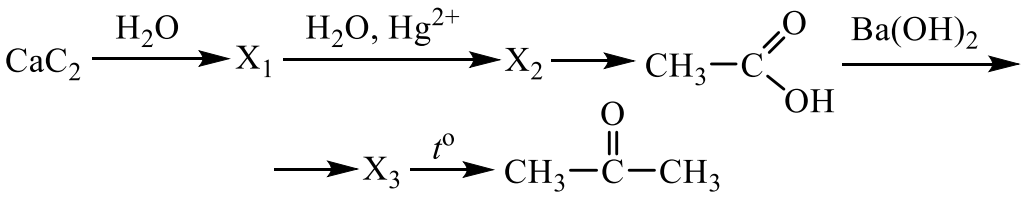

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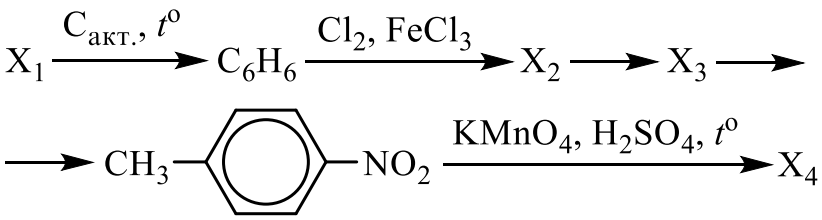

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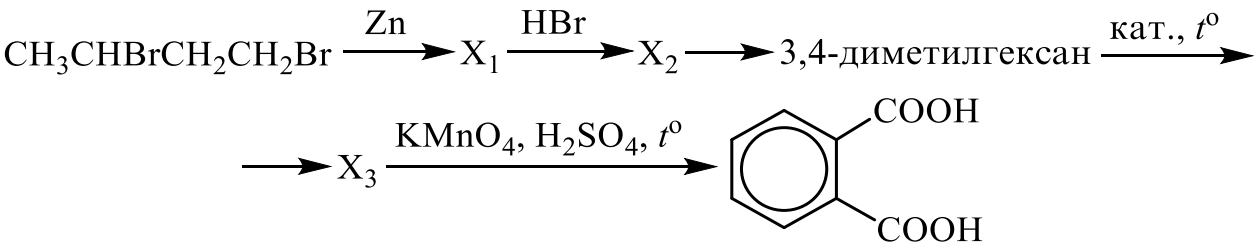

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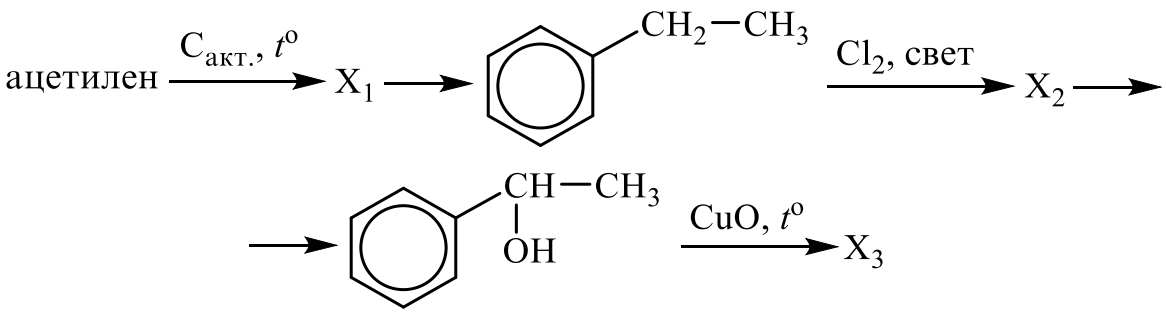

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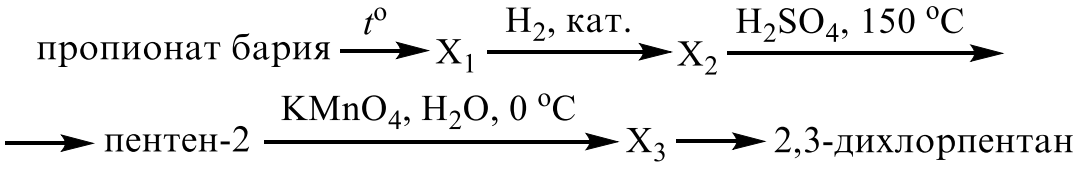

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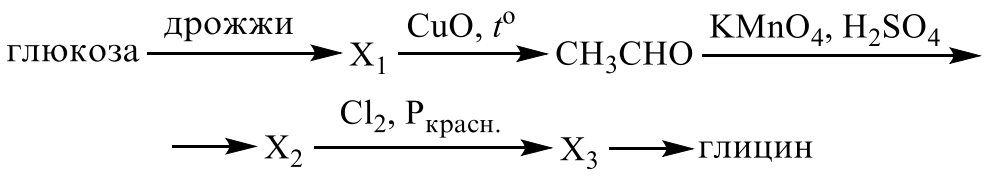

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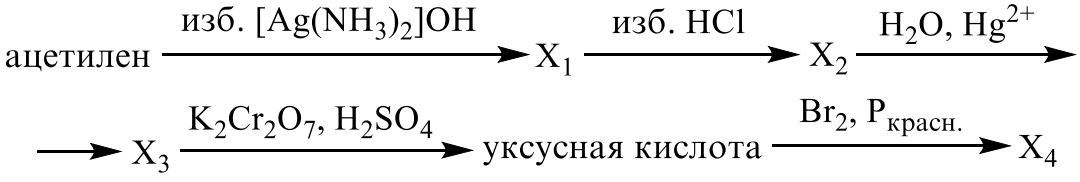

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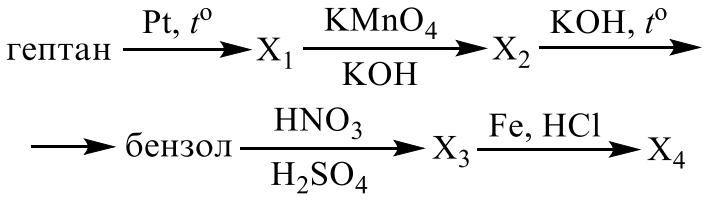

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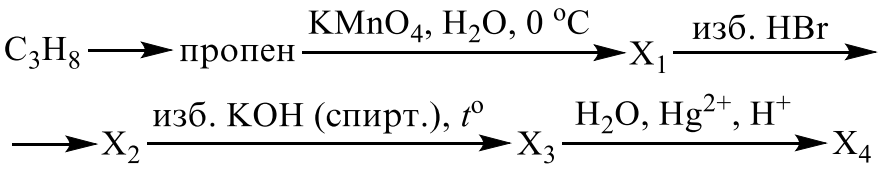

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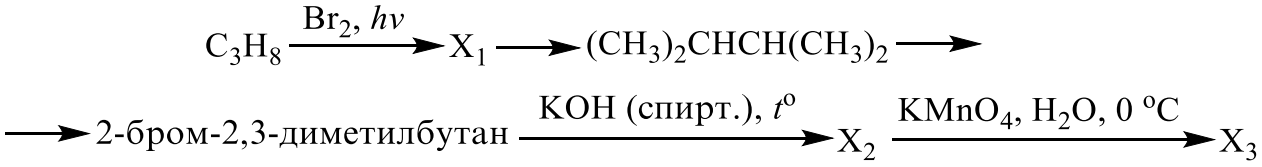

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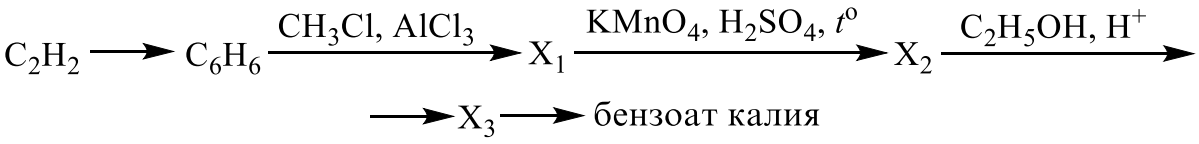

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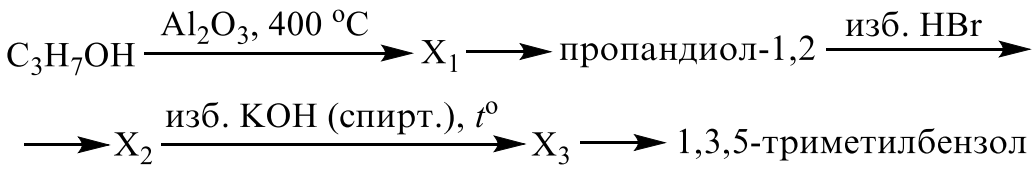

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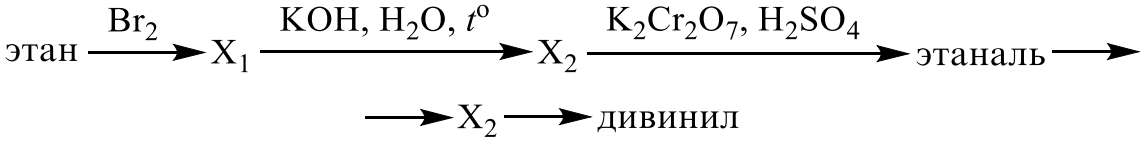

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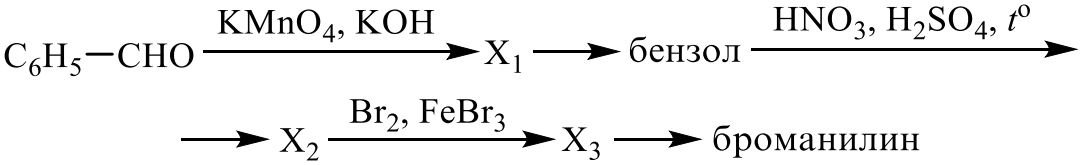

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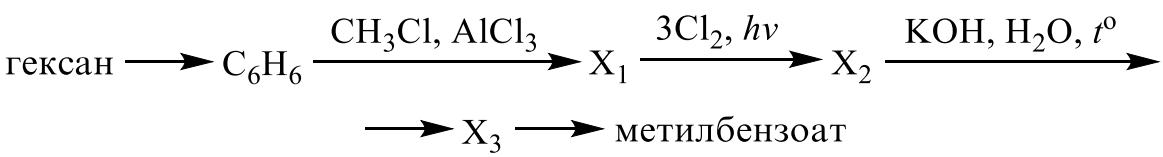

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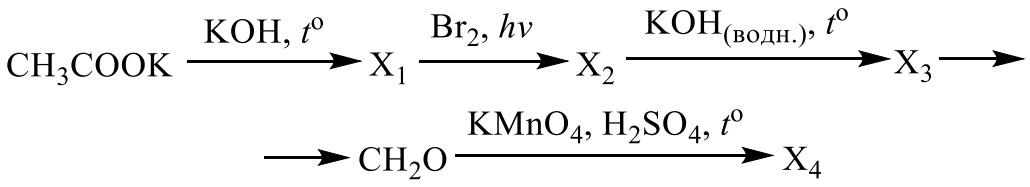

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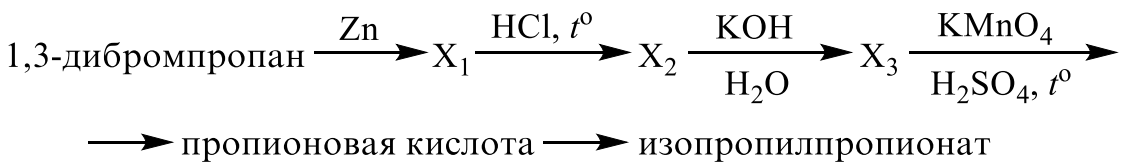

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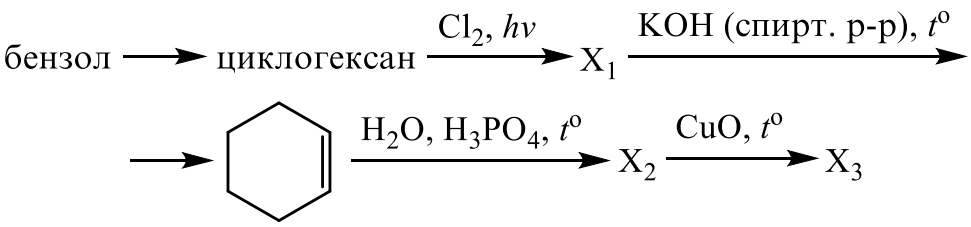

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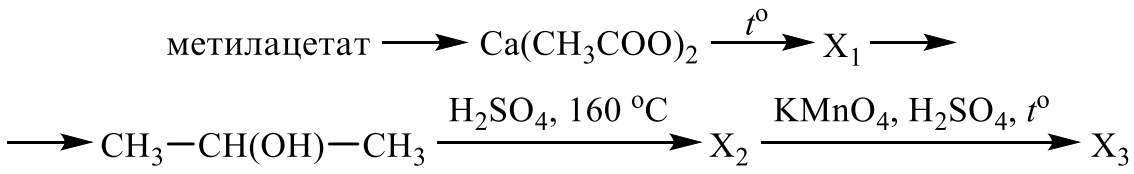

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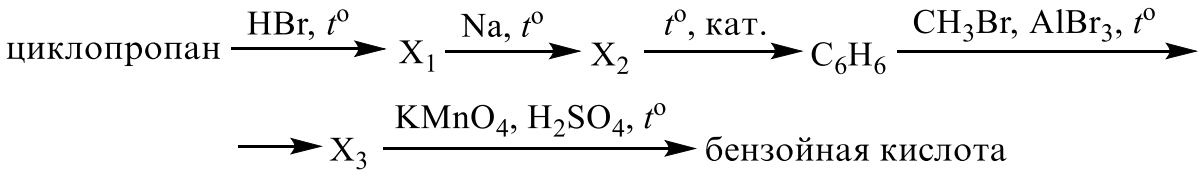

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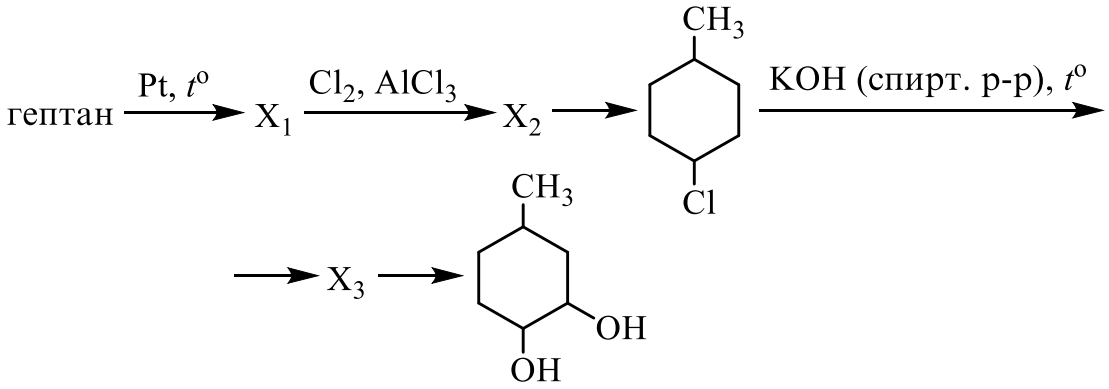

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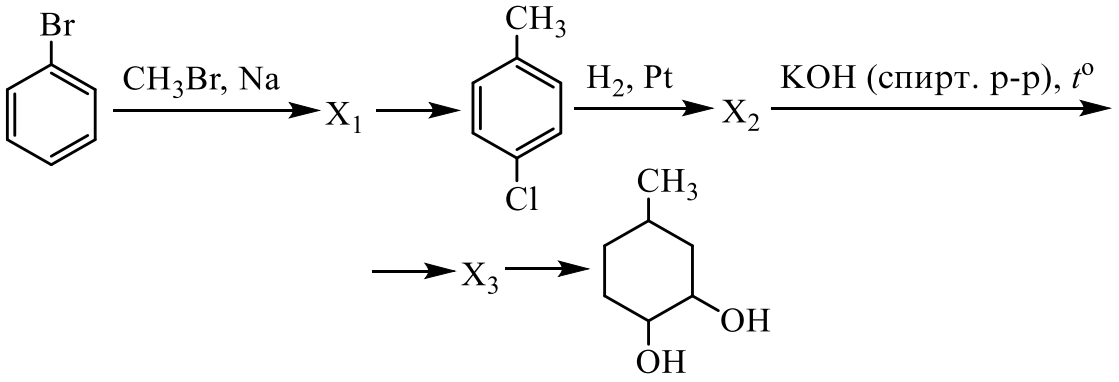

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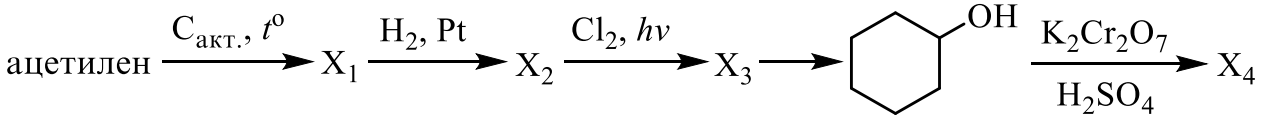

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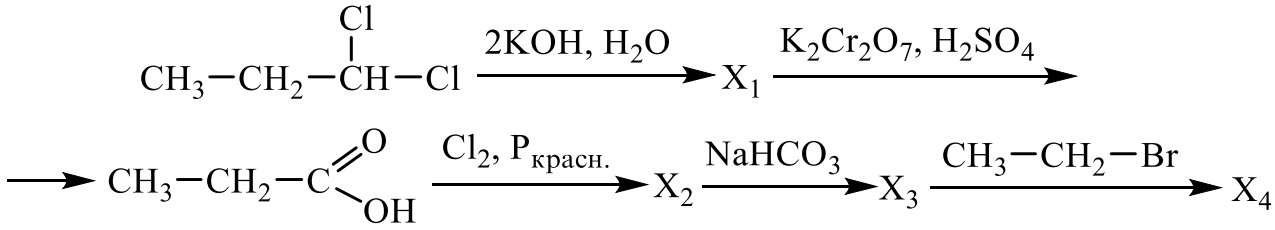

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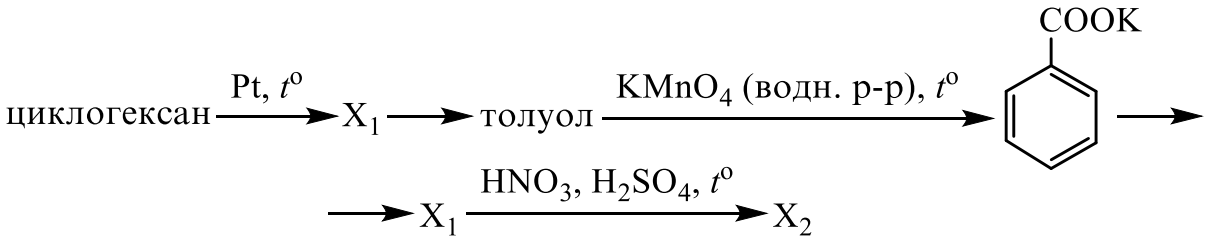

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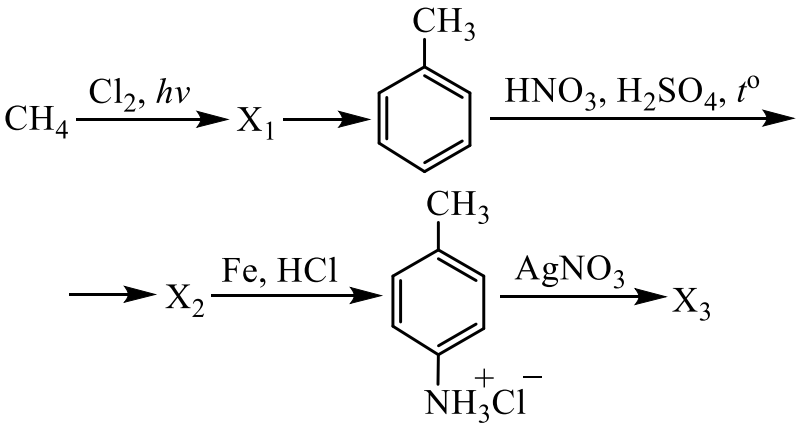

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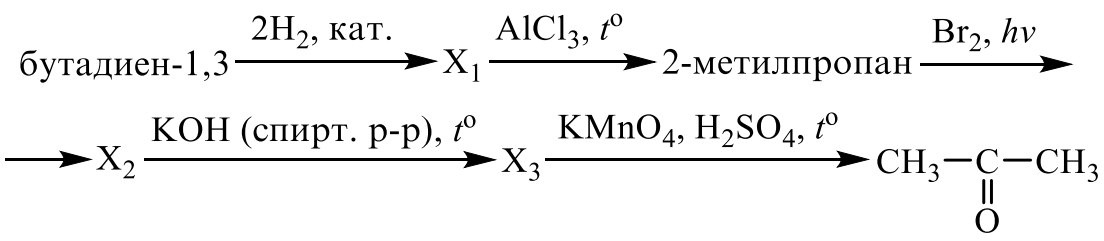

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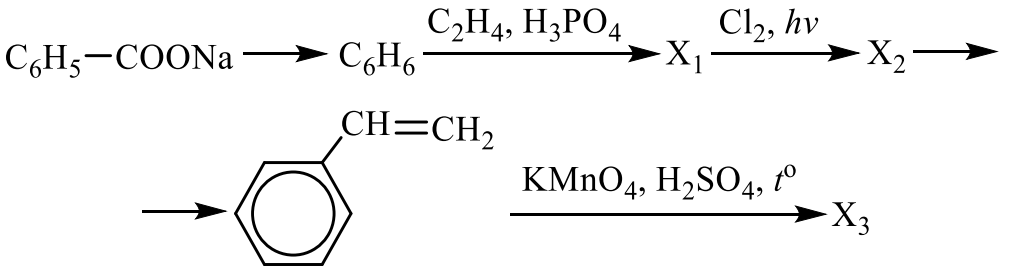

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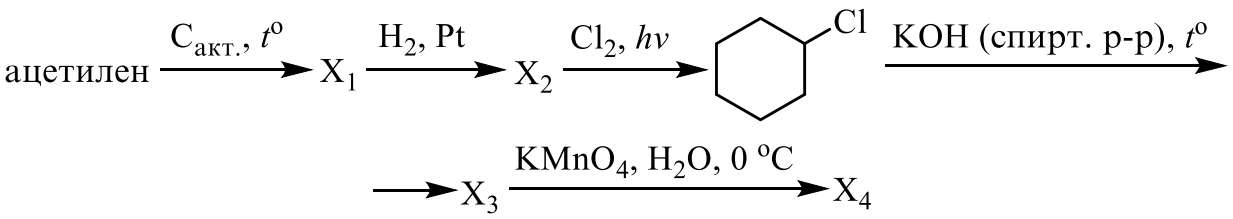

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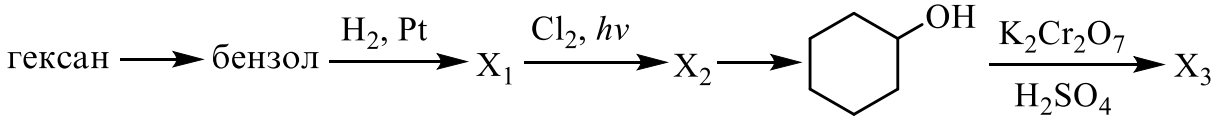

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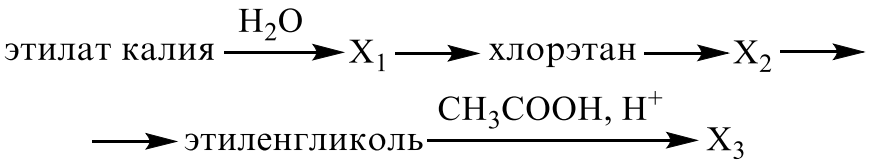

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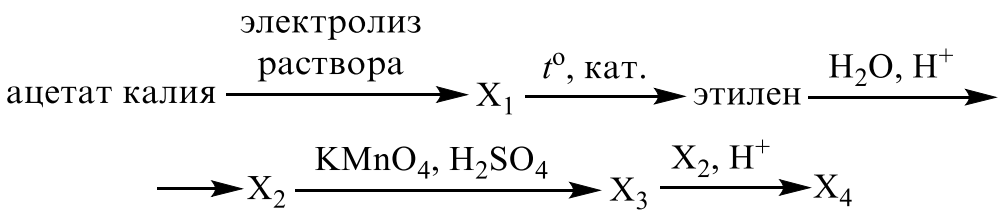
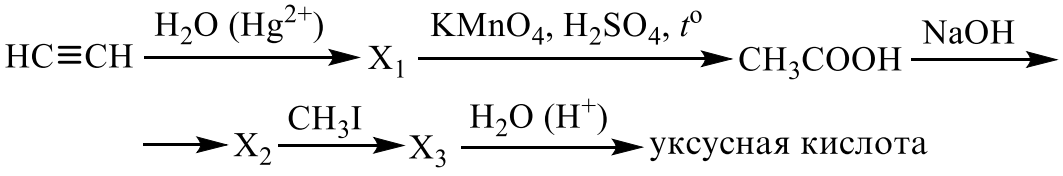


120.



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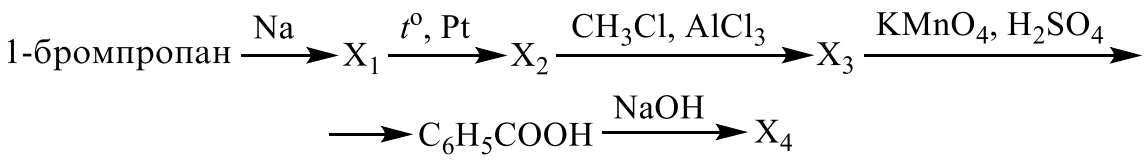

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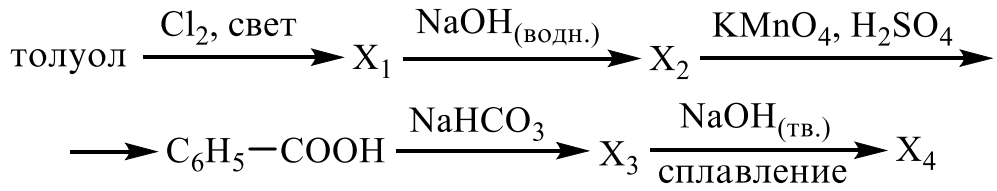
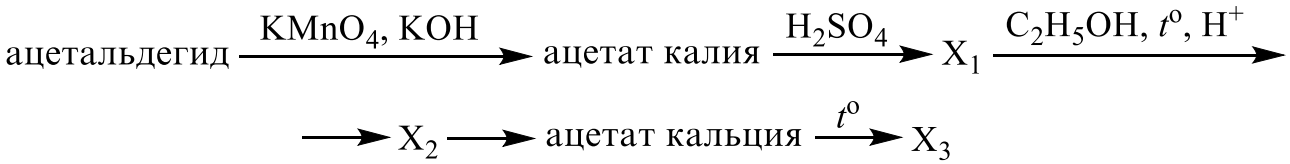


123.



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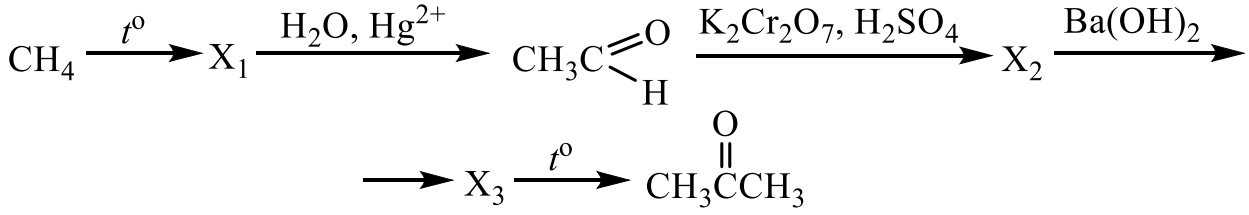

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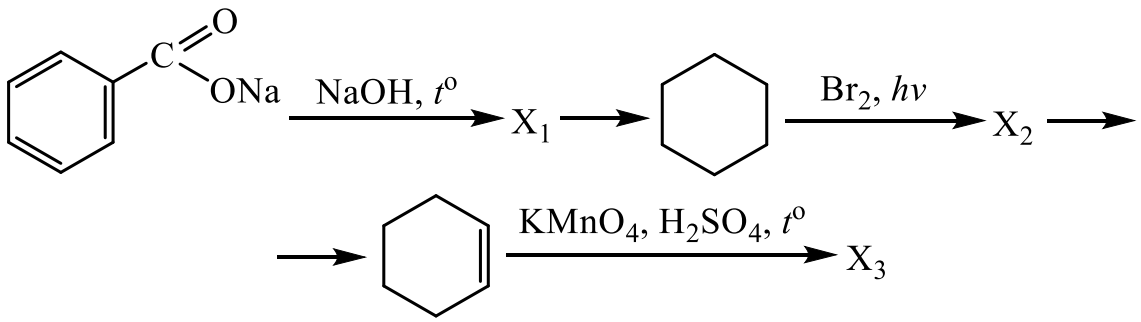

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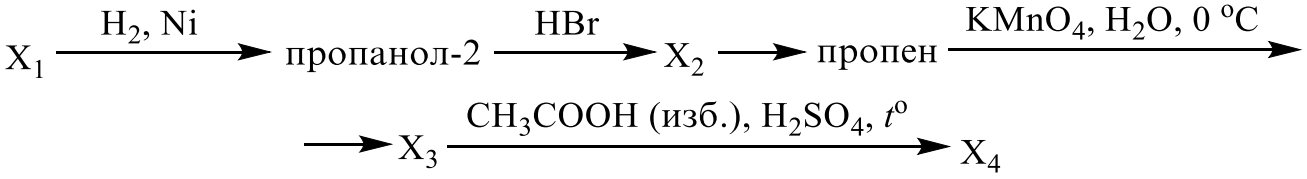

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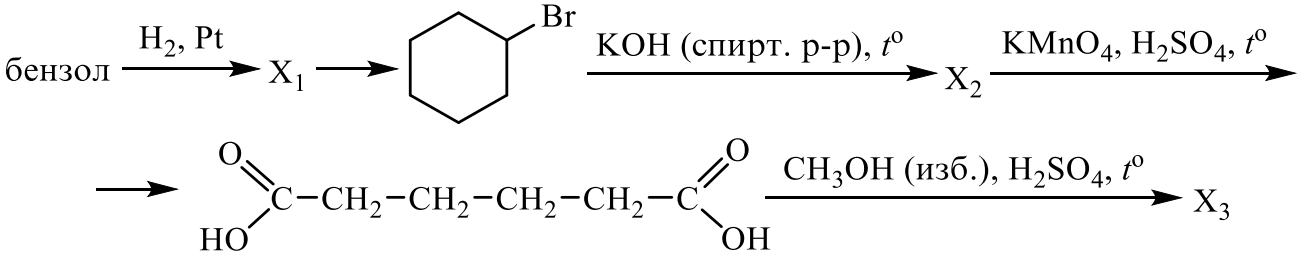
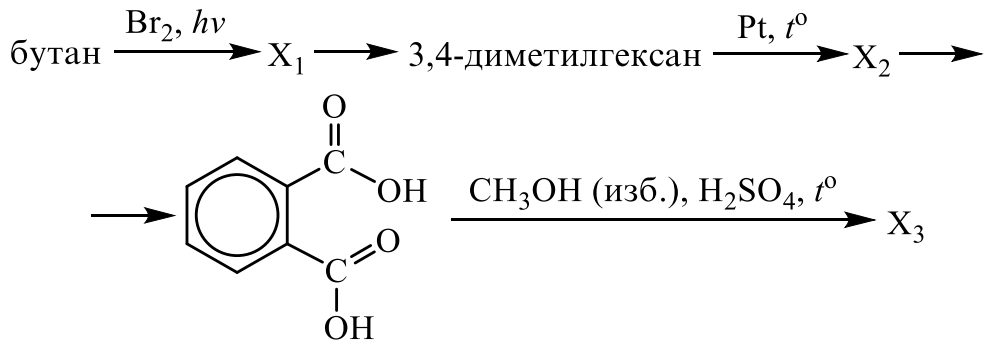
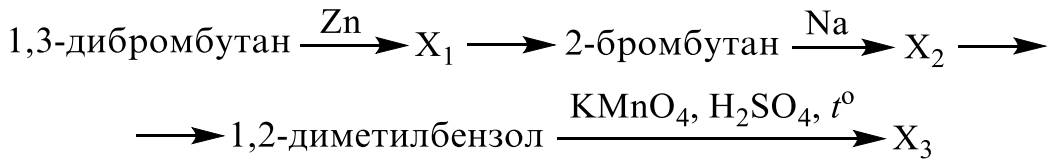


128.

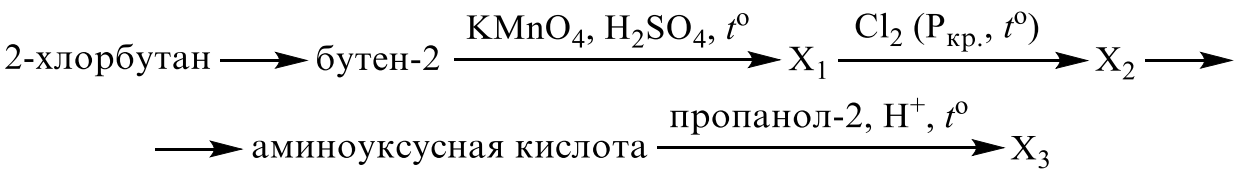


2012

129.



130.



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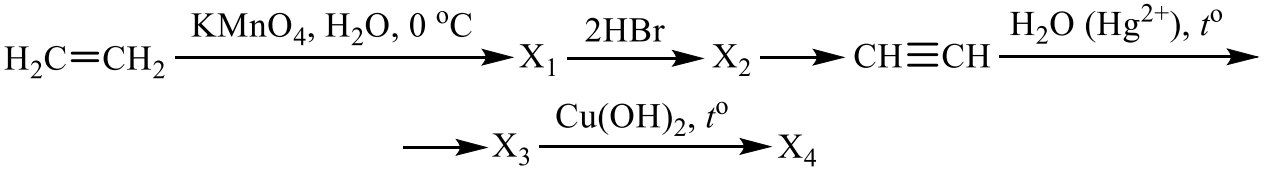

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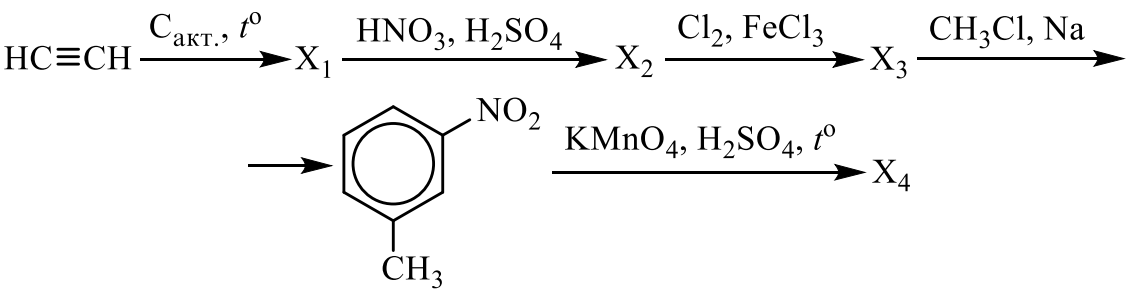

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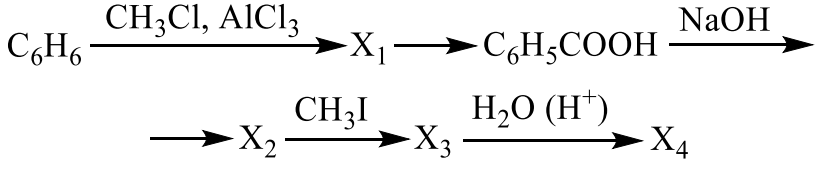

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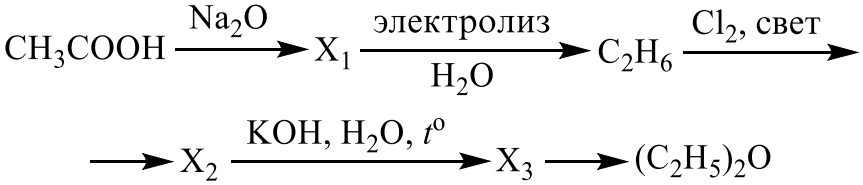


135.

$$CH_2{=}CH_2 \xrightarrow{KMnO_4,\ H_2O,\ 0\ ^oC} X_1 \xrightarrow{\text{изб. HBr}} X_2 \longrightarrow$$

$$\longrightarrow \text{этин} \xrightarrow{[Ag(NH_3)_2]OH} X_3 \longrightarrow \text{этин}$$

136.

$$\text{этин} \xrightarrow{H_2O,\ Hg^{2+}} X_1 \xrightarrow{KMnO_4,\ H_2SO_4} CH_3COOH \xrightarrow{Cl_2,\ P_{красн.}}$$

$$\longrightarrow X_2 \longrightarrow \text{глицин} \xrightarrow{Ba(OH)_2} X_3$$

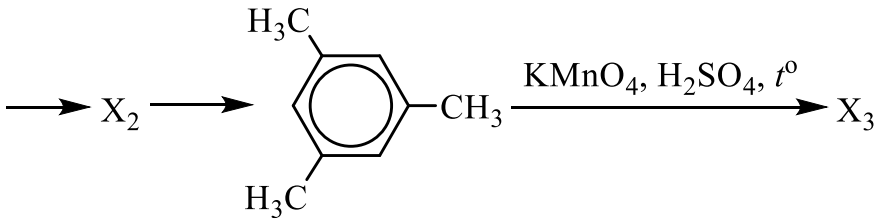
137.

$$\text{этанол} \longrightarrow X_1 \xrightarrow{\text{изб. } H_2,\ \text{кат.}} \text{бутан} \xrightarrow{Cl_2,\ hv} X_2 \longrightarrow$$

$$\longrightarrow \text{бутен-2} \xrightarrow{KMnO_4,\ H_2SO_4,\ t^o} X_3$$

138.

$$\text{пропанол-1} \xrightarrow{Al_2O_3,\ 400\ ^oC} X_1 \longrightarrow \text{1,2-дибромпропан} \xrightarrow{KOH\ (\text{спирт. р-р}),\ t^o}$$



$$\longrightarrow X_2 \longrightarrow \xrightarrow{KMnO_4,\ H_2SO_4,\ t^o} X_3$$

2011

139.

$$C_6H_6 \xrightarrow{C_2H_5Cl,\ AlCl_3} X_1 \xrightarrow{KMnO_4,\ H_2SO_4,\ t^o} X_2 \xrightarrow{t^o,\ \text{кат.}}$$

$$\longrightarrow C_6H_6 \xrightarrow{HNO_3,\ H_2SO_4} X_3 \longrightarrow C_6H_5{-}NH_2$$

140.

$$C_3H_8 \xrightarrow{Br_2,\ \text{свет}} X_1 \xrightarrow{KOH + H_2O} X_2 \longrightarrow C_3H_6 \xrightarrow{Br_2}$$

$$\longrightarrow X_3 \xrightarrow{\text{изб. KOH (спиртов.)},\ t^o} X_4$$

141.

$$CH_3{-}CH_2{-}CH_2{-}OH \xrightarrow[180\ ^oC]{H_2SO_4} X_1 \xrightarrow{HCl} X_2 \xrightarrow{NaOH,\ H_2O}$$

$$\longrightarrow X_3 \longrightarrow X_1 \xrightarrow{KMnO_4,\ H_2O,\ 0\ ^oC} X_4$$

142.

$$X_1 \longrightarrow \text{бензол} \xrightarrow{C_2H_4,\ H^+} X_2 \xrightarrow{KMnO_4,\ H_2SO_4,\ t^o} X_3 \xrightarrow{CH_3OH,\ t^o,\ H^+} X_4 \longrightarrow CO_2$$

143.

$$CH_3C{\equiv}CAg \xrightarrow{HCl} X_1 \xrightarrow{HBr\ (\text{изб.})} X_2 \longrightarrow X_1 \xrightarrow{H_2O,\ Hg^{2+}} \text{ацетон} \xrightarrow{H_2,\ \text{кат.},\ t^o} X_3$$

144.

$$C_3H_8 \longrightarrow C_3H_6 \xrightarrow{Br_2} X_1 \longrightarrow CH_3C{\equiv}CH \xrightarrow[Hg^{2+},\ H^+]{H_2O} X_2 \longrightarrow CH_3{-}CH(OH){-}CH_3$$

145.

$$\text{ацетилен} \xrightarrow{C_{\text{акт.}},\ t^o} X_1 \xrightarrow{C_2H_5Cl,\ AlCl_3} X_2 \xrightarrow{Cl_2,\ \text{свет}} X_3 \longrightarrow \text{стирол} \longrightarrow \text{полистирол}$$

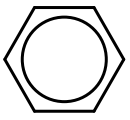
146.

$$C_2H_5COONa \xrightarrow{NaOH\ (\text{сплав.})} X_1 \longrightarrow \text{бромэтан} \xrightarrow{KOH\ (\text{спирт.}),\ t^o} X_2 \xrightarrow{Br_2} X_3 \xrightarrow{\text{изб. KOH (водн.)},\ t^o} X_4$$

147.

$$\text{ацетальдегид} \xrightarrow{H_2,\ \text{кат.}} X_1 \longrightarrow \text{бромэтан} \longrightarrow \text{бутан} \xrightarrow{t^o,\ \text{кат.}} X_2 \xrightarrow{2Br_2} X_3$$

148.

$$\text{толуол} \xrightarrow{KMnO_4,\ H_2SO_4,\ t^o} X_1 \xrightarrow{KOH} X_2 \longrightarrow \text{  } \xrightarrow{HNO_3,\ H_2SO_4,\ t^o} X_3 \longrightarrow \text{анилин}$$

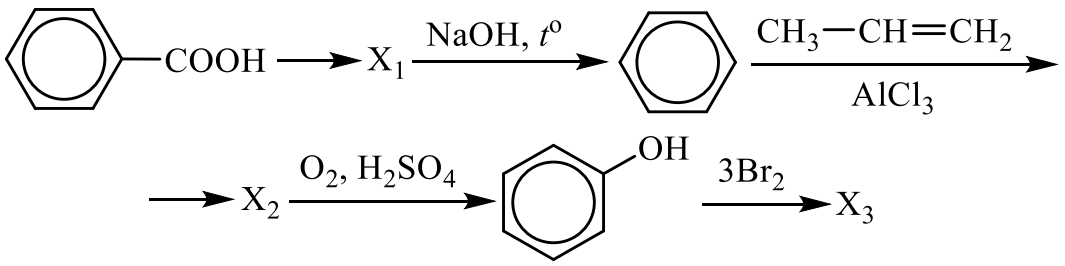
149.

$$\text{толуол} \xrightarrow{Cl_2,\ \text{свет}} X_1 \xrightarrow{NaOH_{(\text{водн.})}} X_2 \xrightarrow{KMnO_4,\ H_2SO_4} C_6H_5{-}COOH \xrightarrow{Na} X_3 \xrightarrow[\text{сплавление}]{NaOH_{(\text{тв.})}} X_4$$

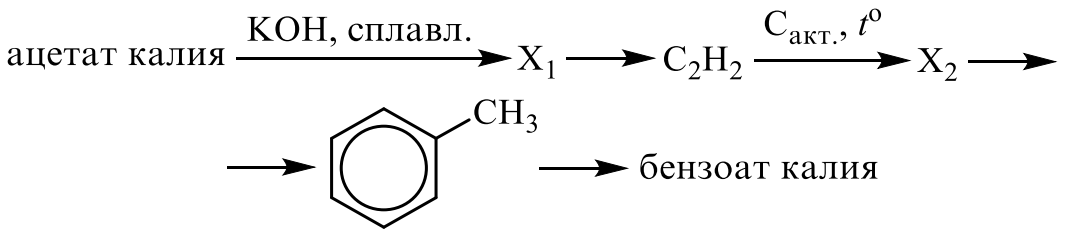
150.

$$C_2H_2 \xrightarrow{[Ag(NH_3)_2]OH} X_1 \xrightarrow{HCl} X_2 \xrightarrow{H_2O} CH_3CHO \xrightarrow{H_2} X_3 \longrightarrow \text{этилацетат}$$

151.

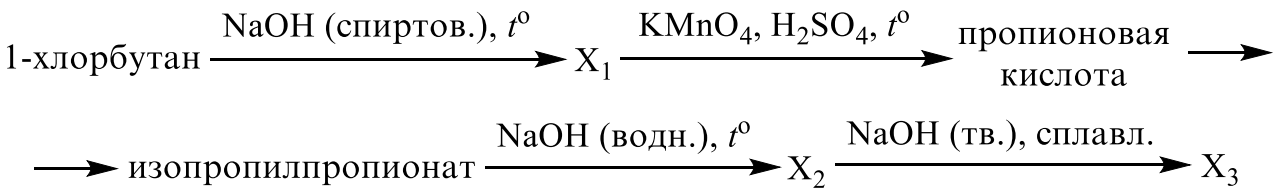


152.

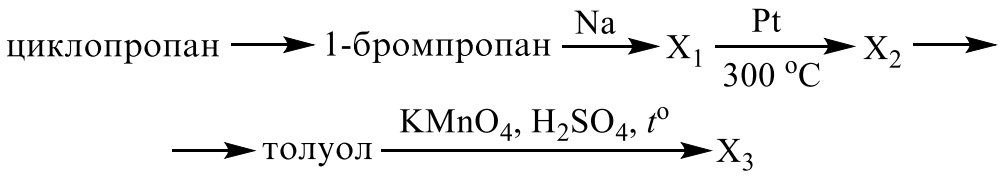


2010

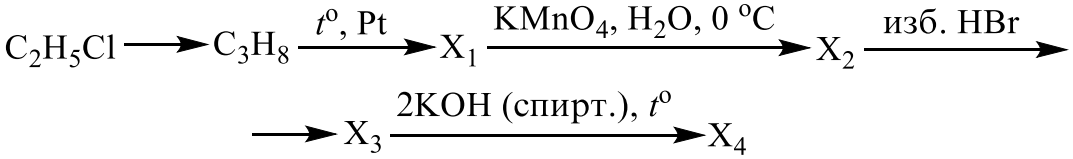
153.



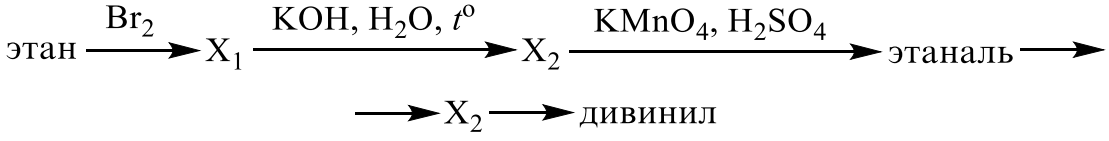
154.



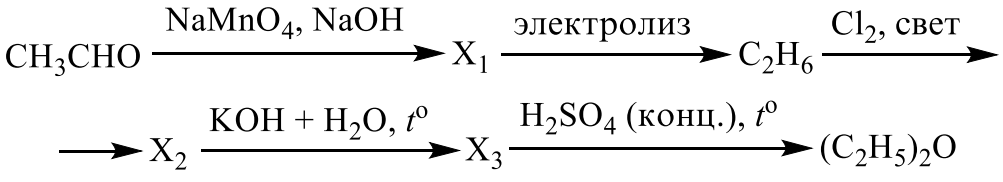
155.



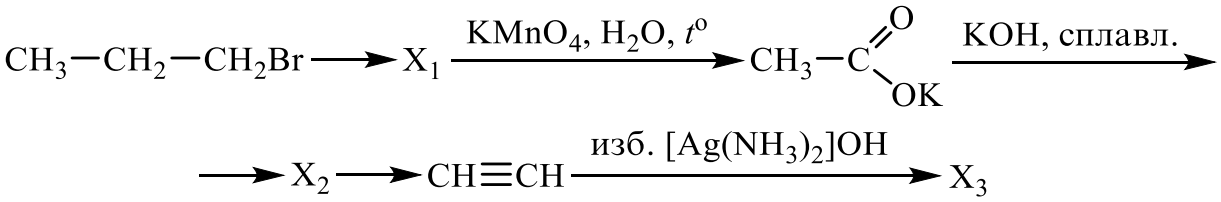
156.



157.

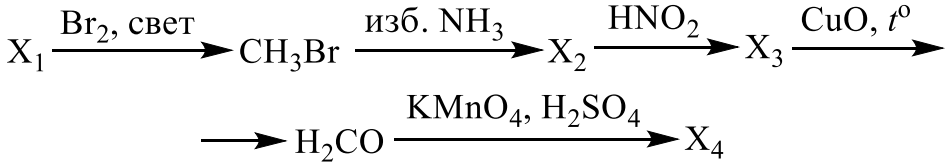


158.

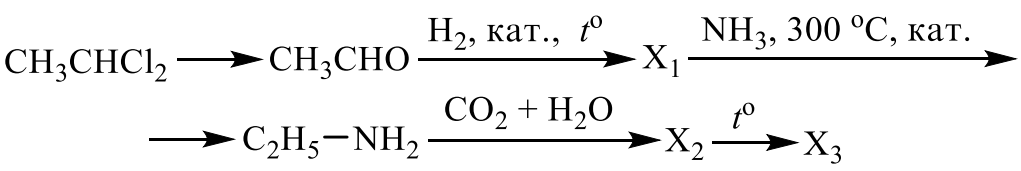


2009

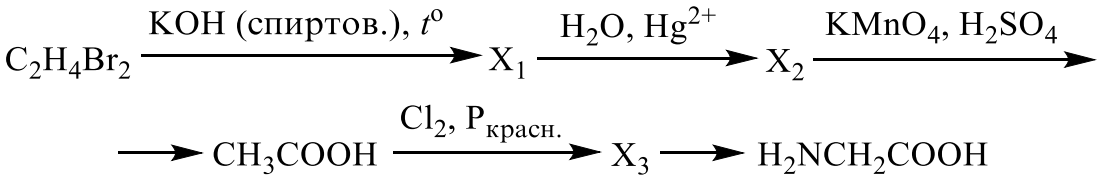
159.



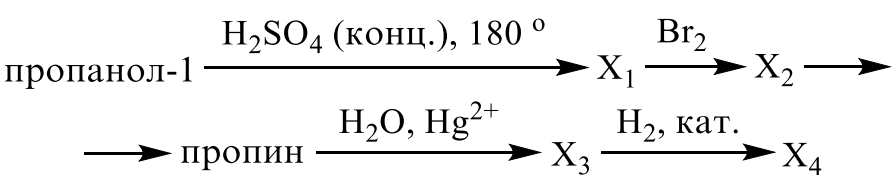
160.



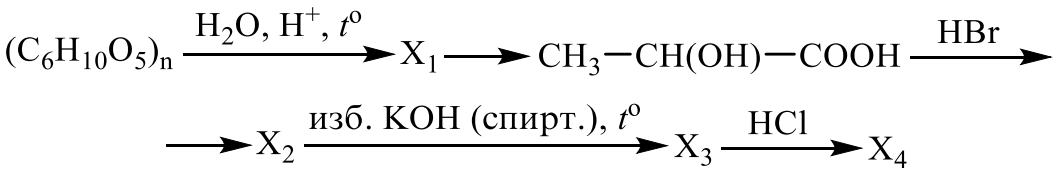
161.



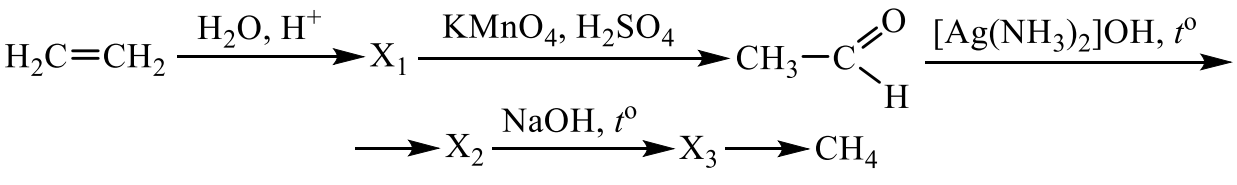
162.



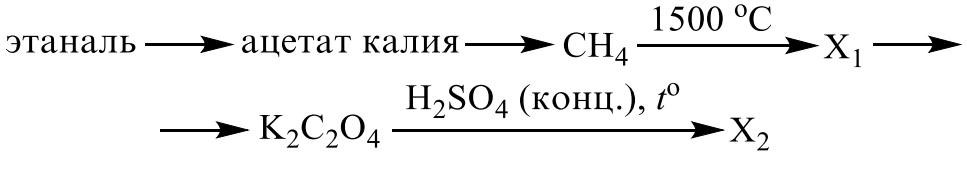
163.



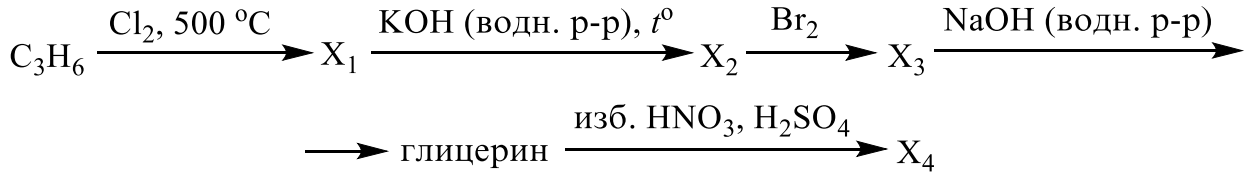
164.



165.

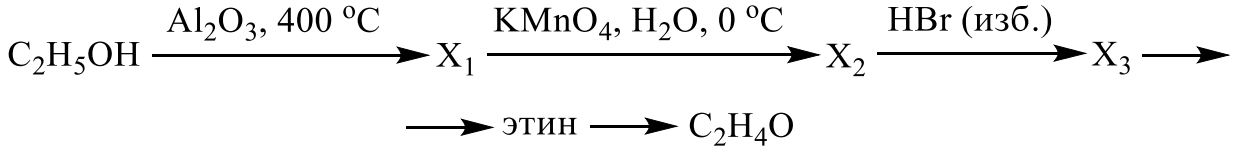


166.

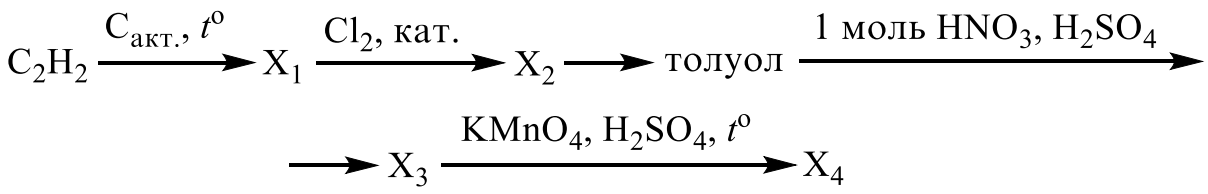


2008

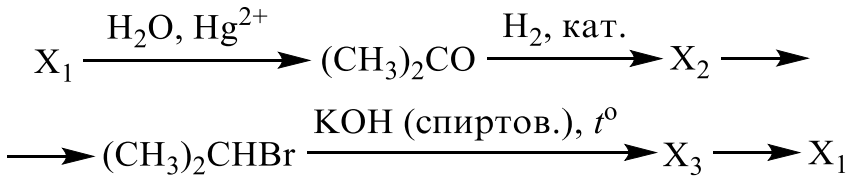
167.



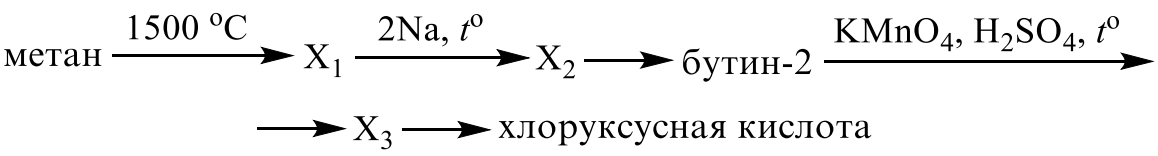
168.



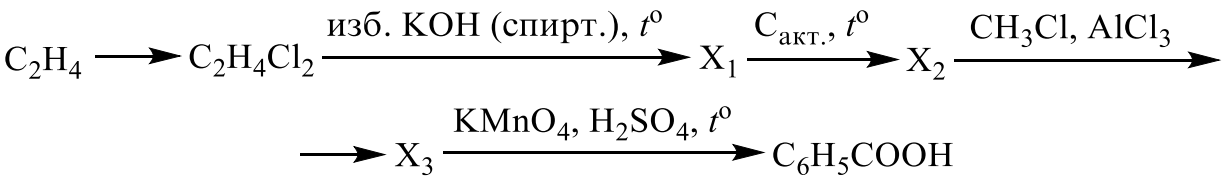
169.



170.



171.



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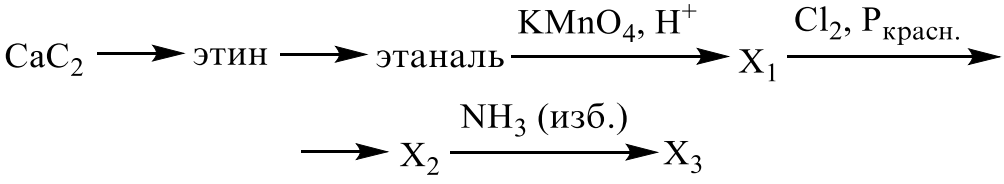

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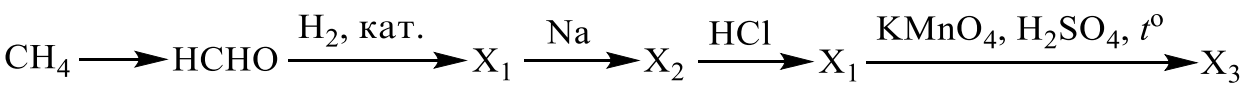


174.

$$CaCO_3 \longrightarrow CaC_2 \longrightarrow X_1 \xrightarrow{[Ag(NH_3)_2]OH} Ag_2C_2 \xrightarrow{HCl} \longrightarrow X_1 \xrightarrow{KMnO_4,\ H_2O} X_2$$

175.

$$C_6H_6 \xrightarrow{C_2H_5Br,\ кат.} X_1 \xrightarrow{Br_2,\ свет} X_2 \longrightarrow C_6H_5{-}CH(OH)CH_3 \xrightarrow{H_2SO_4,\ t^o} \longrightarrow X_3 \xrightarrow{полимеризация} X_4$$

176.

$$C_2H_6 \xrightarrow{HNO_3,\ t^o} X_1 \xrightarrow{H_2,\ t^o,\ кат.} X_2 \xrightarrow{HBr} X_3 \xrightarrow{NaOH} X_2 \xrightarrow{C_2H_5Br} X_4$$

177.

$$C_2H_5OH \xrightarrow{HBr} X_1 \xrightarrow{KOH\ (спиртов.),\ t^o} X_2 \xrightarrow{кат.} C_6H_5C_2H_5 \xrightarrow{Br_2,\ свет} \longrightarrow X_3 \xrightarrow{KOH\ (спиртов.),\ t^o} X_4$$

178.

$$H_2C_2O_4 \longrightarrow CO \xrightarrow{H_2,\ t^o,\ кат.} X_1 \xrightarrow{CH_3COOH,\ H^+,\ t^o} \longrightarrow X_2 \xrightarrow{NaOH,\ H_2O,\ t^o} X_3 \longrightarrow CH_4$$

179.

$$бутан \xrightarrow{O_2,\ t^o,\ кат.} уксусная\ кислота \xrightarrow{Ca} X_1 \xrightarrow{t^o} \longrightarrow ацетон \xrightarrow{H_2,\ t^o,\ кат.} X_2 \xrightarrow{HCOOH,\ H^+,\ t^o} X_3$$

Задания разных лет

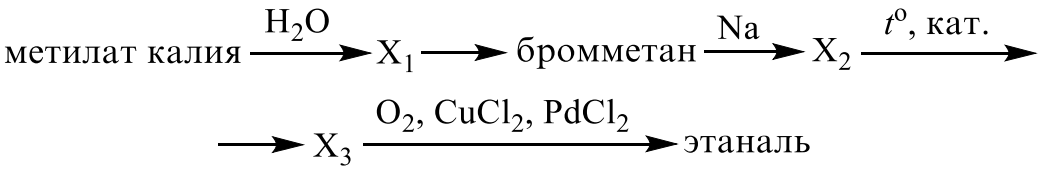
180.

$$CH_4 \longrightarrow этин \longrightarrow винилацетилен \xrightarrow{изб.\ H_2,\ кат.} X_1 \longrightarrow \longrightarrow этановая\ кислота \xrightarrow{NH_3} X_2$$

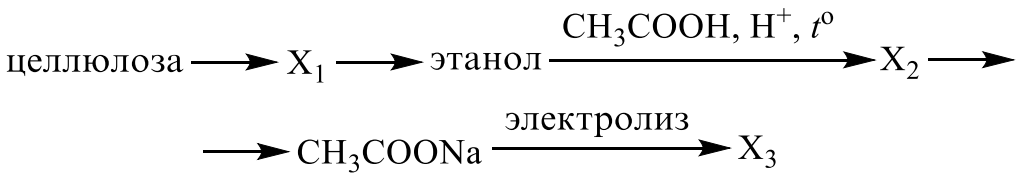
181.

$$метан \xrightarrow{HNO_3\ (р\text{-}р),\ t^o} X_1 \longrightarrow метиламин \longrightarrow X_2 \xrightarrow{KOH} \longrightarrow метиламин \longrightarrow N_2$$

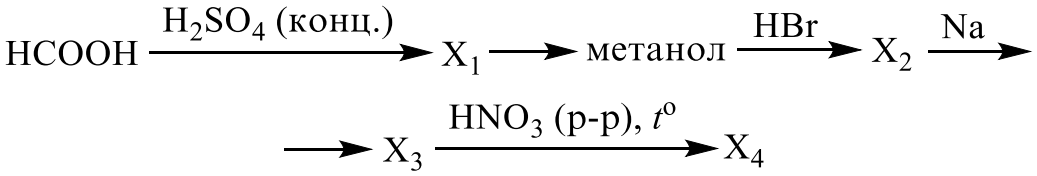
182.



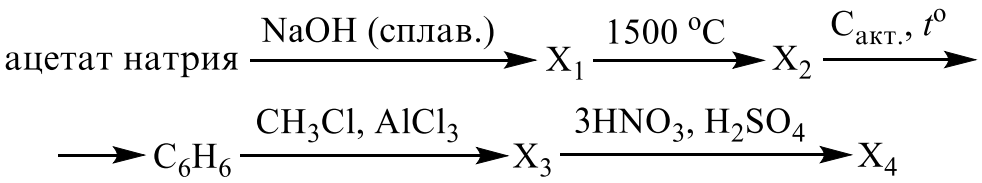
183.



184.



185.



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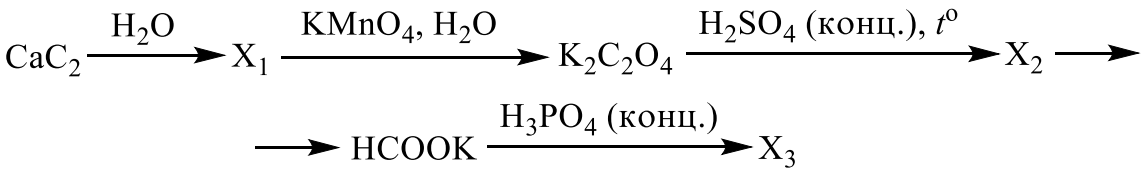

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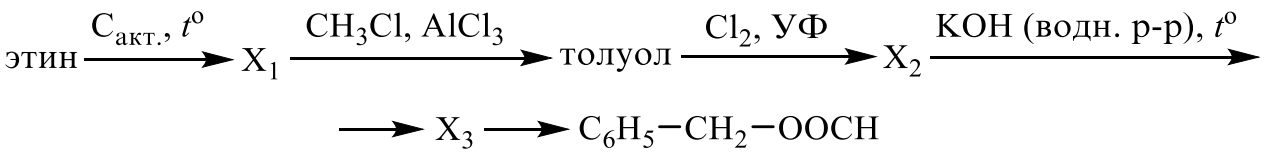

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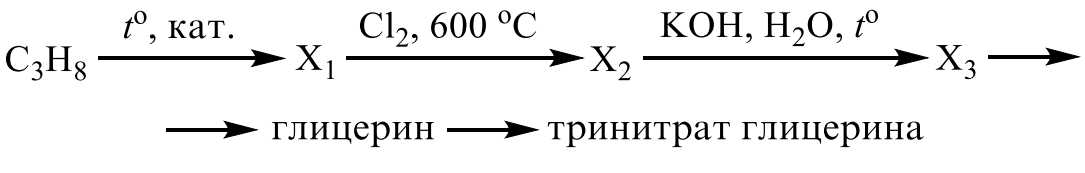

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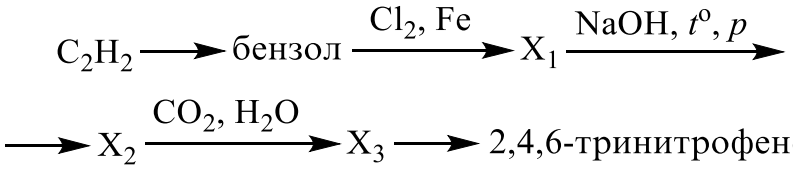

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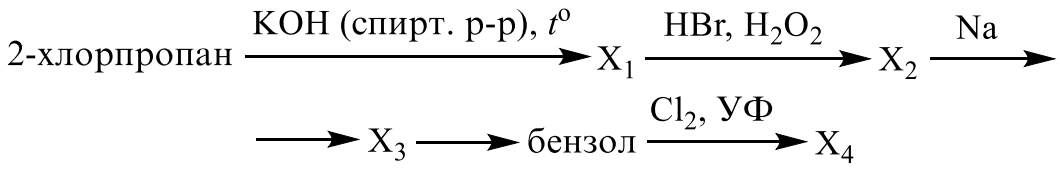

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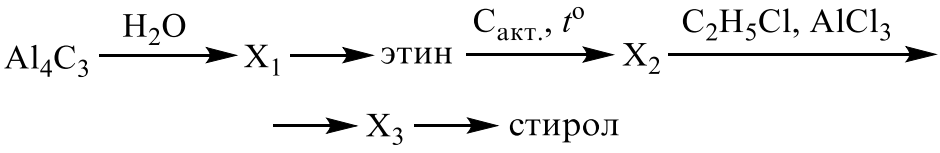

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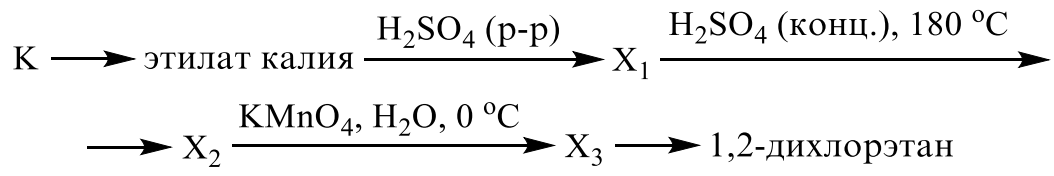

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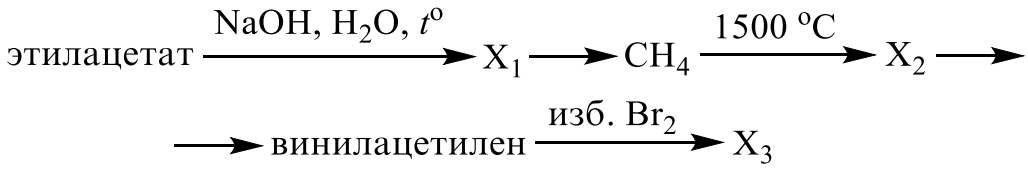

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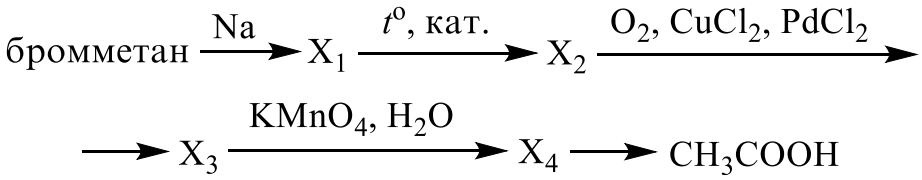

195.