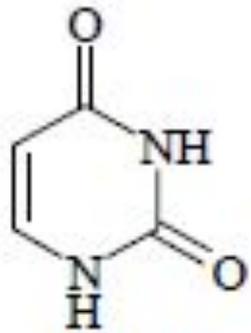
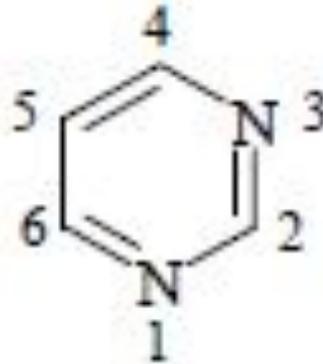
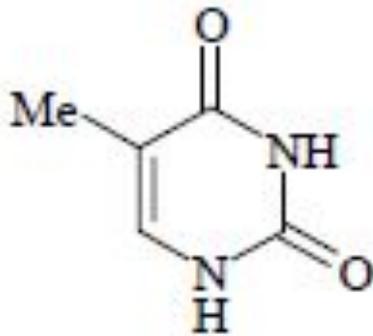


***Шестичленные
гетероциклы с несколькими
атомами азота***

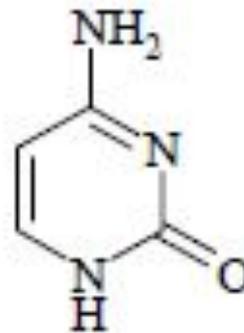
Пиримидины



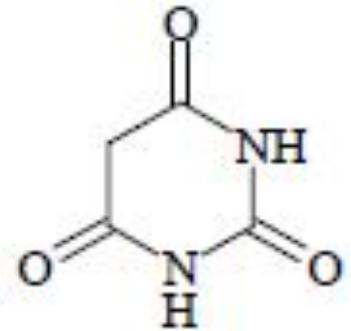
урацил



тимин



цитозин



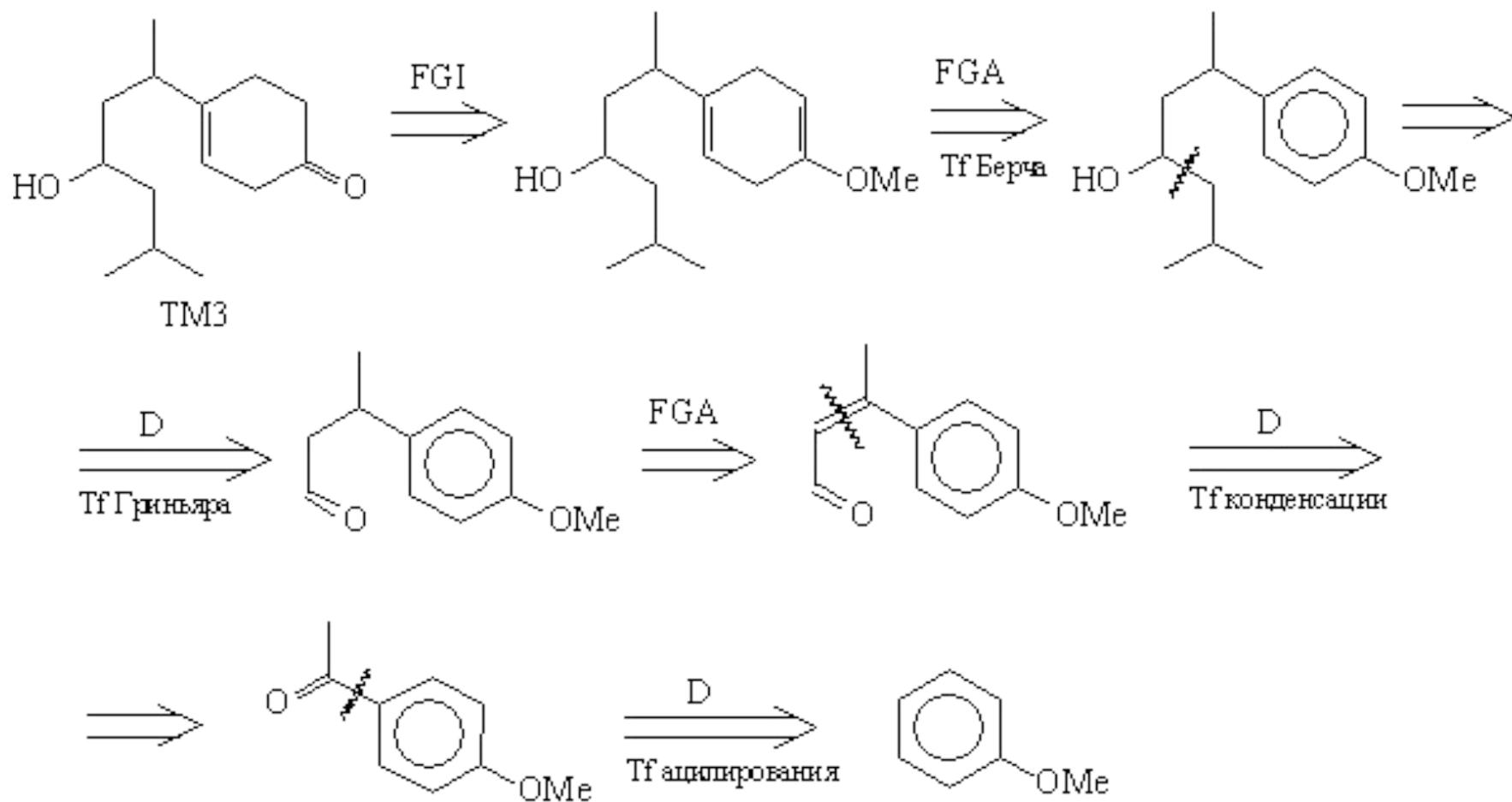
барбитуровая кислота

Основные понятия ретросинтетического анализа

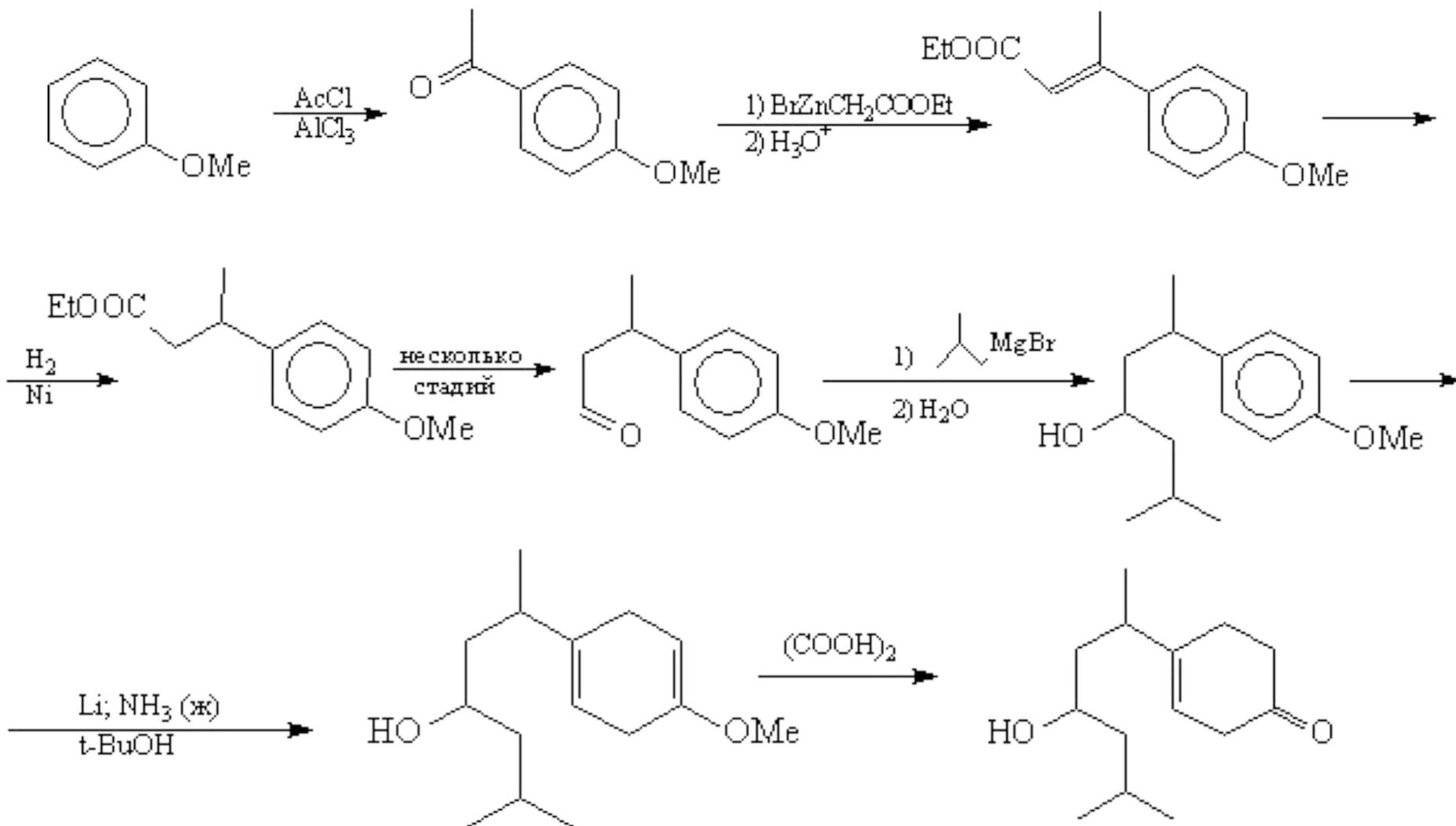
В основе ретросинтетического анализа лежит идея постепенного уменьшения молекулярной сложности.

Проводят последовательное упрощение структуры ТМ в соответствии с определенными правилами до тех пор, пока не будет получено доступное соединение, либо такое соединение, способ синтеза которого известен.

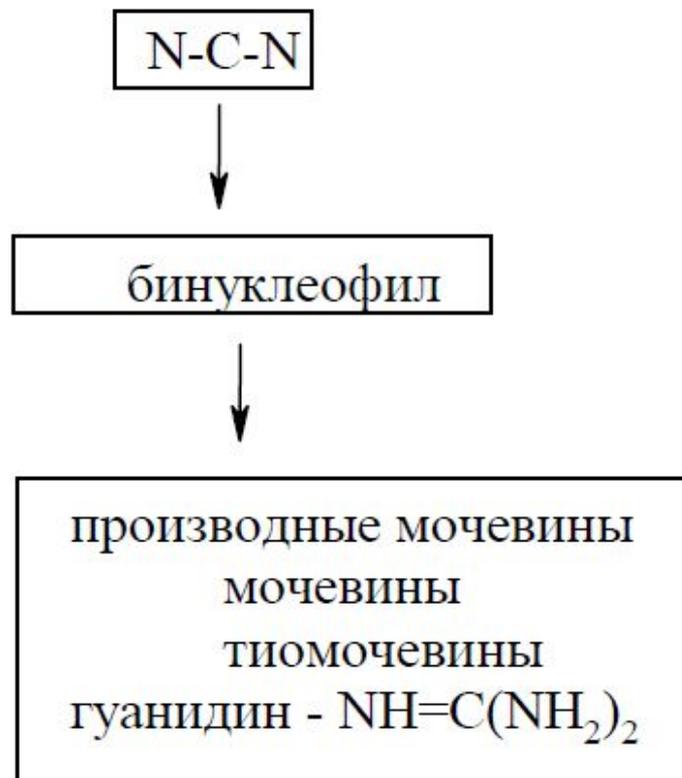
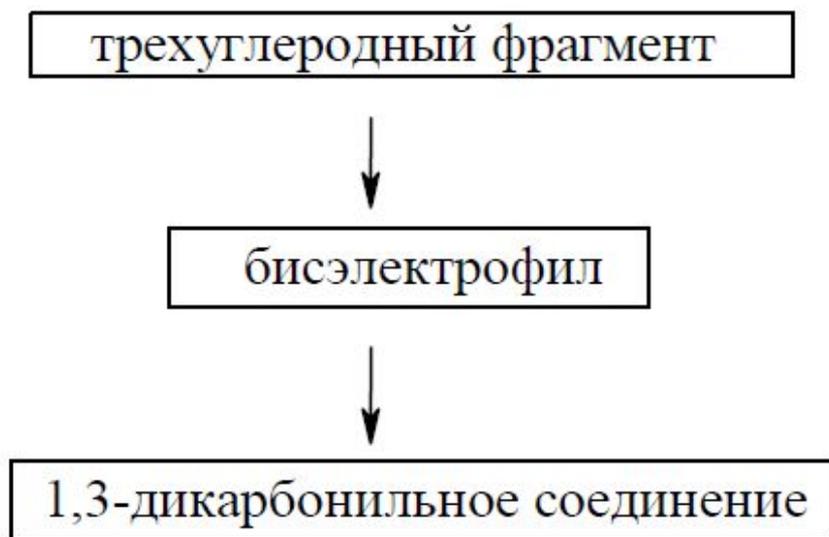
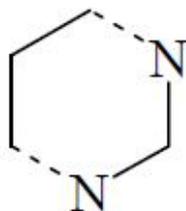
Пример анализа



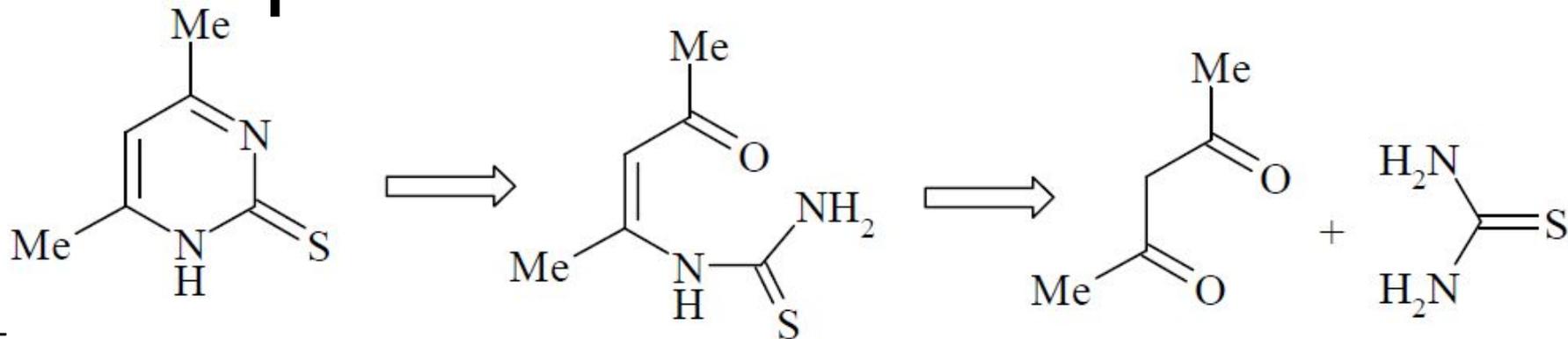
Пример синтеза



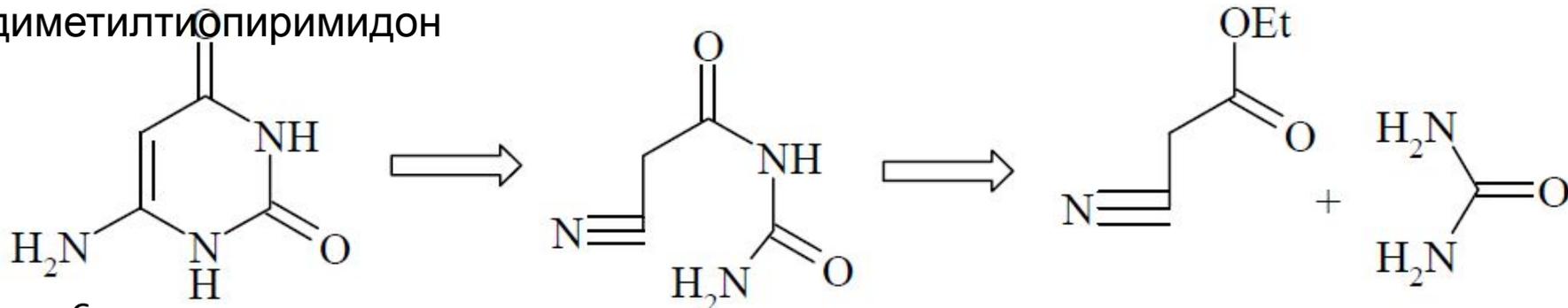
Методы синтеза пиримидинов



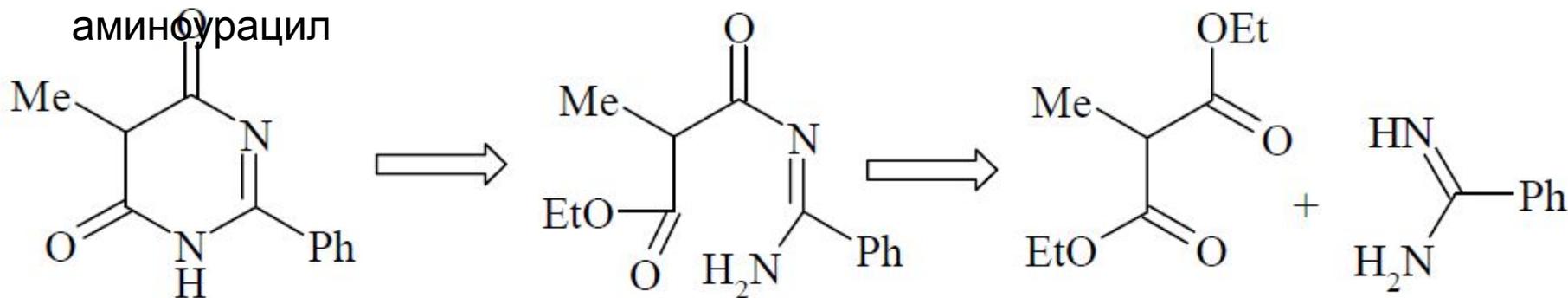
Ретросинтетический анализ



4,6-
диметилтиопиримидон



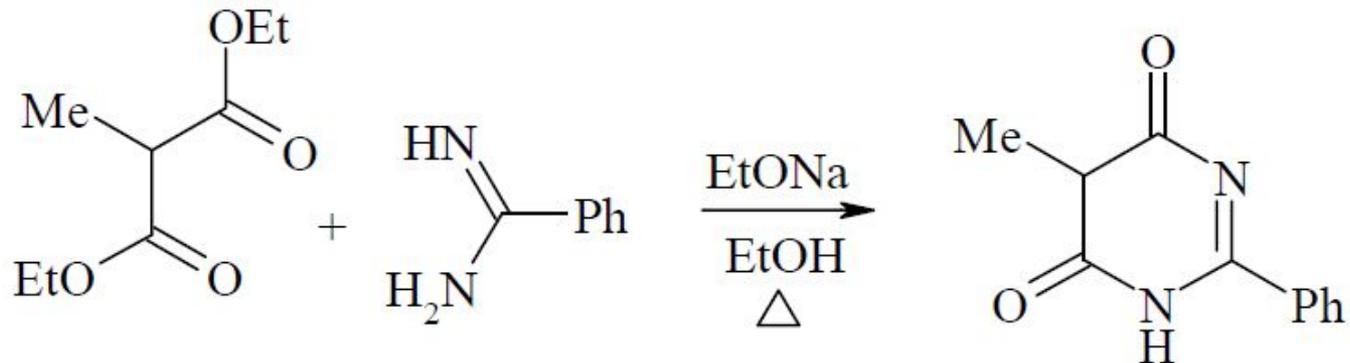
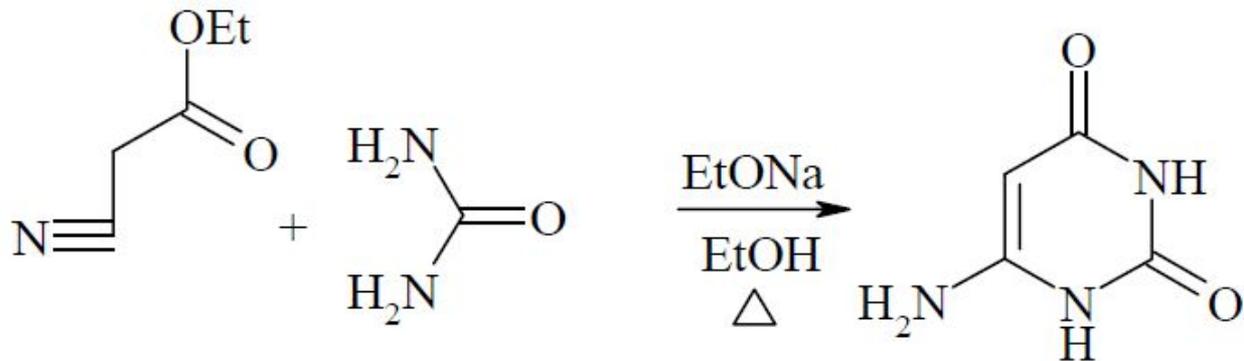
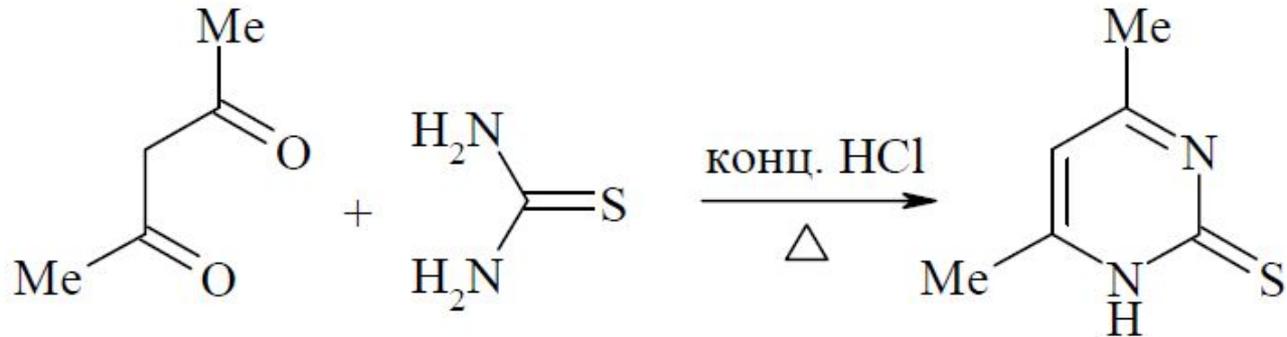
6-
аминоурацил



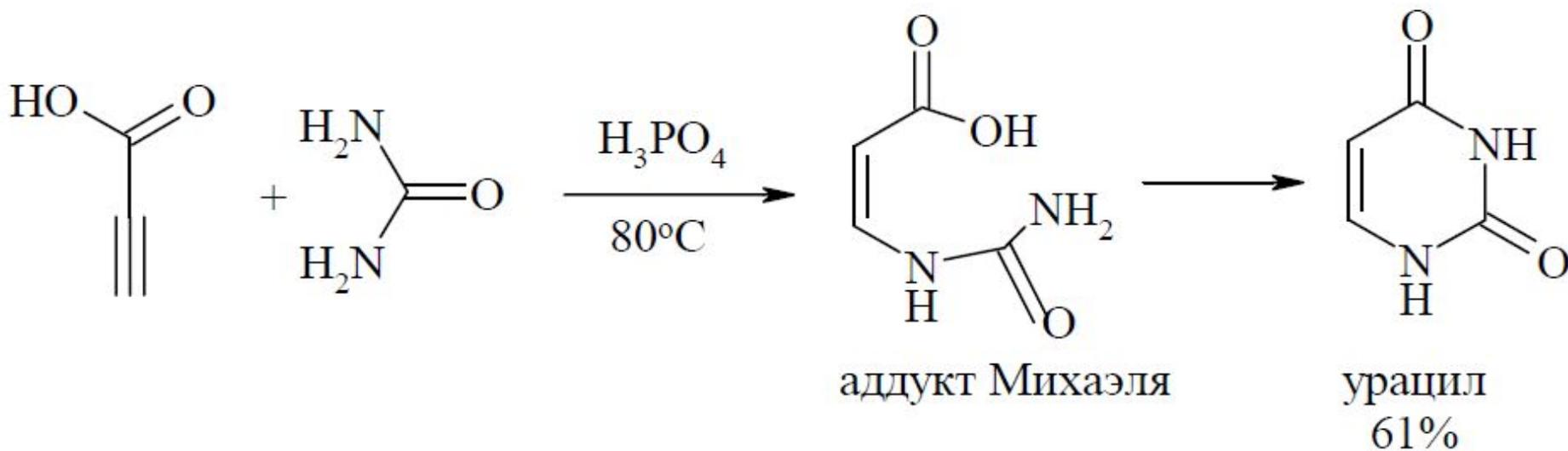
5-метил-2-фенилпиримидин-4,6-
дион

Примеры синтеза

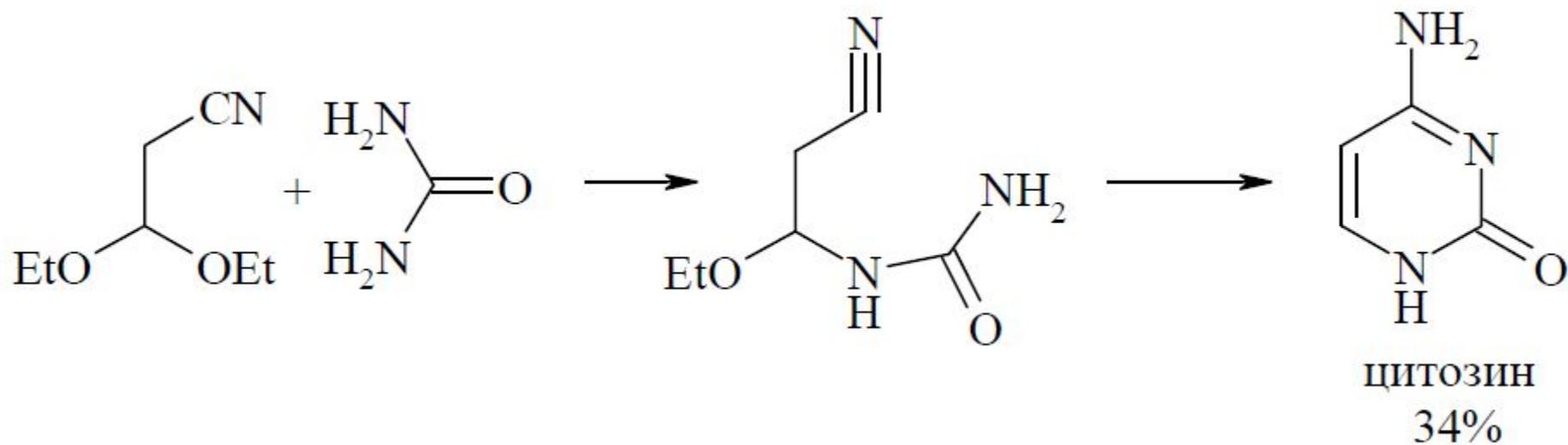
ПИРИМИДИНОВ



Пример получения урацила

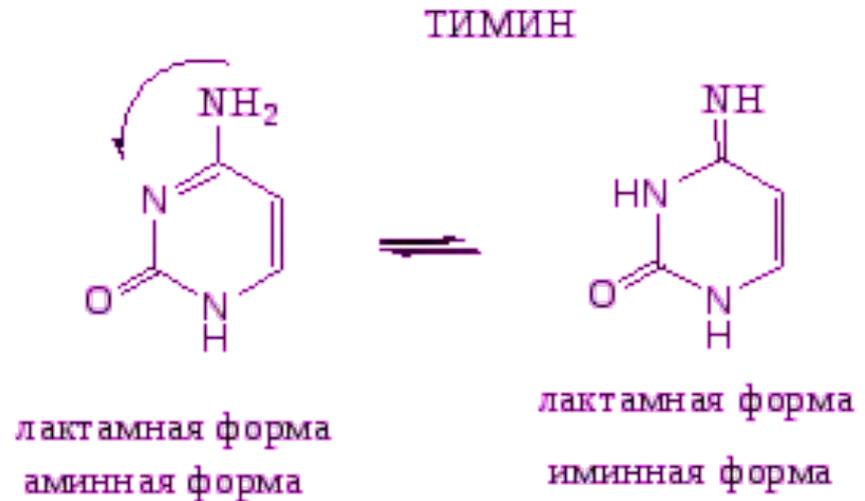
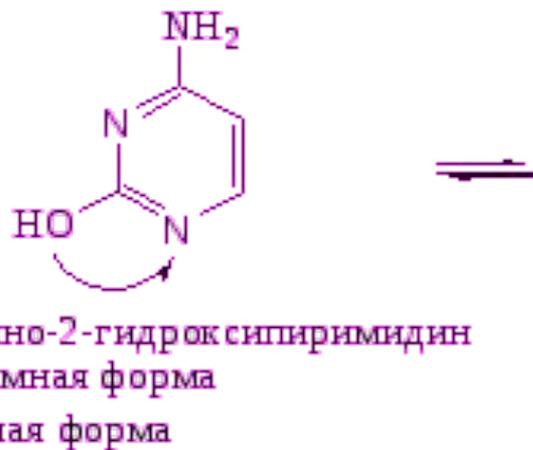
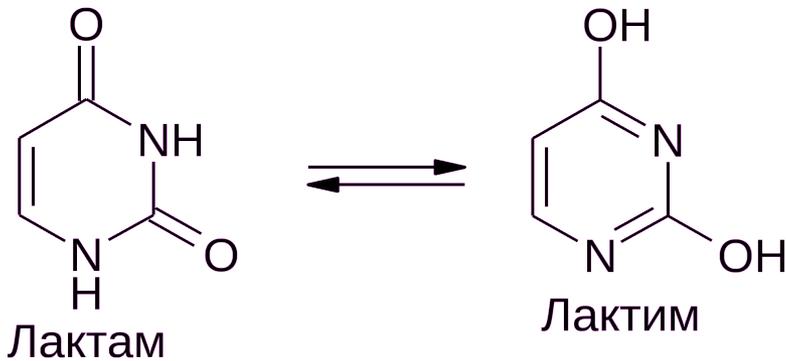


Пример синтеза цитозина



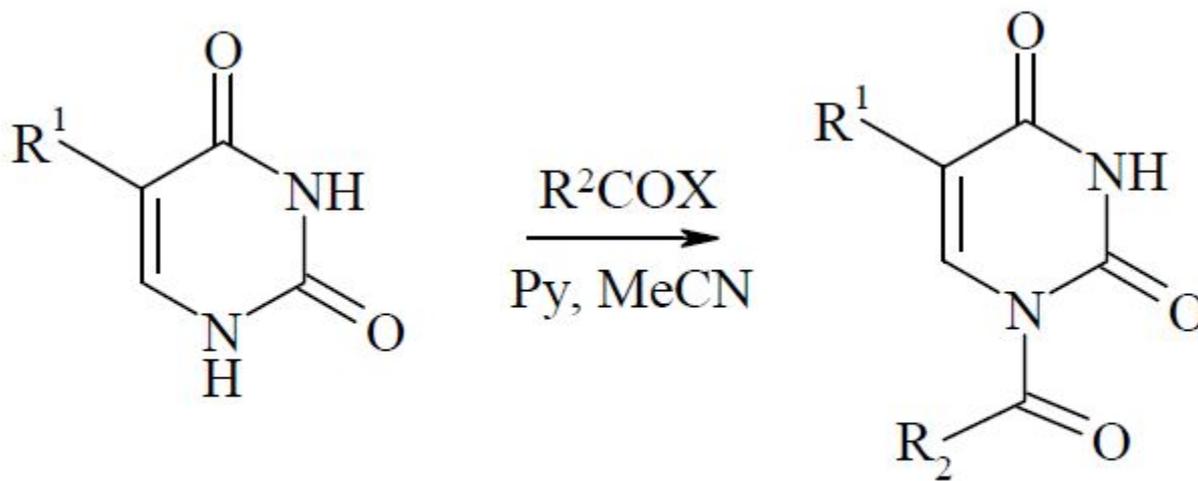
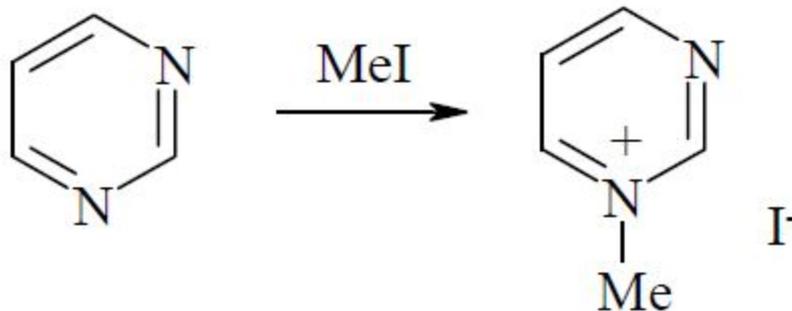
Химические свойства пиримидиновых оснований таутомерия

Две таутомерных формы урацила



ЦИТОЗИН

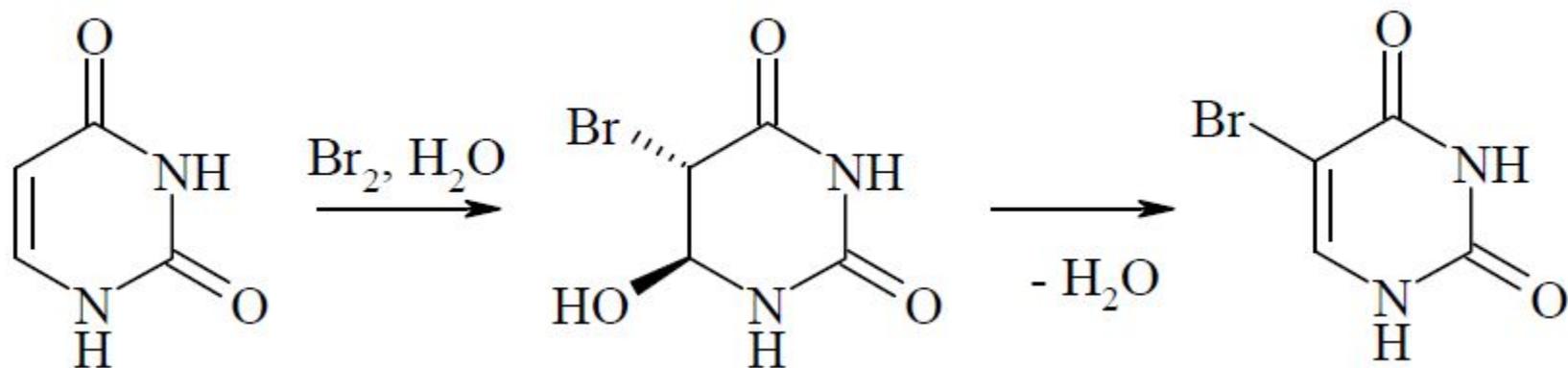
Химические свойства производных пиримидина



$\text{R}^1 = \text{H}$ - урацил

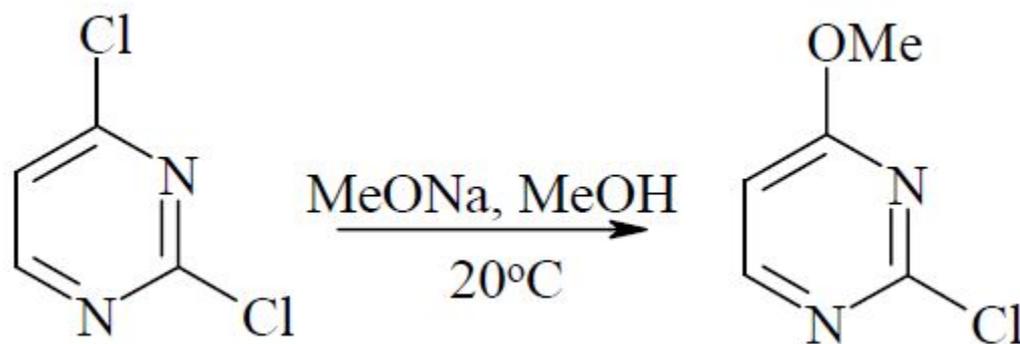
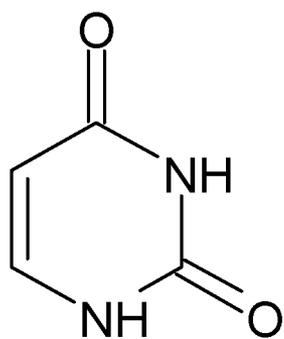
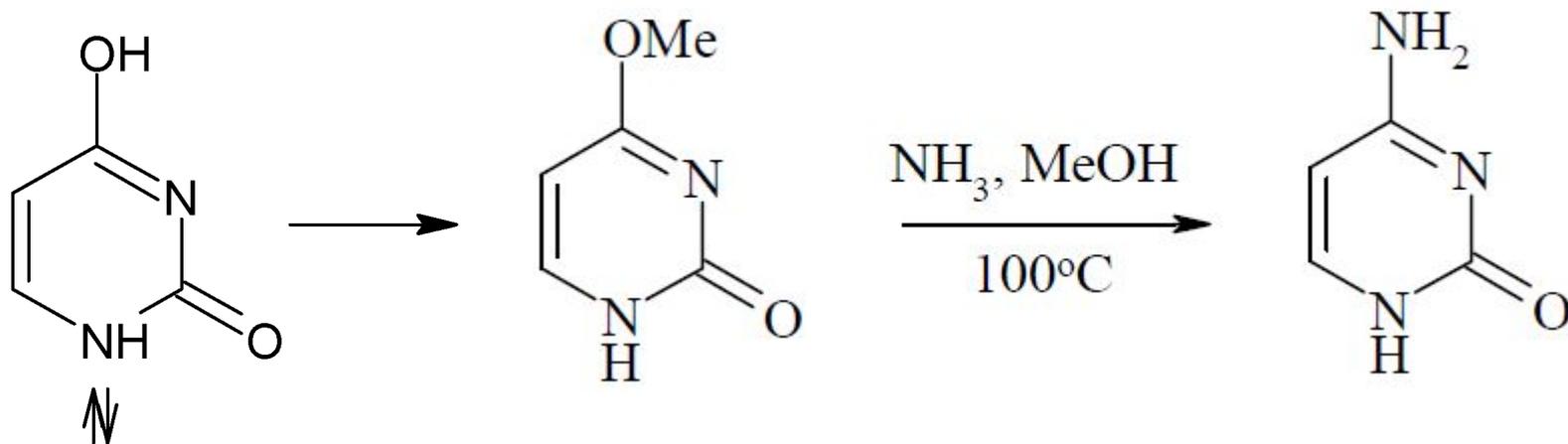
$\text{R}^1 = \text{Me}$ - тимин

Электрофильное замещение в молекуле урацила

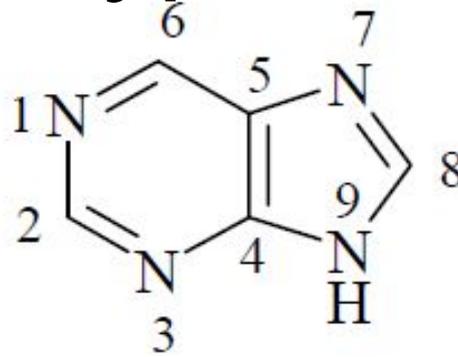


Электрофил	Условия реакции	Выход, η (%)
NO_2^+	HNO_3 ($d=1.5$), 75°C	90
Br^+	Br_2 , H_2O , 100°C	90
Cl^+	N-хлорсукцинимид, AcOH , 50°C	52
F^+	F_2 , AcOH , 10°C	92
$\text{CH}_2=\text{N}^+\text{Me}_2$	$(\text{CH}_2\text{O})_n$, Me_2N , 78°C	76
$^+\text{CH}_2\text{Cl}$	$(\text{CH}_2\text{O})_n$, HCl , 80°C	57

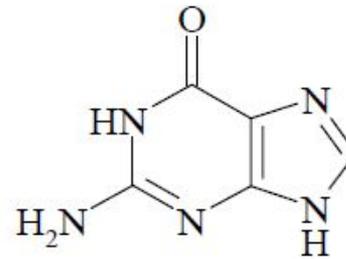
Нуклеофильное замещение



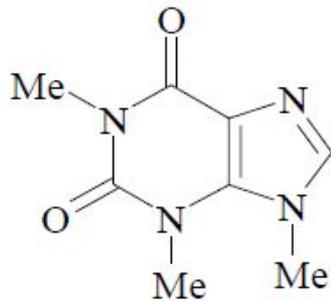
Пурины



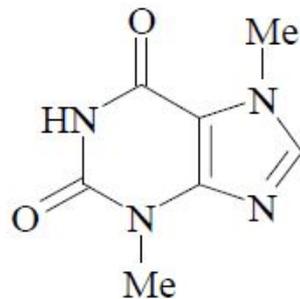
аденин
XXIX



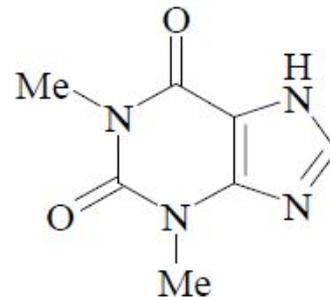
гуанин
XXX



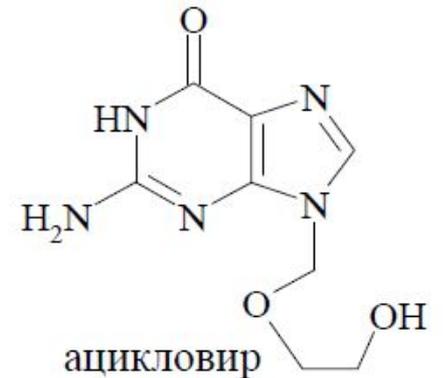
кофеин



теобромин



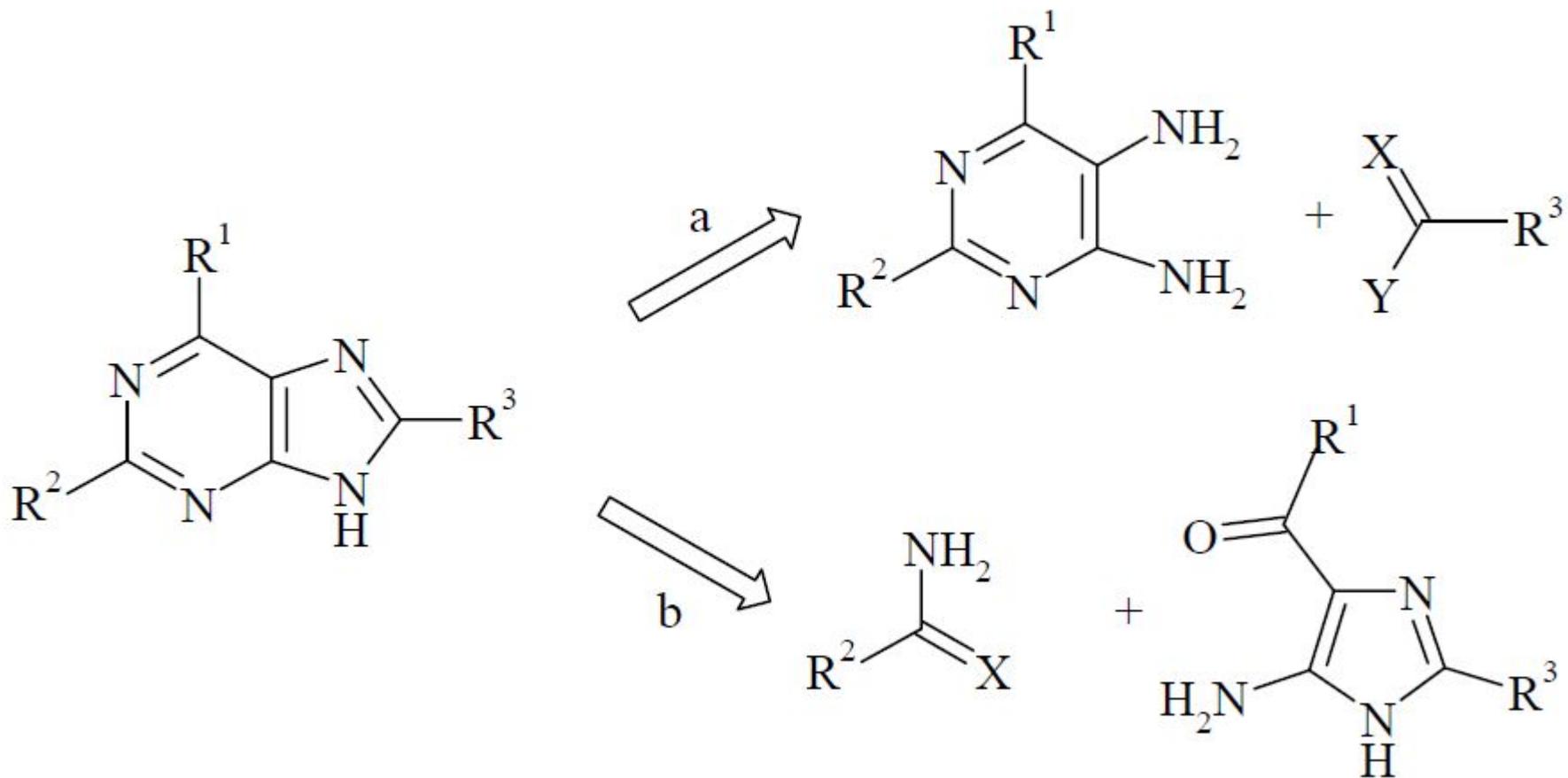
теофиллин



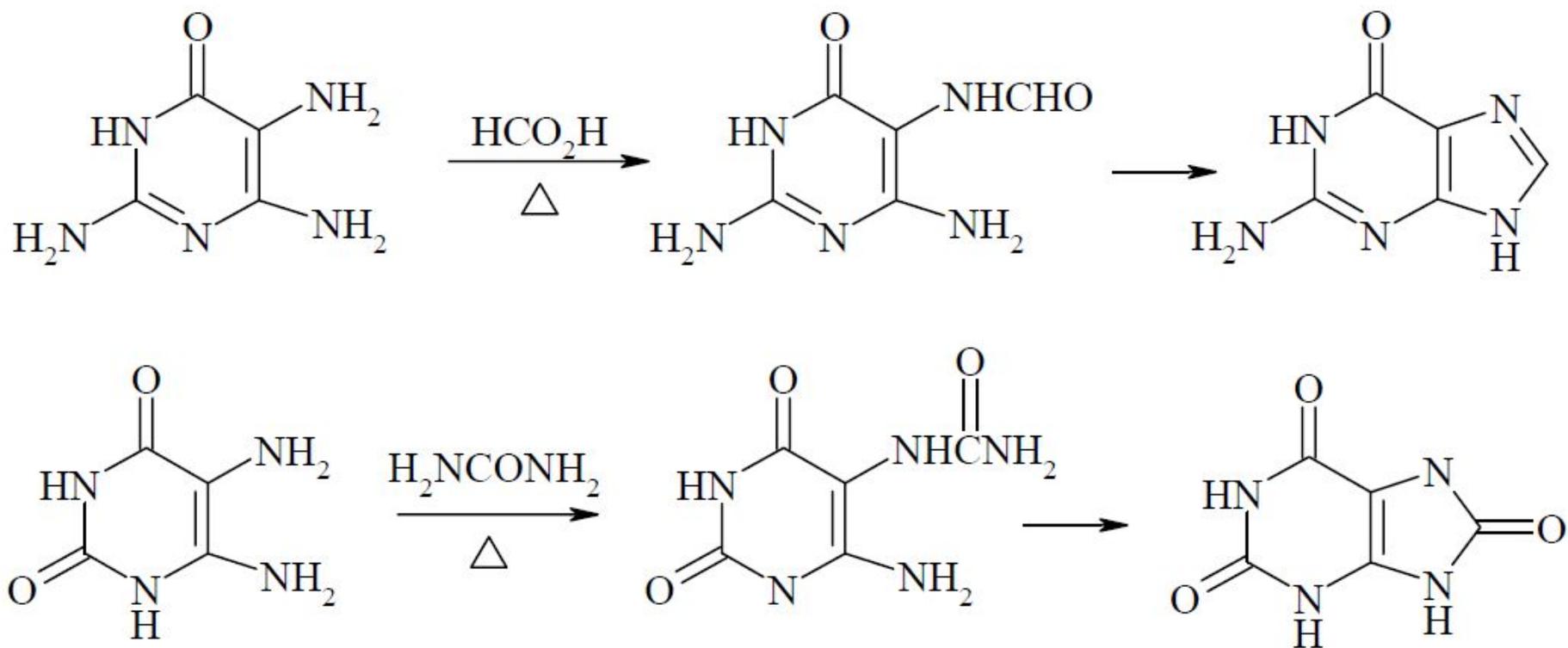
ацикловир

Методы получения пуринов

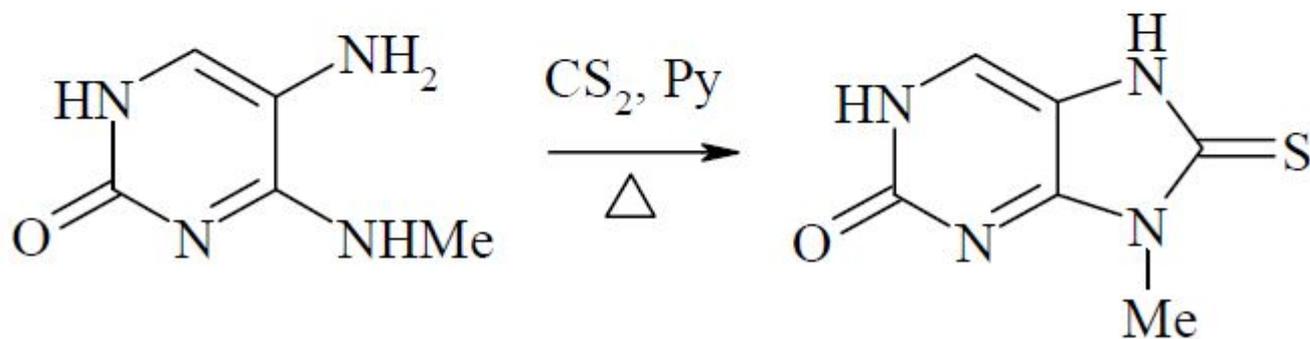
Ретиросинтетический анализ



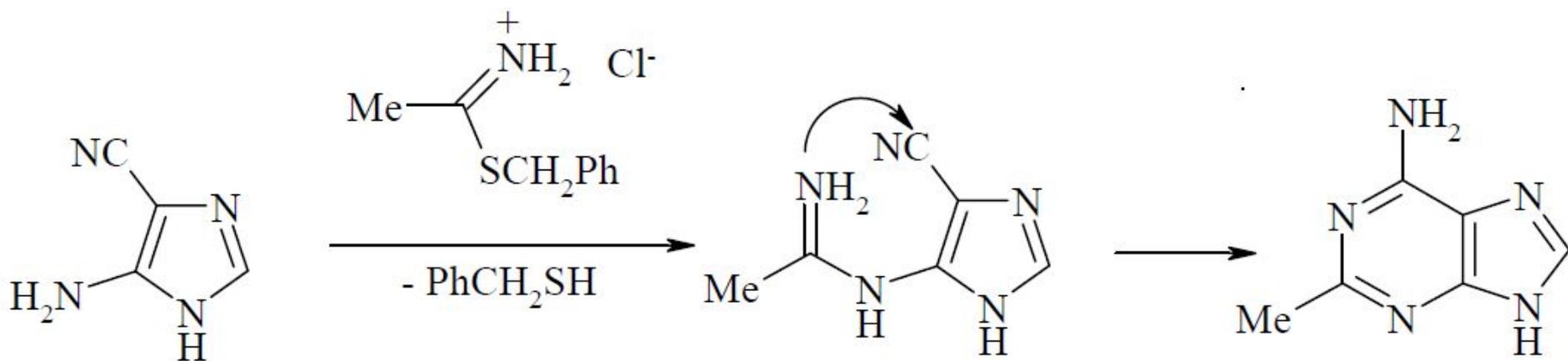
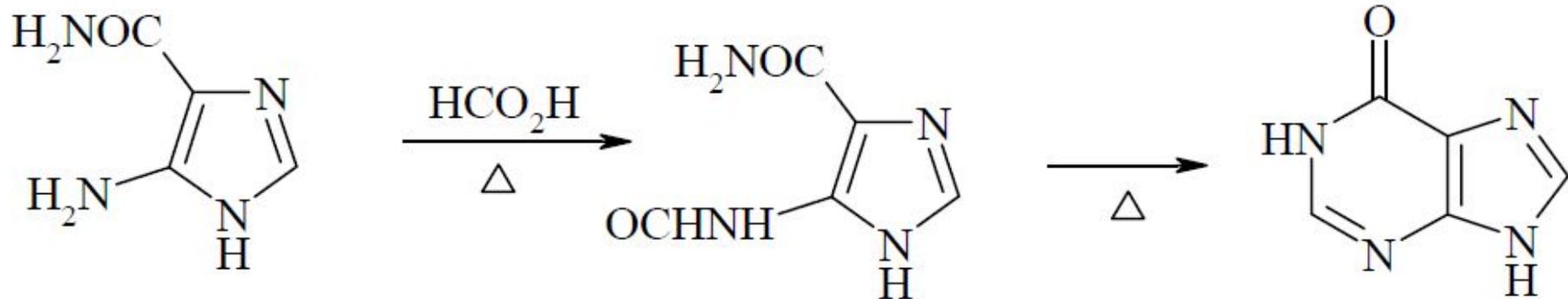
Путь а (Синтез Траубе)



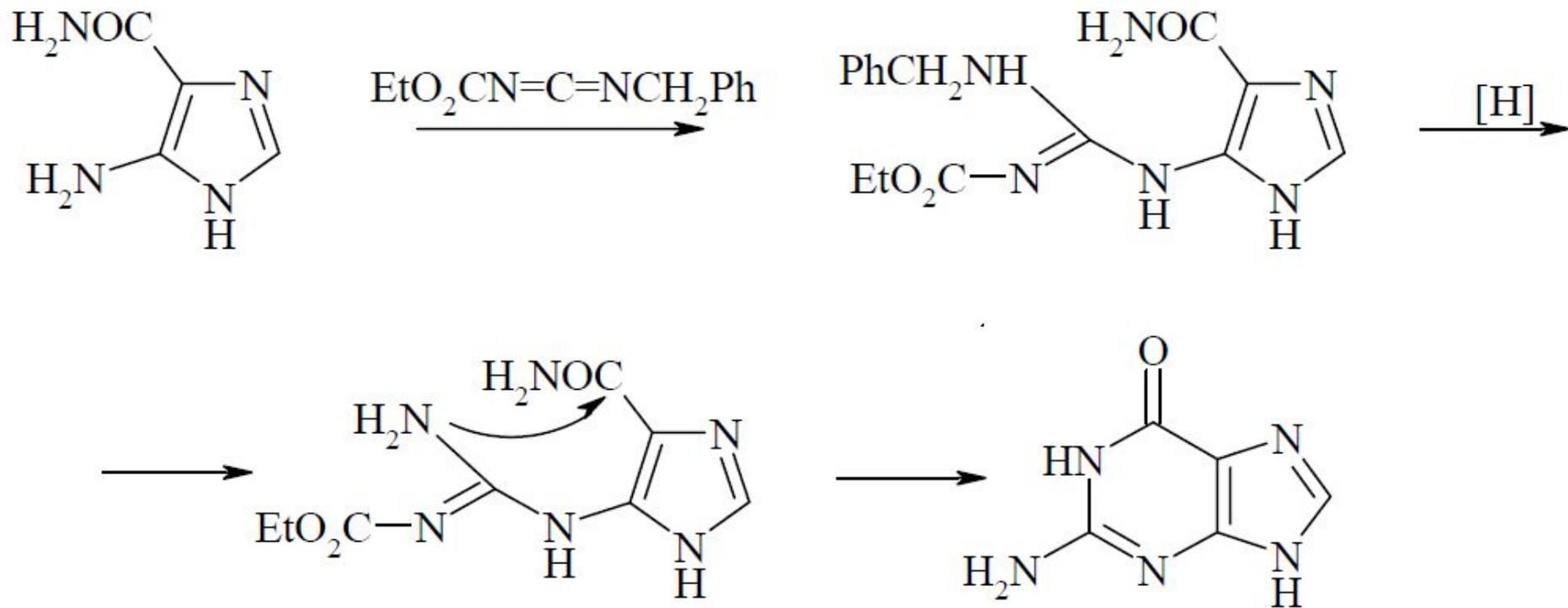
Путь а (Синтез Траубе)



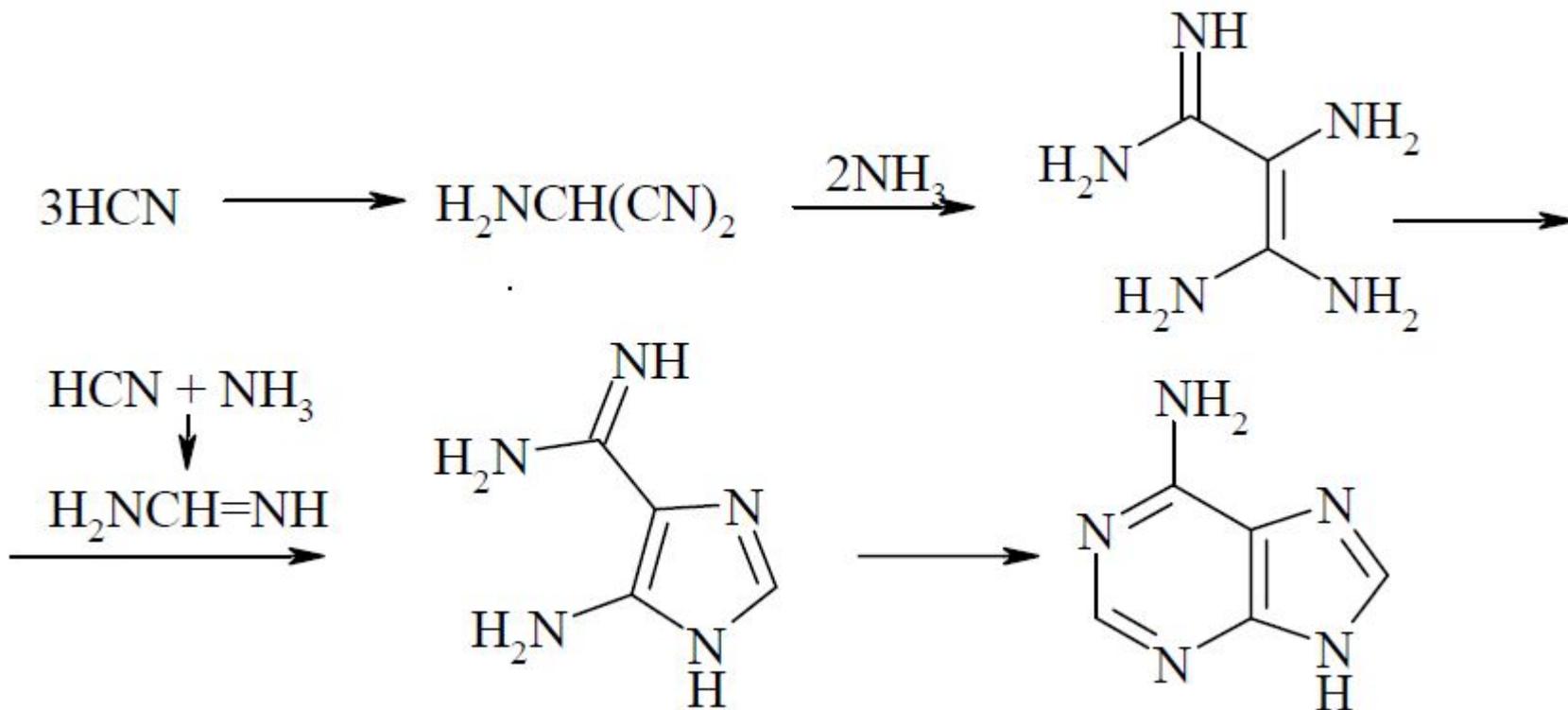
Путь b



Получение гуанина

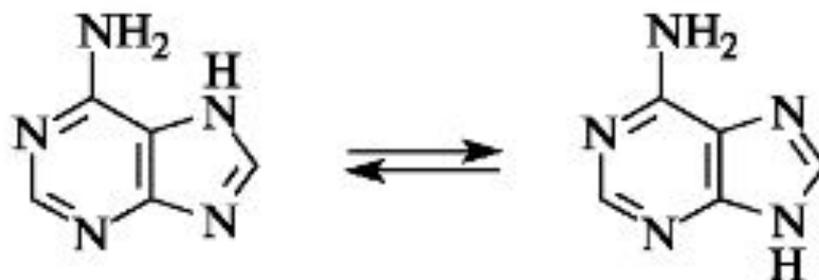


Пример получения аденина

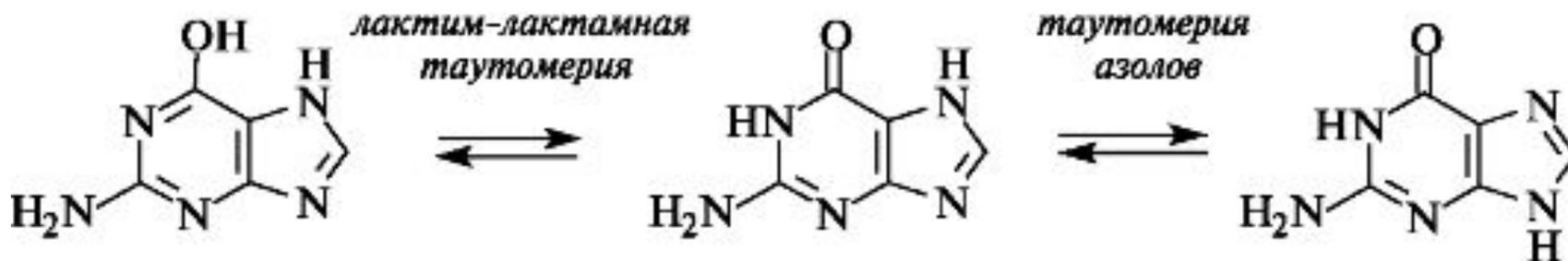


Химические свойства пуринов

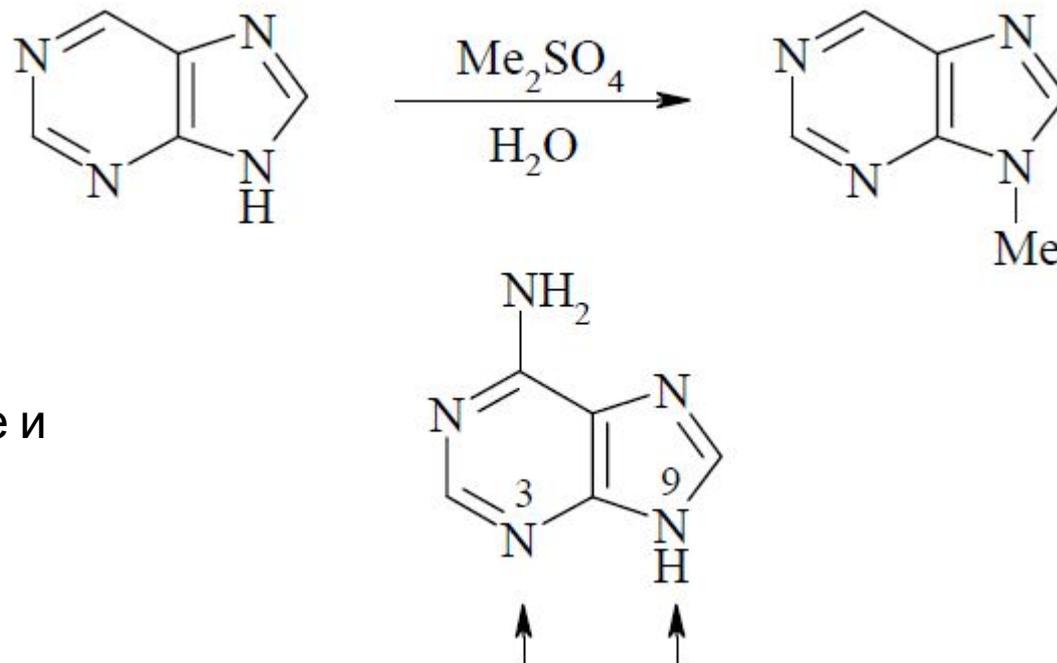
таутомерия



ТАУТОМЕРИЯ ГУАНИНА

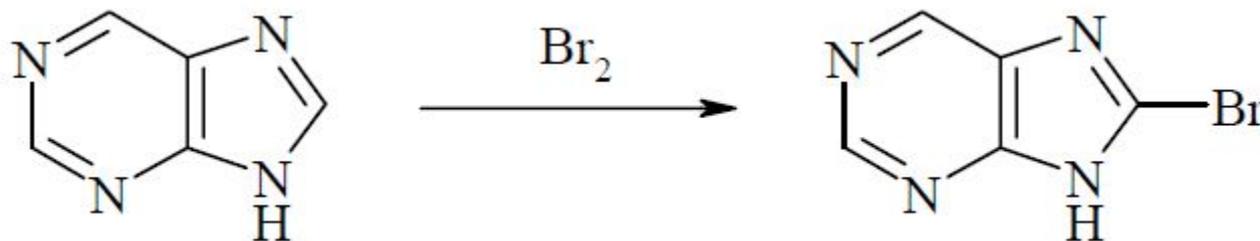


Химические свойства пуринов



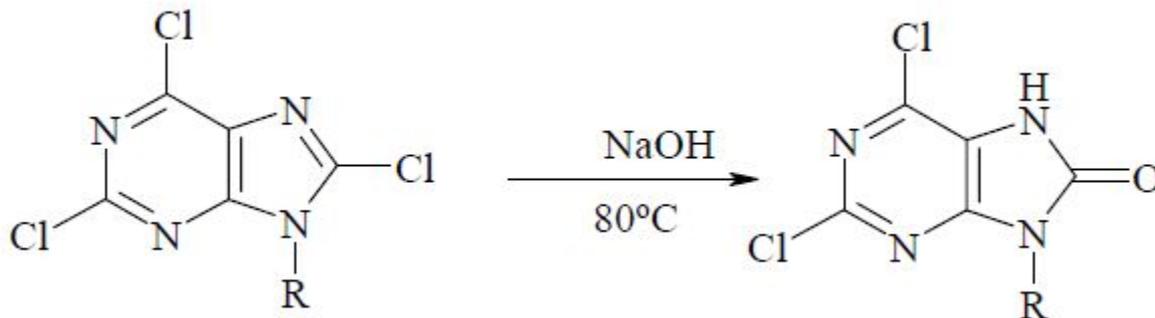
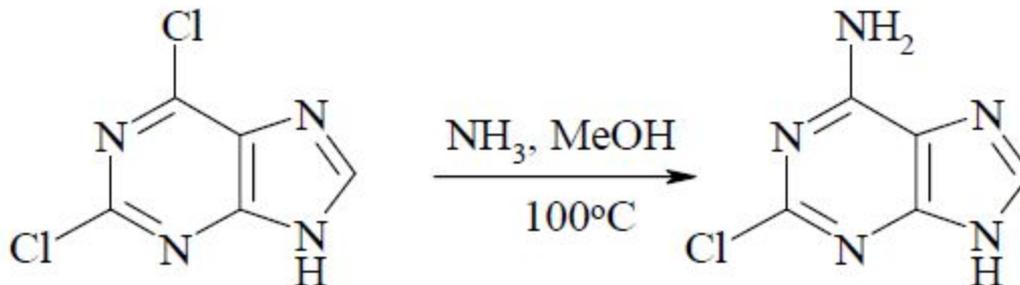
Алкилирование и
ацилирование
аденина

Реакции электрофильного замещения

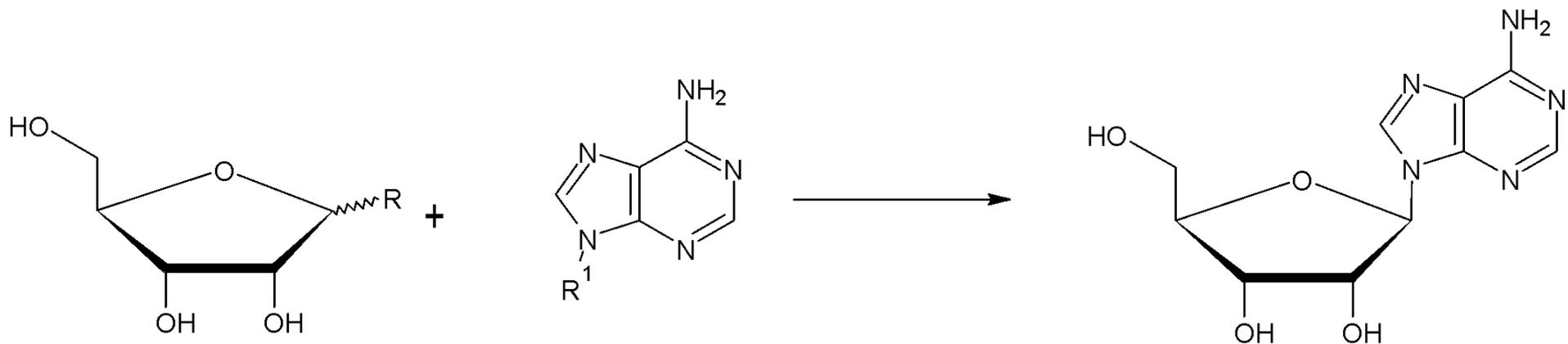


Практически
единственным примером служит
бромирование пурина по положению 8

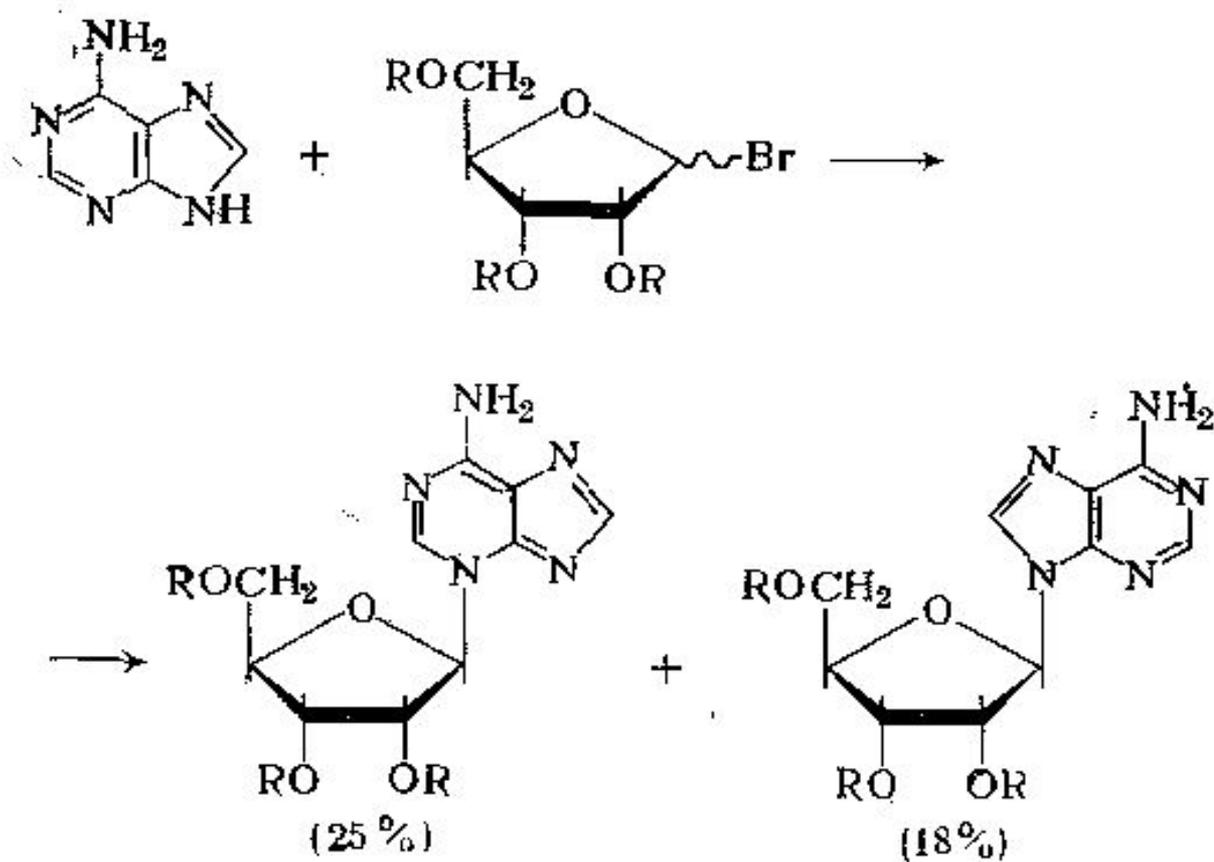
Реакции нуклеофильного замещения



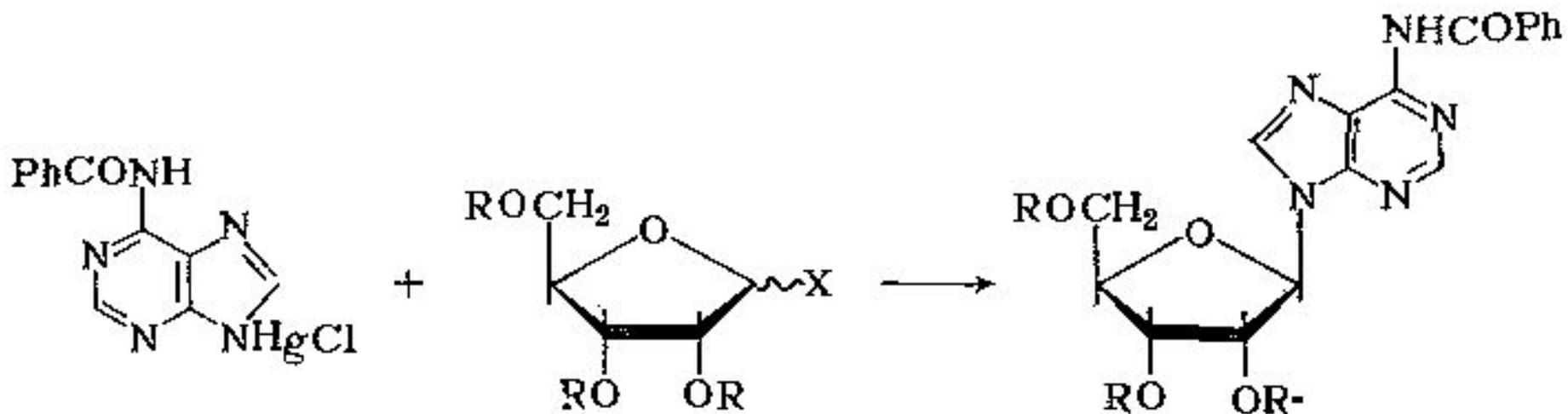
Синтез нуклеозидов



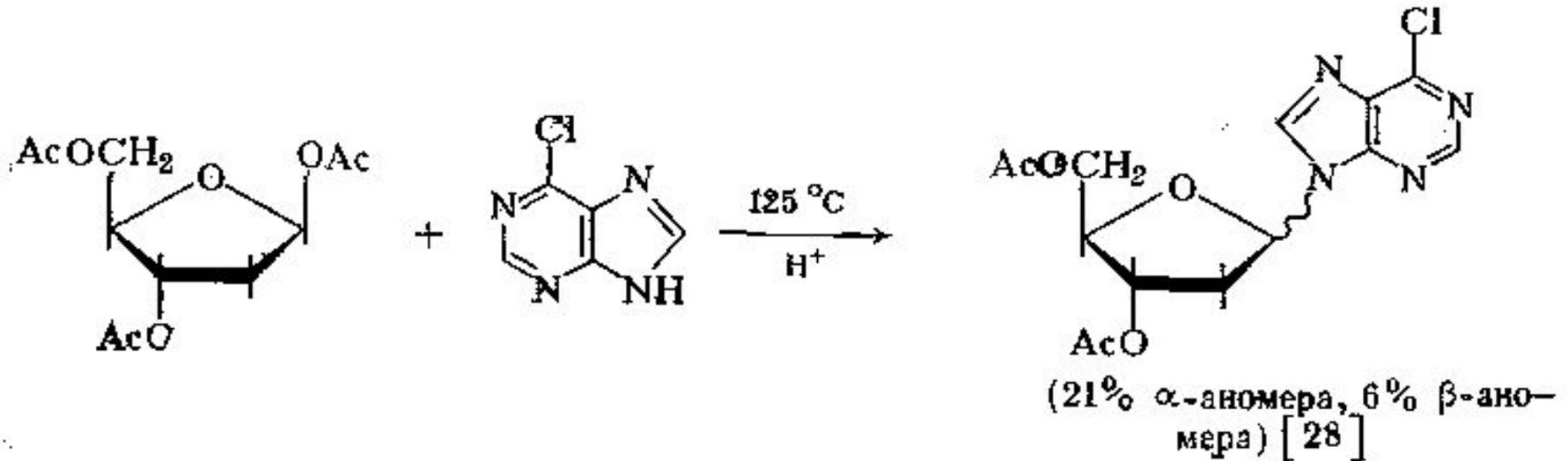
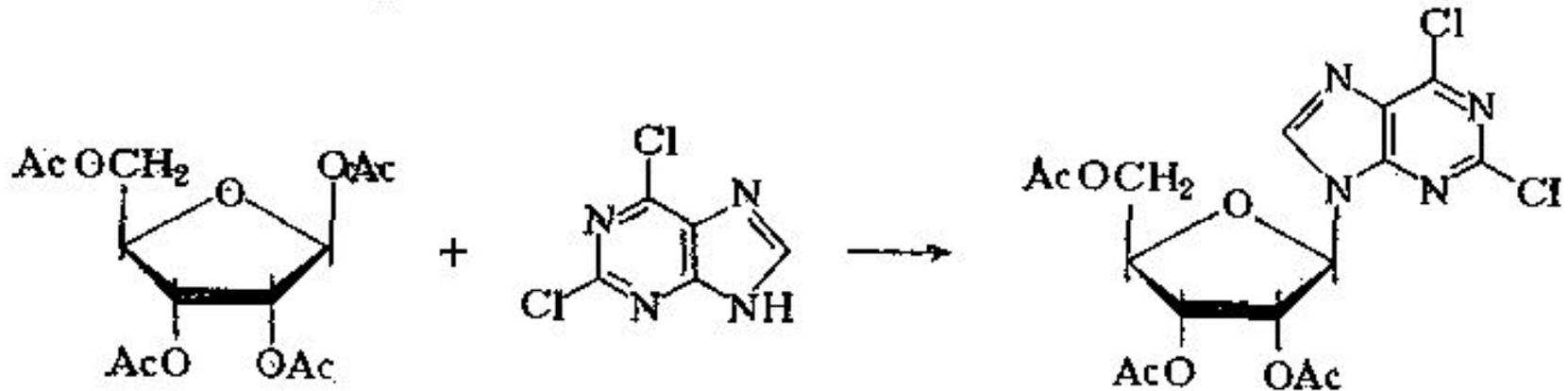
Взаимодействие аденина с галогенпроизводным рибозы



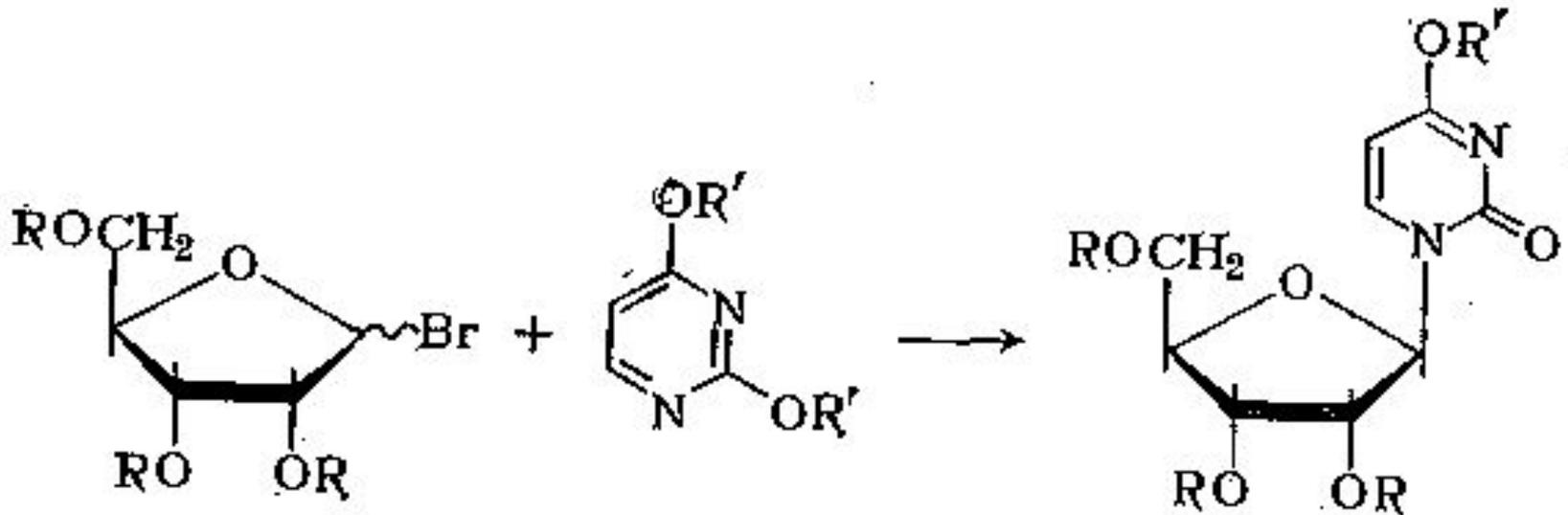
Активация N-меркуратом



Метод сплавления

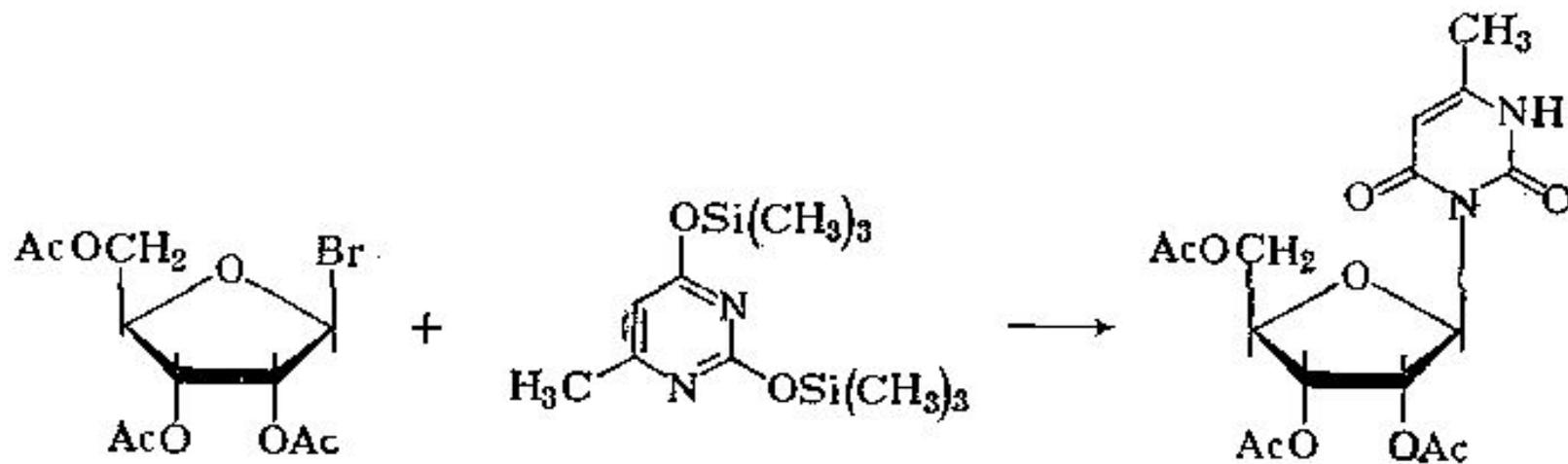
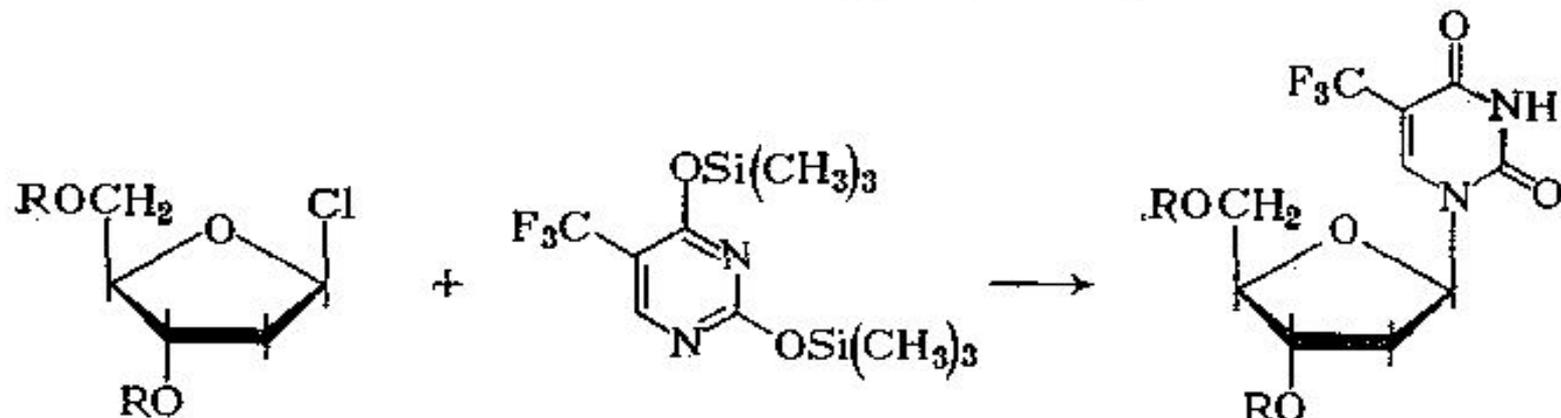


Гликозилирование пиримидиновых оснований Метод Гильберта-Джонсона

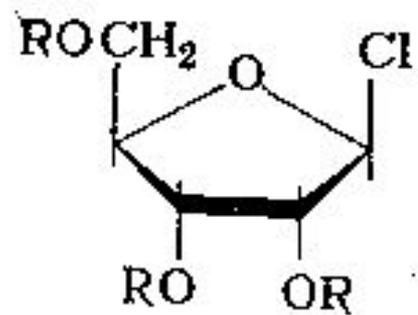


R = Alk (Me, Et, i-Pr)

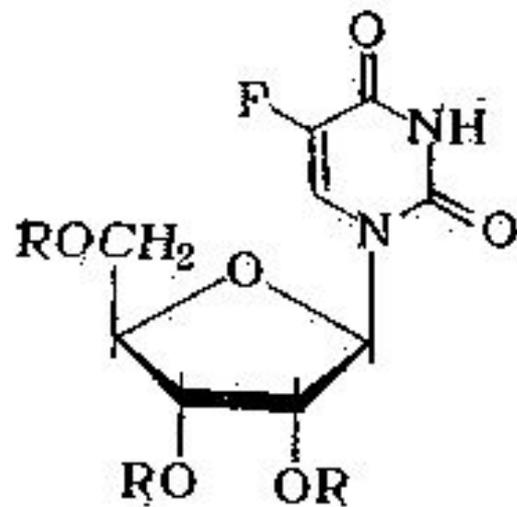
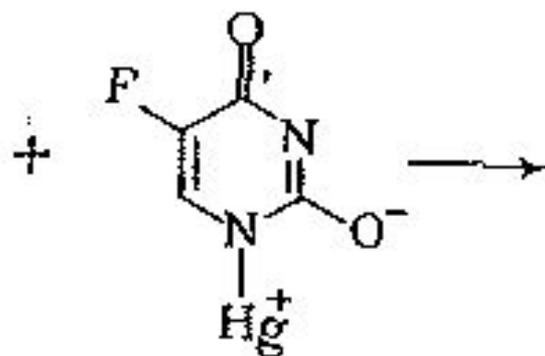
Использование триметилсилильных производных



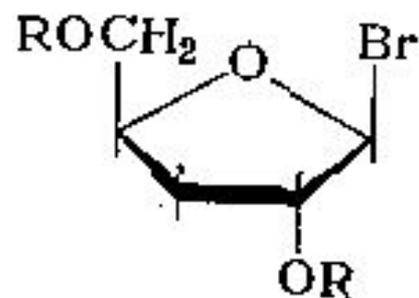
R = *n*-нитробензил, Ac = COCH₃



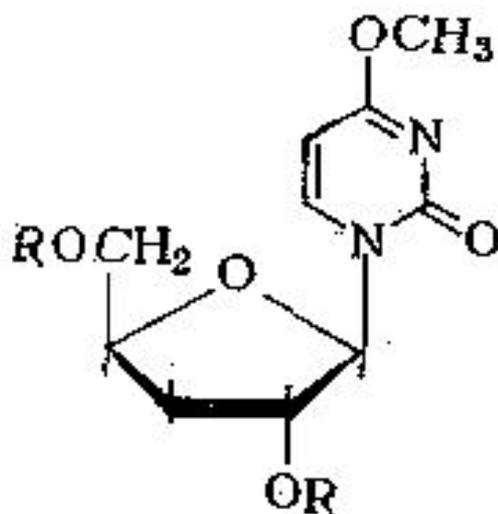
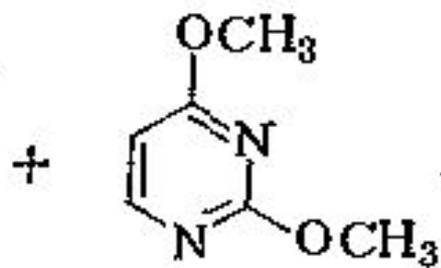
R = бензоил

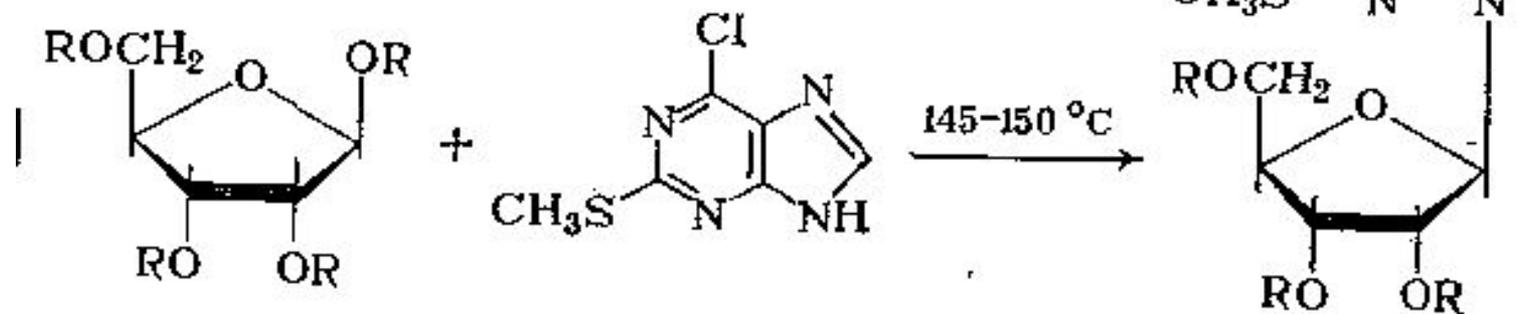


(74%)

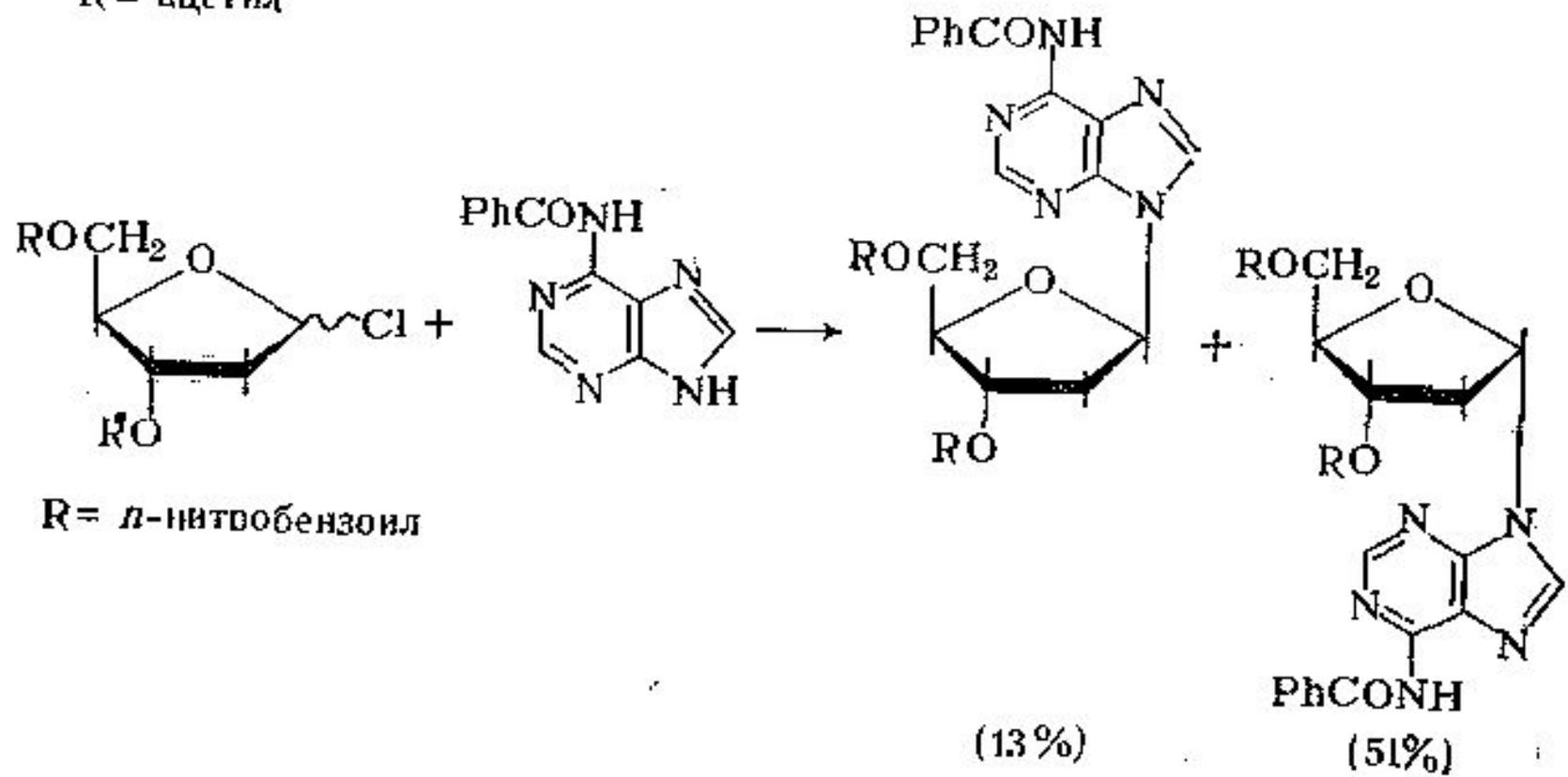


R = *p*-нитробензоил



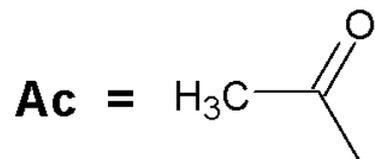
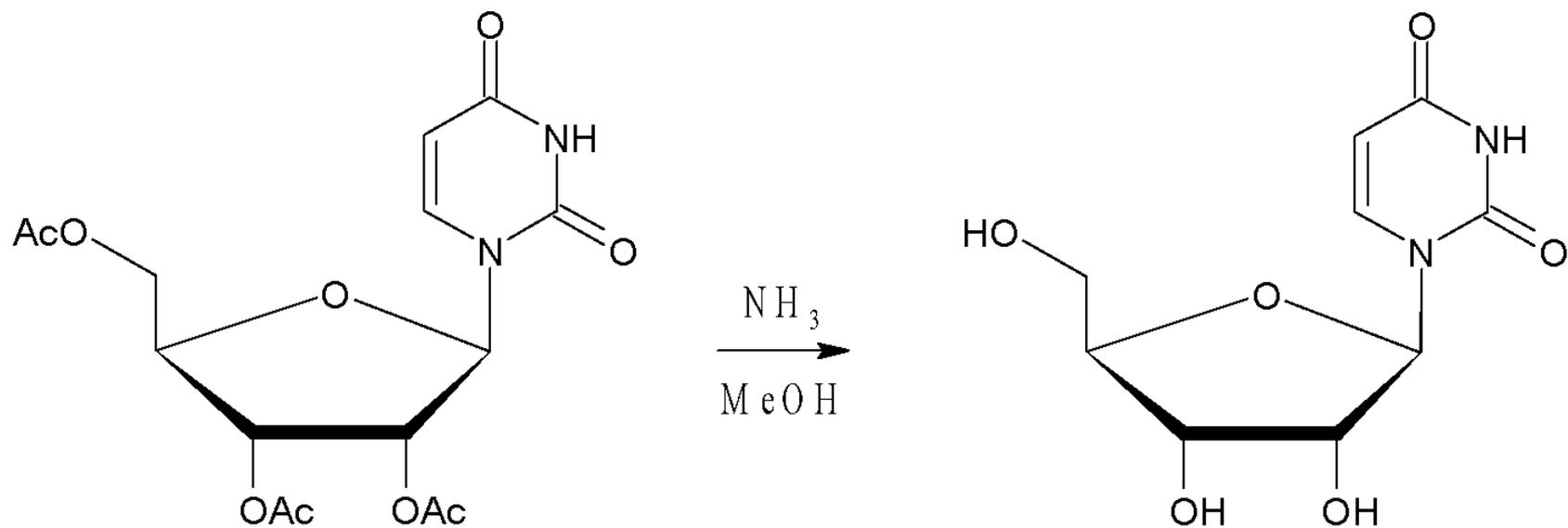


R = ацетил

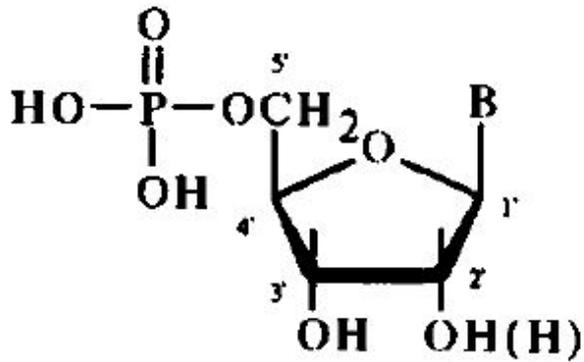


R = *p*-нитробензил

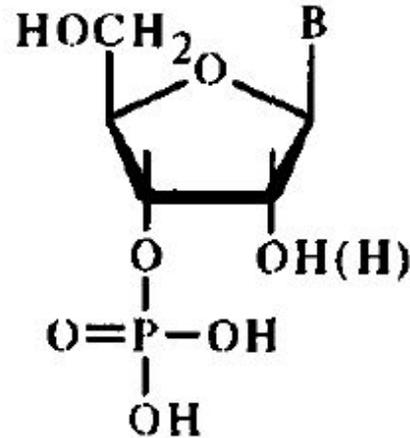
Удаление защитных групп



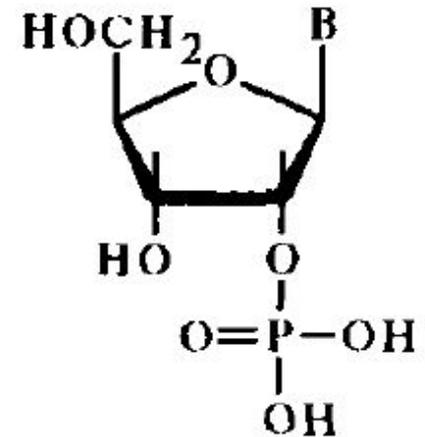
Химический синтез нуклеотидов



nucleoside-5'-phosphates

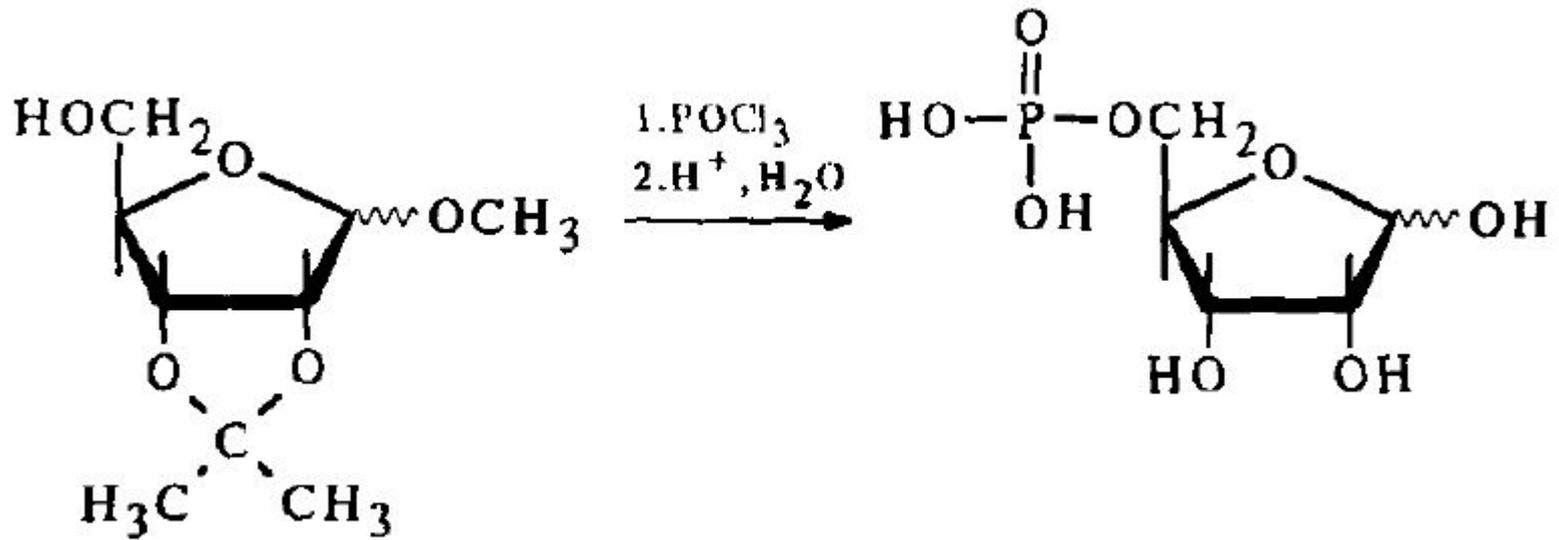


nucleoside-3'-phosphates

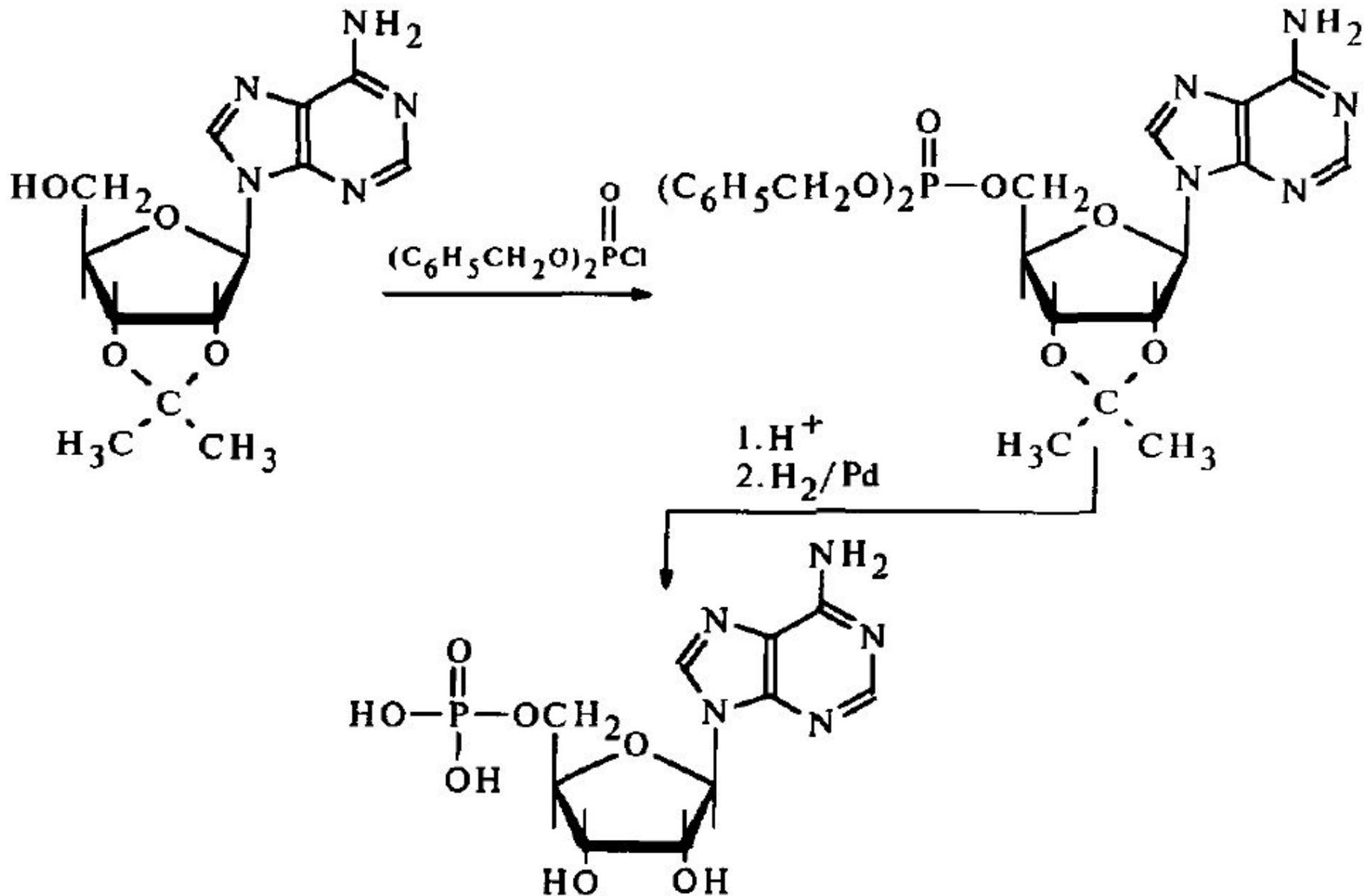


nucleoside-2'-phosphates

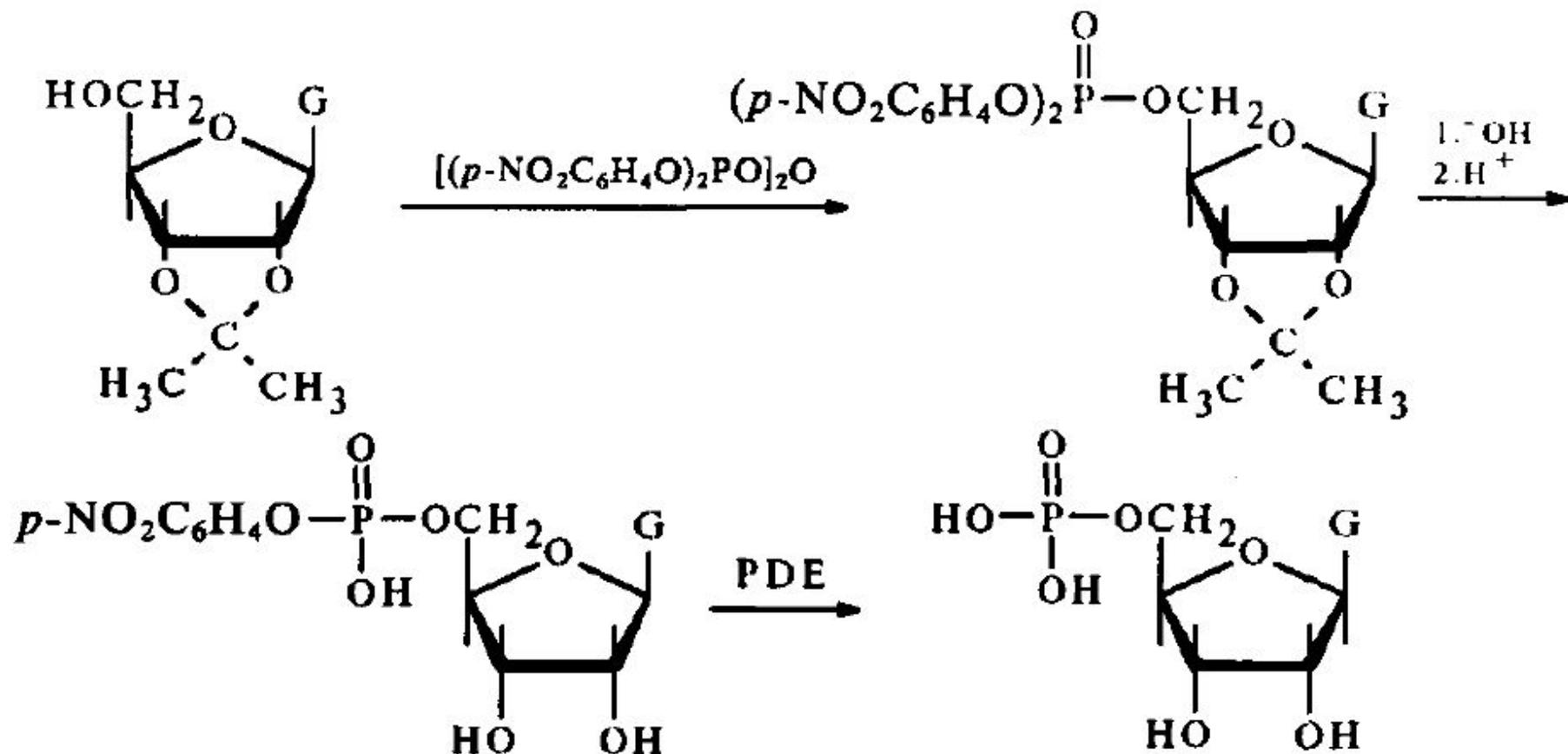
5`-фосфаты



Аденозин-5`-фосфат

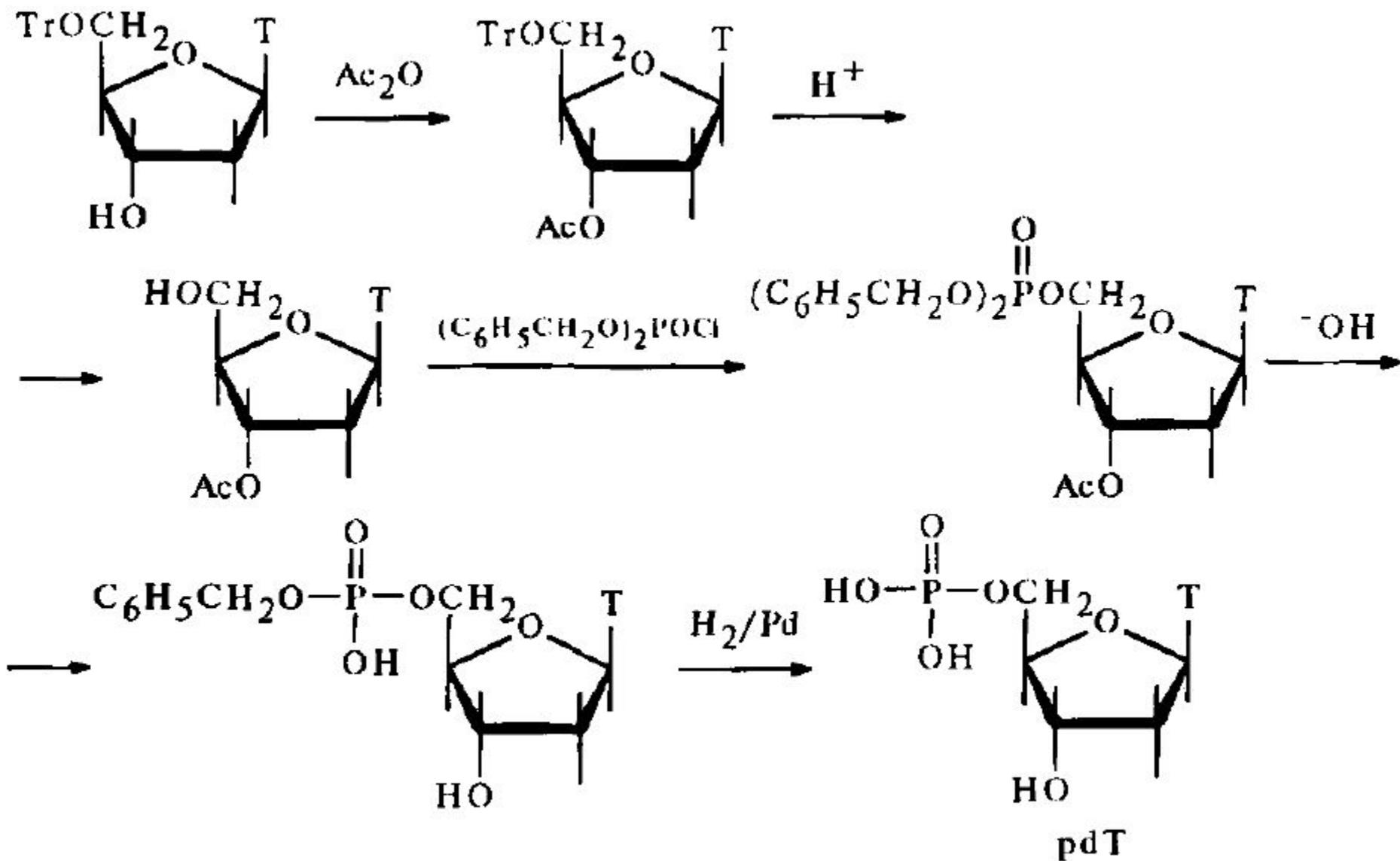


Гуанозин-5`-фосфат

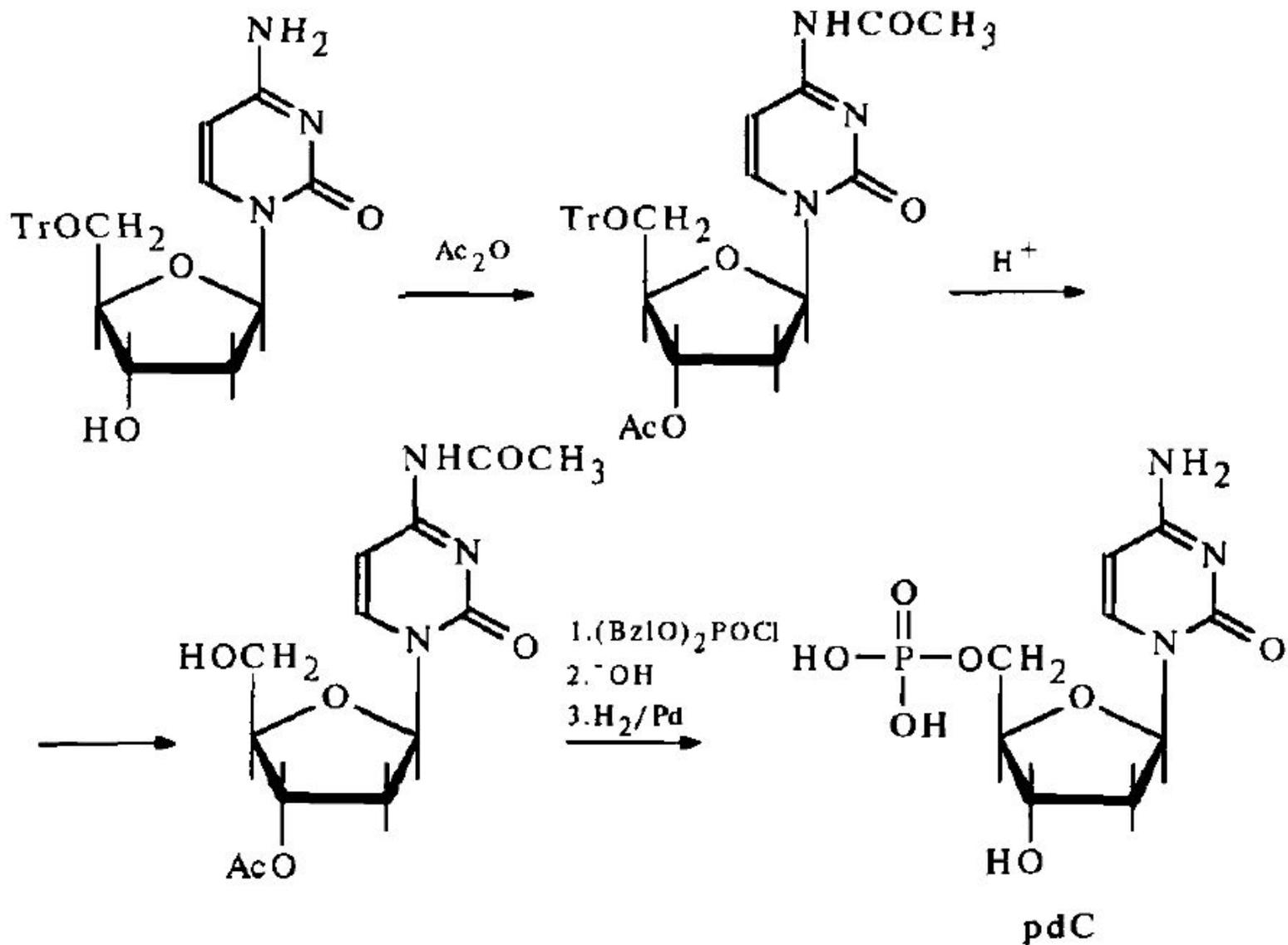


PDE - фермент фосфодиэстераза

Дезокситимидин-5`-фосфат



Дезоксицитидин-5`-фосфат



Дезокситимидин-3`-фосфат

