



CHEMICAL BLOCK

CUSTOM SYNTHESIS ABILITIES

55 reactions & main products

**scale-up reactions
marked as ***

Reactions

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134	1. Favorsky reaction*
134	Products of 1: Synthesis of cyclic carbonates, piperidones, chloro-, vinylacetylene derivatives
135	2. Carol reaction*
135	3. Selective hydrogenation: triple bond to double bond*
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135	5. Hydrogenation of nitriles*
136	6. Ammonia addition to activated double bond*
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136	9. Oxidative coupling of propargyl alcohols*
137	10. Cyclocarbonates from propargyl alcohols*
	Products of 10: Synthesis of N-polycyclic heterocycles: analogues of alkaloids, tryptamine, beta-ethylamine and aminoacid derivatives:
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143	20. One-step synthesis of 3,4-diamino-1,2,5-oxadiazole*
144	21. Pyrolysis of cellulose into anhydrosugars*
144	Products of 21: Synthesis of anhydrosugars by pyrolysis of cellulose and stereoselective synthesis of heterocyclic systems with sugar fragment
145	22. Oxidation of methyl in aromatic compounds*
145	Products of 22: Synthesis of heterocycles from trinitrotoluene (TNT)
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149	29. Hydrogenation of ketones
149	30. Synthesis of propargylamines*
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150	33. Synthesis of triptamines (Fischer-Grandberg reaction)*
150	34. Reductive amination

Reactions

Page	Reaction
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151	37. Jap-Klingemann reaction followed by Fischer rearrangement*
151	38. Triptamine synthesis by dihydrocarboline hydrolysis
152	39. Transformation of hydroxybenzoic acids to alkoxybenzoic acids*
152	40. Selective oxidation of one methyl group
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154	45. Transformation of 4-(5)-bromoimidazoles into 4-(5)-carboxyimidazoles
154	46. Bromination of anilines
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155	48. Nitration of isatines
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155	50. Synthesis of indazoles from ortho-methylanilines
156	51. Oxidation of phenantroline
156	52. Introduction of 1-aminopropyl fragment into imidazoles*
156	53. Synthesis of 4-chlorobutanol*
157	54. Synthesis of 3-(5)-1,2,4-triazolylacetic acides
157	55. Synthesis of 5-carboxyisoxazoles with aldehyde function

Reaction Types:

Hydrogenation: 3, 4, 5, 29, 34, 36, 44, 45, 46, 52

Heterocycles Formation: products of 1, 2, products of 2 [parts 1,2,3], 11, products of 14, products of 16, 20, 21, products of 21, 22, 23, products of 24, products of 25, 27, 33, 35, 36, 37, 41, 43, 44, 47, 54, 55

Alkylation: 18, 26, 39, 45

Diazotation: 17, 31, 50

Oxidation: 8, 9, 22, 40, 41, 42, 51, 53

Introduction of Halogens: 19, 24, 25, 30, 43

Nitration: 16, 42, 48, 55

Condensation: 12, 14, 15, 28

Nucleophylic addition: 1, 6, 7, 52

Halogenanhydrides formation: 13, 24

Miscellaneous: 2, 32, 38

Hydrolysis: 49

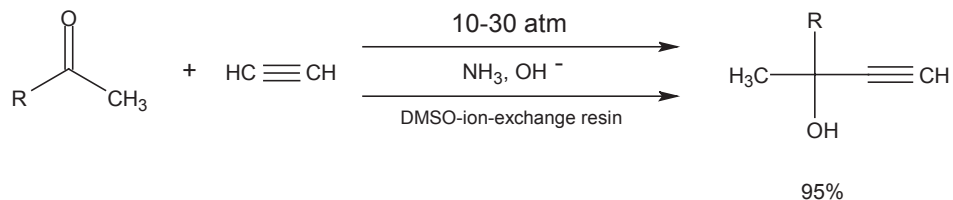
Reactions with well development scale-up technologies:

1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 21, 22, 24, 25, 27, 30, 36, 39, 52, 53

Reactions

№1

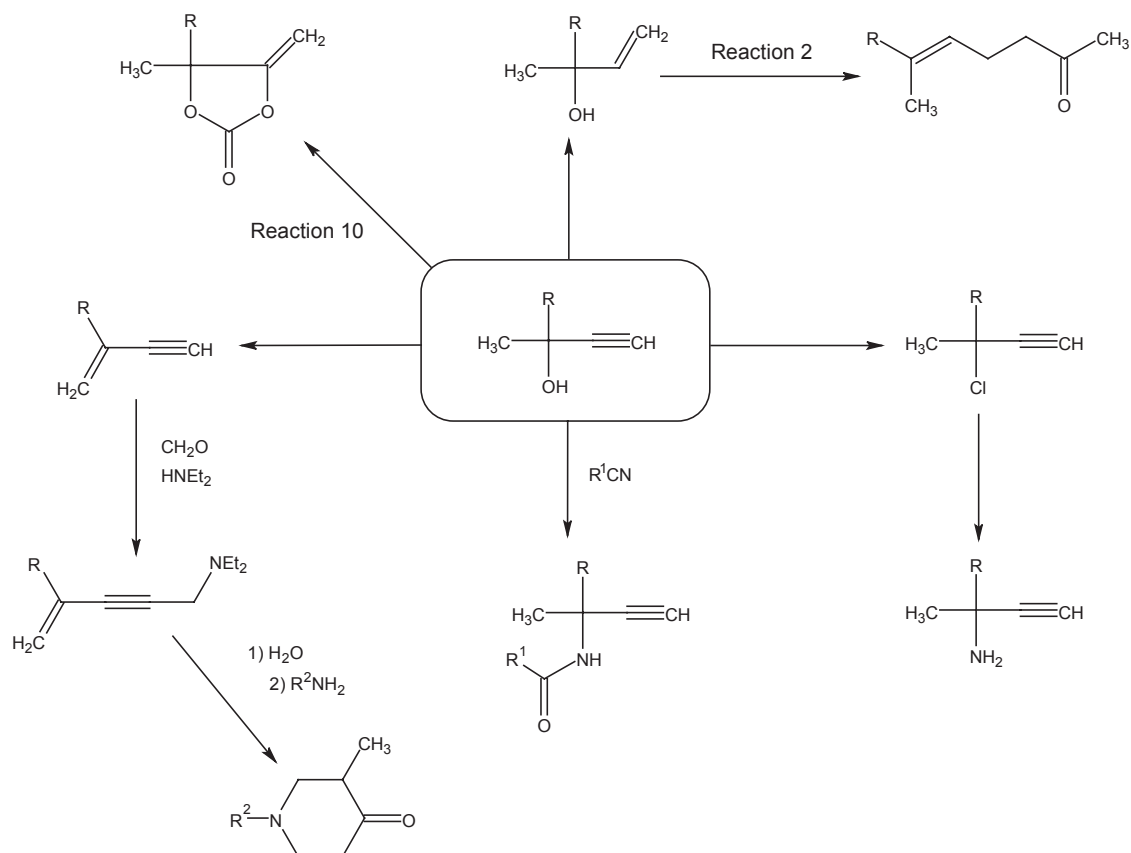
Favorsky reaction*



products

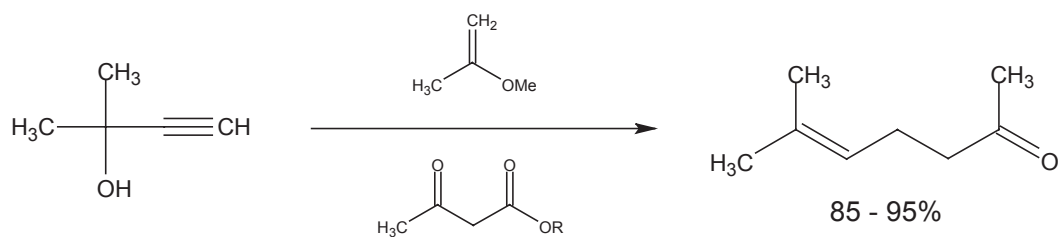
№1

Synthesis of cyclic carbonates,
piperidones, chloro-, vinylacetylene derivatives

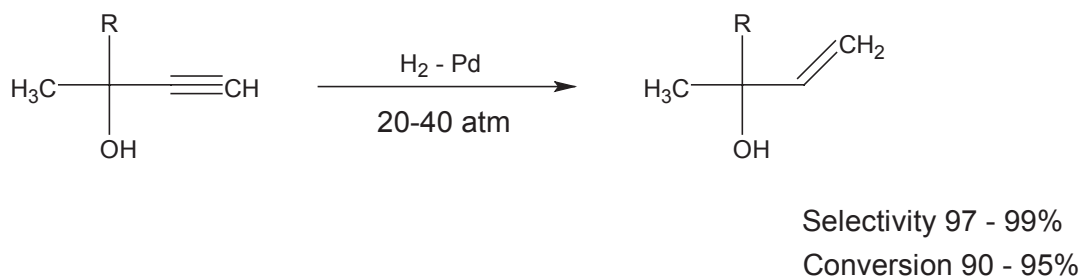


Reactions

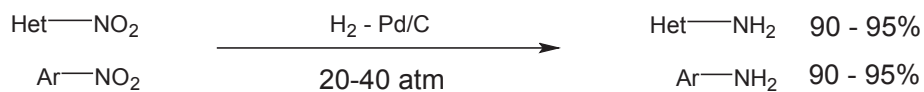
№2 | Carol reaction*



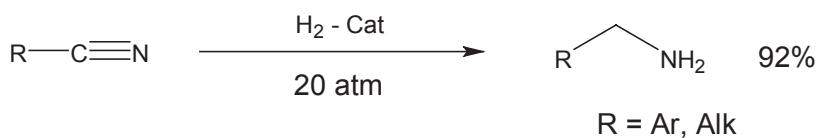
№3 | Selective hydrogenation: triple bond to double bond*



№4 | Hydrogenation of aromatic nitrogroup*



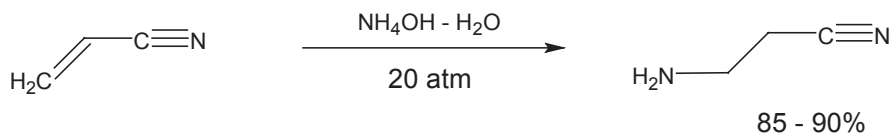
№5 | Hydrogenation of nitriles*



Reactions

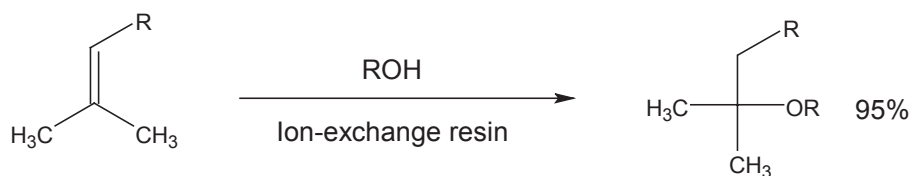
N^o 6

Ammonia addition to activated double bond*



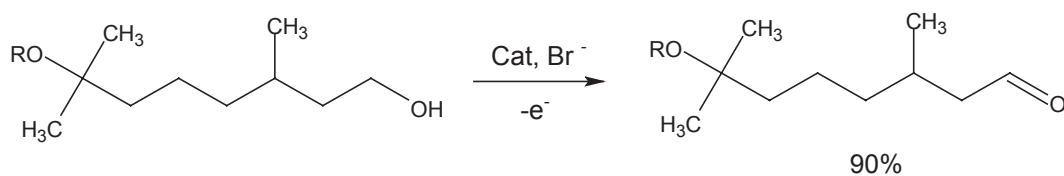
N^o 7

Methoxylation of olefines



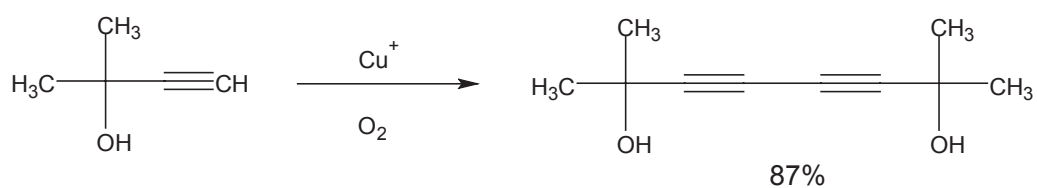
N^o 8

Mild electrooxidation of primary hydroxyl into aldehyde*



N^o 9

Oxidative coupling of propargyl alcohols*



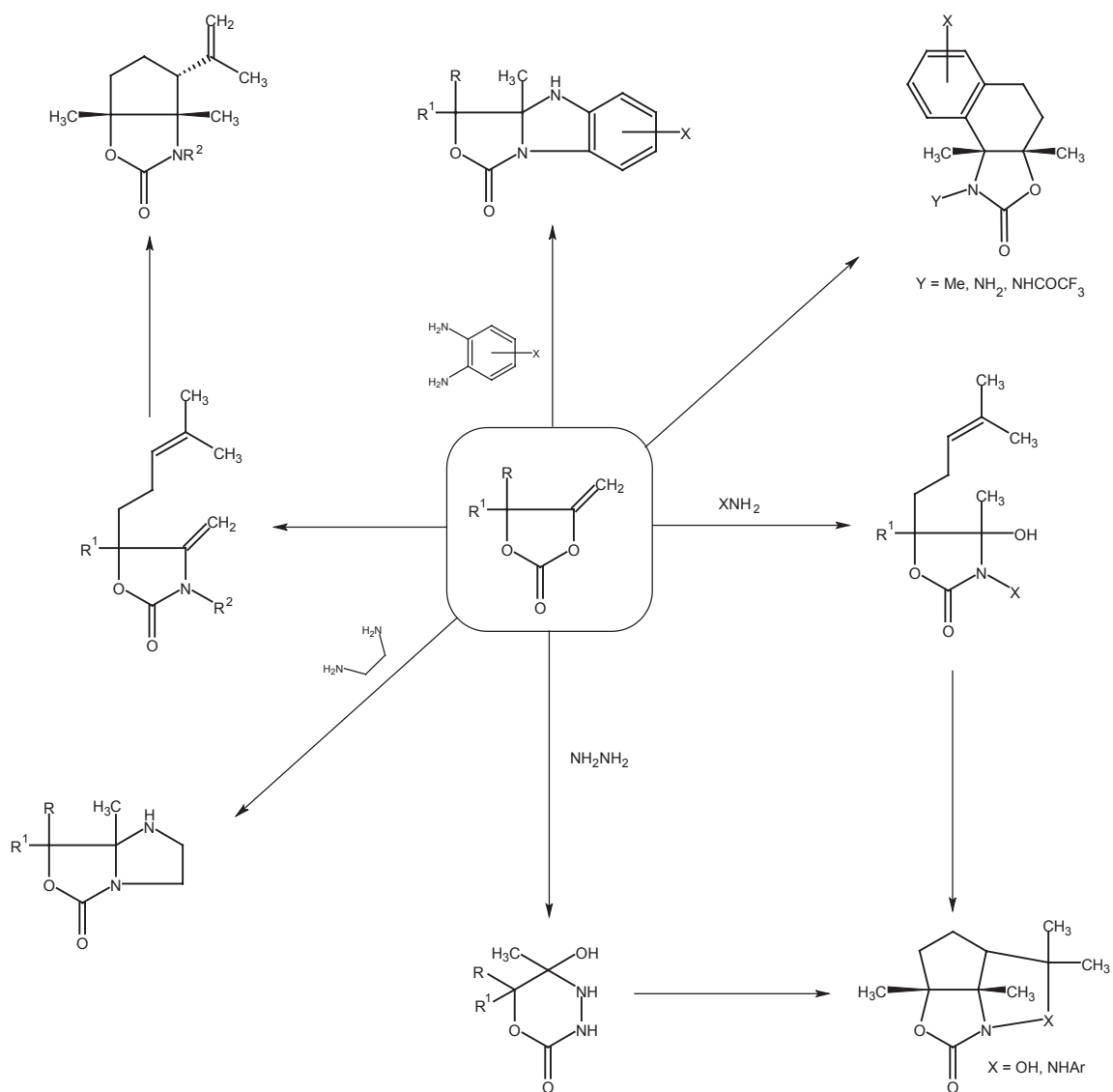
Reactions

products

№ 10

Synthesis of N-polycyclic heterocycles:
analogues of alkaloids, tryptamine,
 β -ethylamine and aminoacid derivatives
.....

part 2



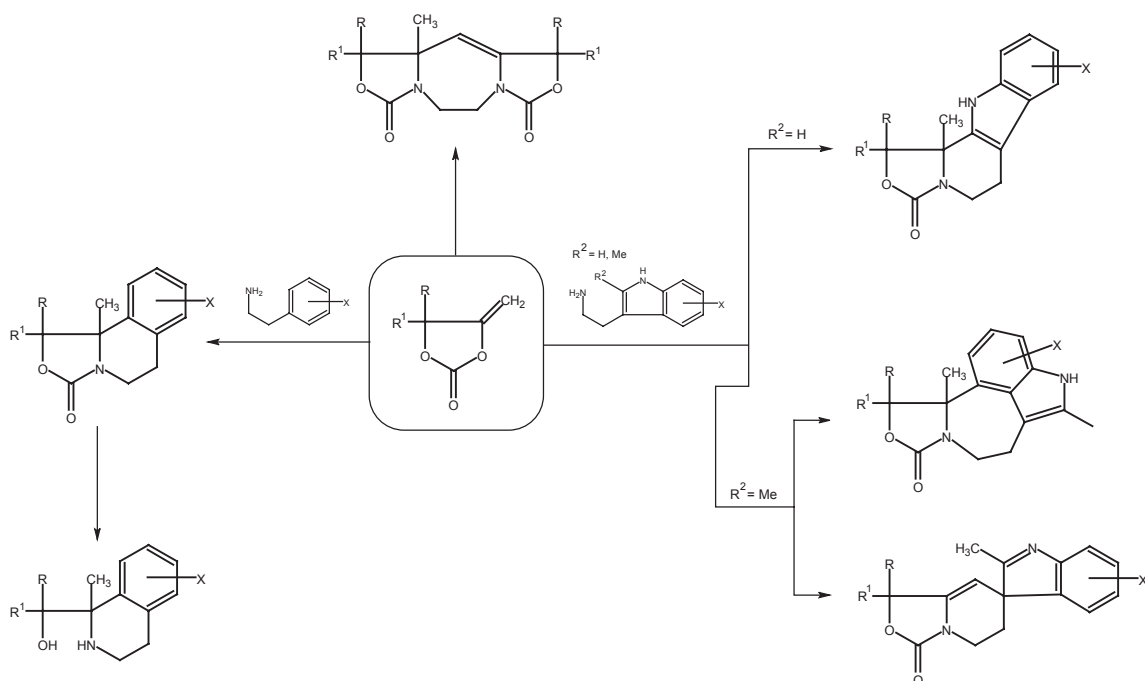
Reactions

products

№10

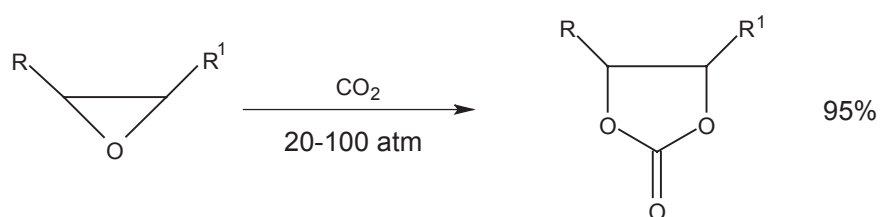
Synthesis of N-polycyclic heterocycles:
analogues of alkaloids; tryptamine,
 β -ethylamine and aminoacid derivatives
.....

part 3



№11

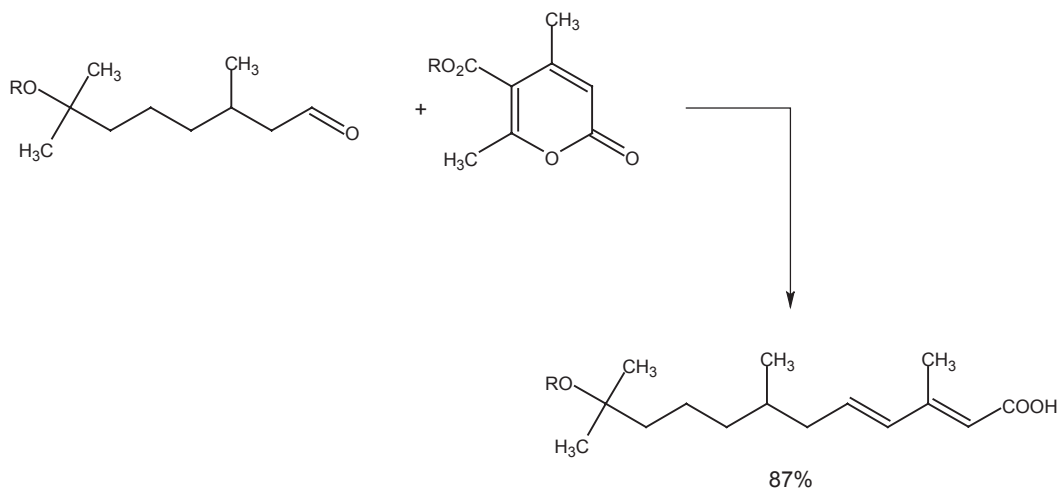
Cyclocarbonates from epoxides
.....



Reactions

N^o 12

Synthesis of juvenile hormones*



N^o 13

Acid chloroanhydrides from acids and thionyl chlorides*

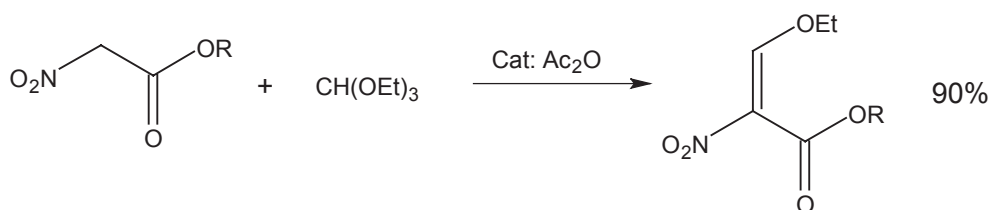


N^o 14

See after reaction N15

N^o 15

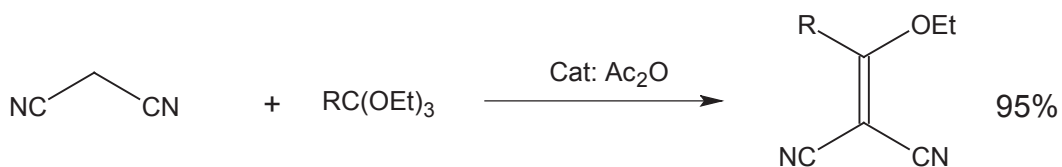
Nitroacetyl ester condensation with triethylorthoformate



Reactions

№ 14

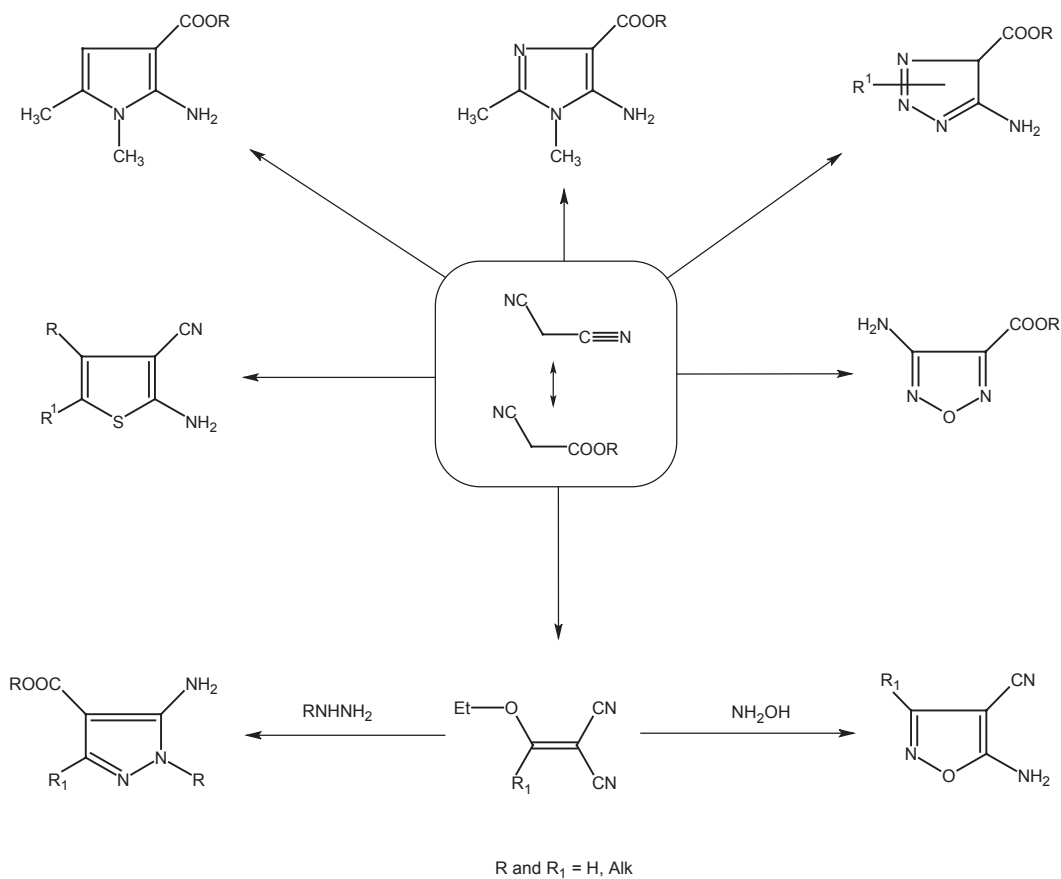
Malondinitrile condensation with triethylorthoformate*



products

№ 14

Synthesis of 5-membered amino-N-heterocycles with carboxylic group in ortho- position: precursors for condensed pyrimidines

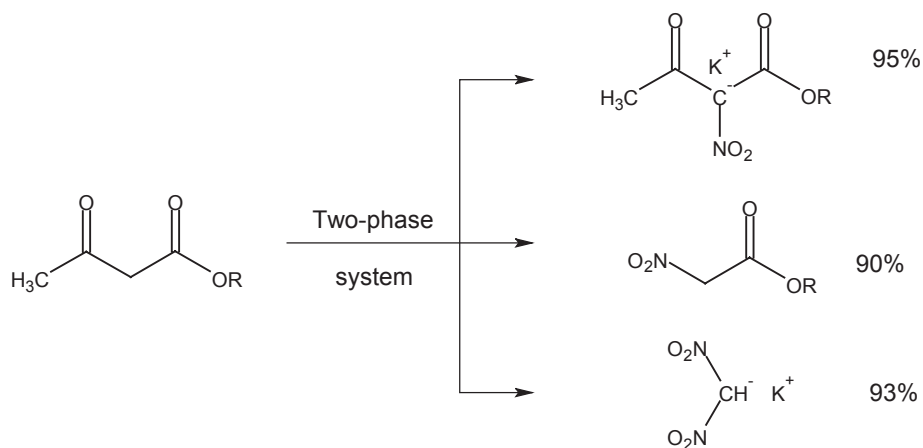


R and R₁ = H, Alk

Reactions

N^o 16

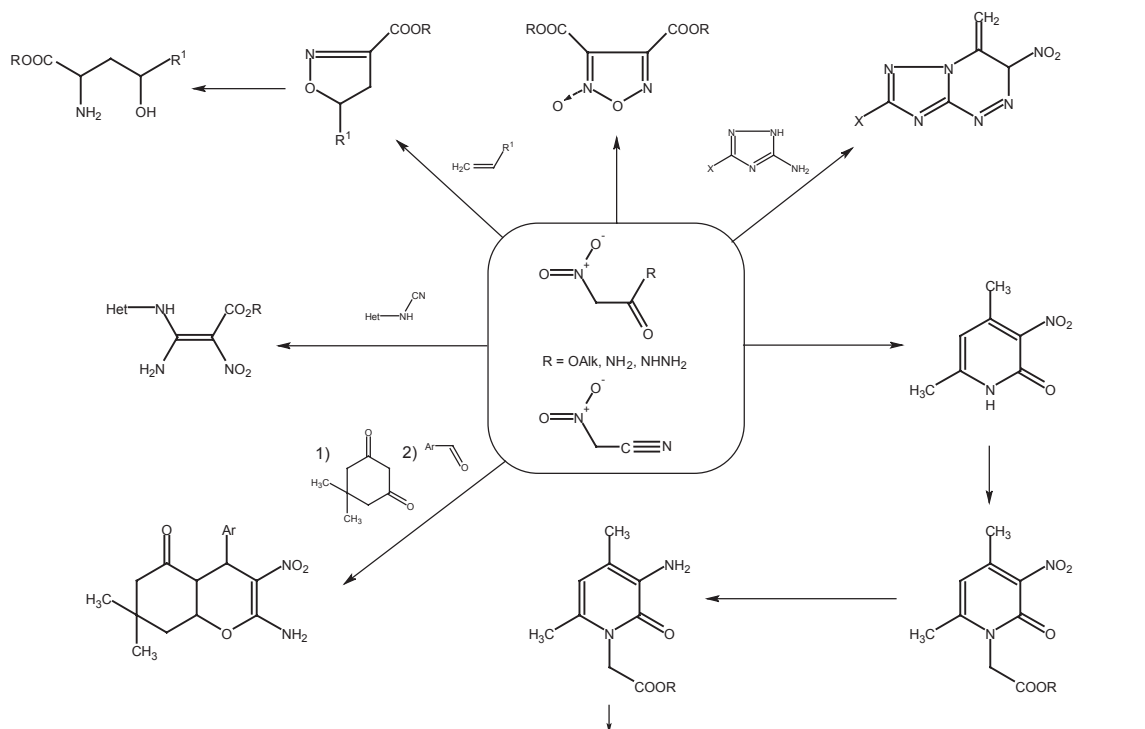
Nitration of nitroacetic ester in two-phase system*



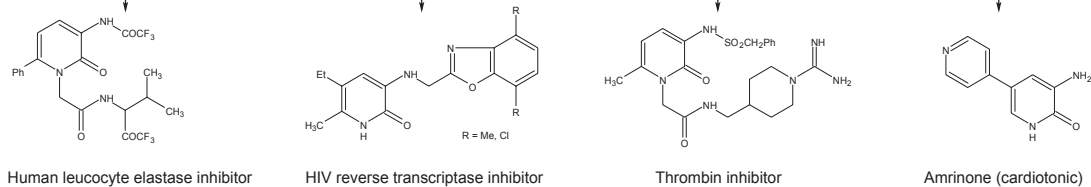
products

N^o 16

Synthesis of 5,6-membered nitro- and aminoheterocyclic derivatives - biologically active class of compounds: pyridones, pyranes, isoxazoles, pyrazoles, oxadiazoles, triazinones, aminoacids



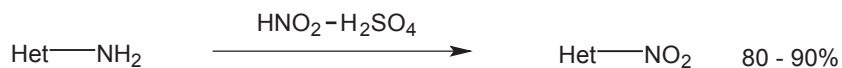
Additional information: some biologically active compounds available from 3-nitropyridones



Reactions

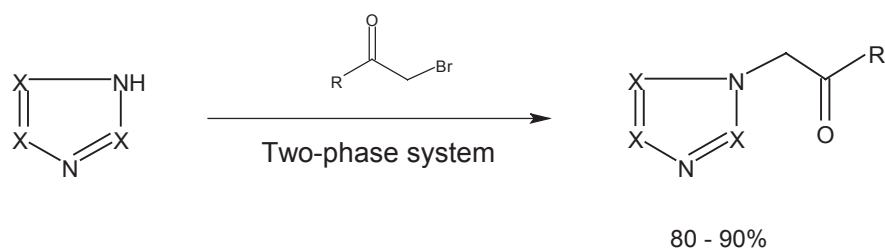
№17

Amino to nitrogroup transformation for heterocycles



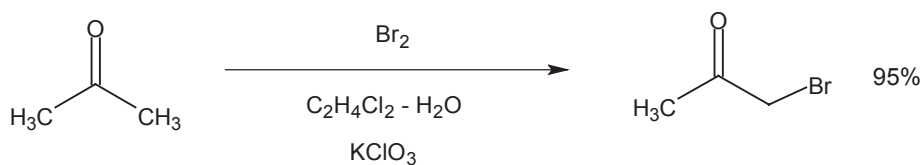
№18

N-Alkylation of 5-membered nitrogen heterocycles by bromoketones*



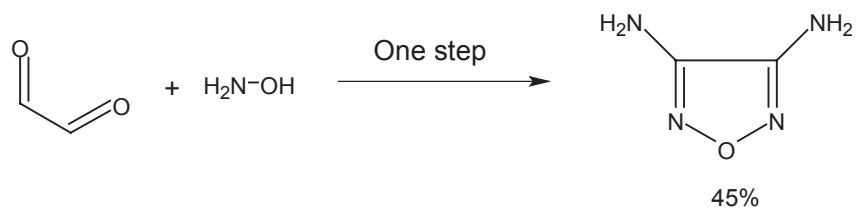
№19

Synthesis of monobromoacetone in two-phase system*



№20

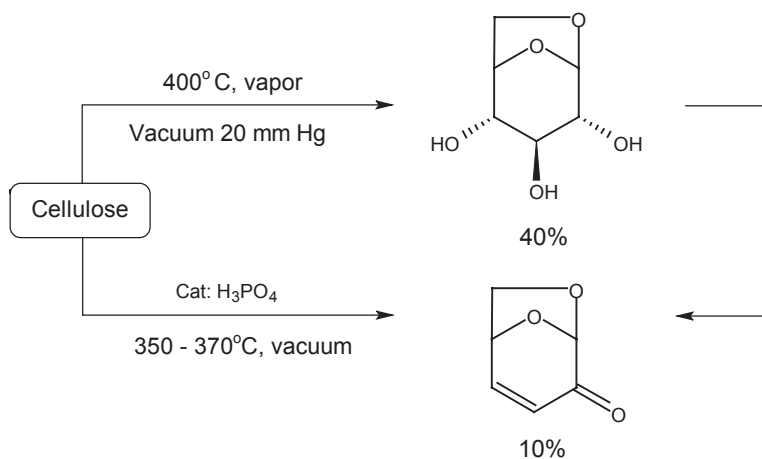
One-step synthesis of 3,4-diamino-1,2,5-oxadiazole*



Reactions

№ 21

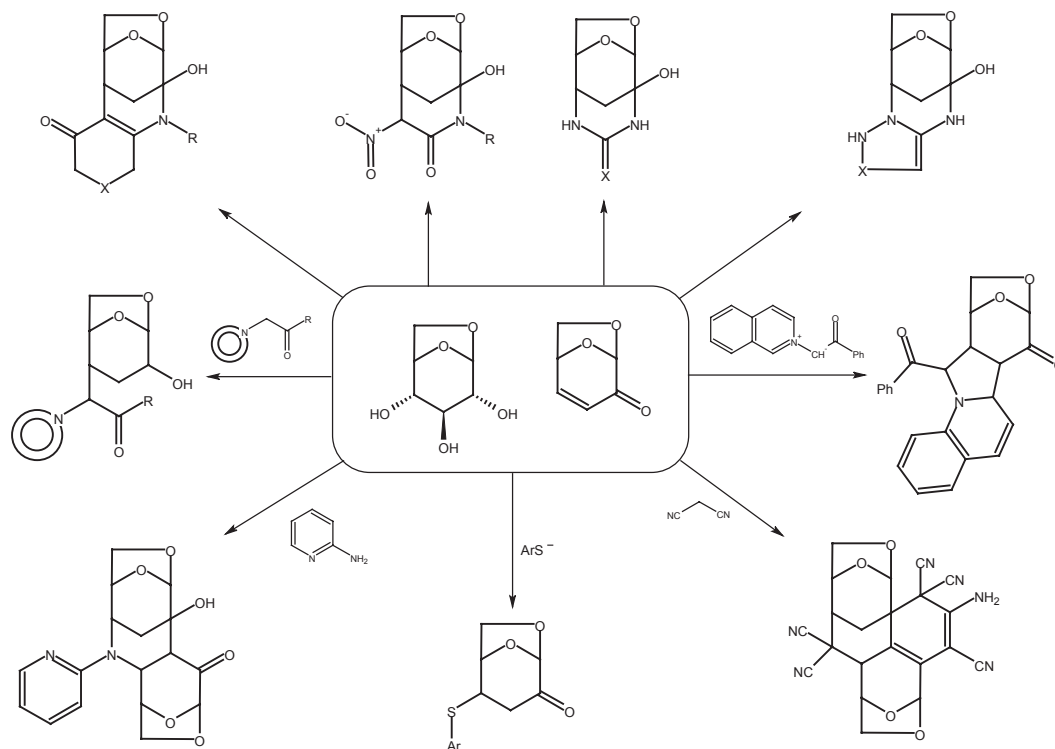
Pyrolysis of cellulose into anhydrosugars*



products

№ 21

Synthesis of anhydrosugars by pyrolysis of cellulose and stereoselective synthesis of heterocyclic systems with sugar fragment



Reactions

N_o 23

One-step synthesis of 1-substituted tetrazoles



N_o 24

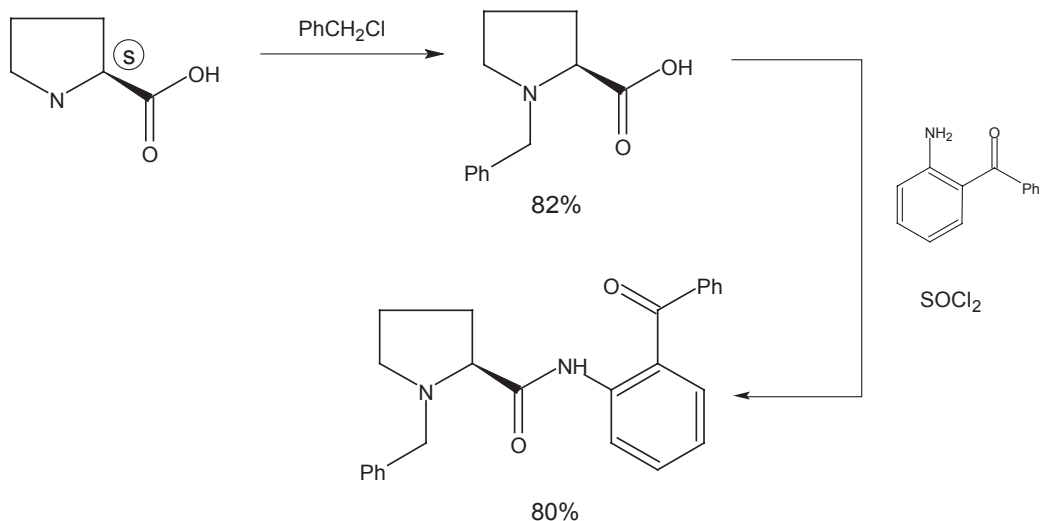
See after reaction N27

N_o 25

See after reaction N24

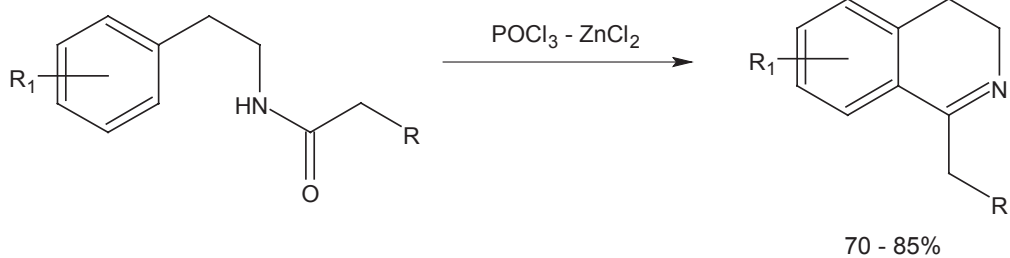
N_o 26

Catalyst for chiral aminoacid synthesis



N_o 27

Bischler-Napiralski Reaction*



Reactions

№ 24

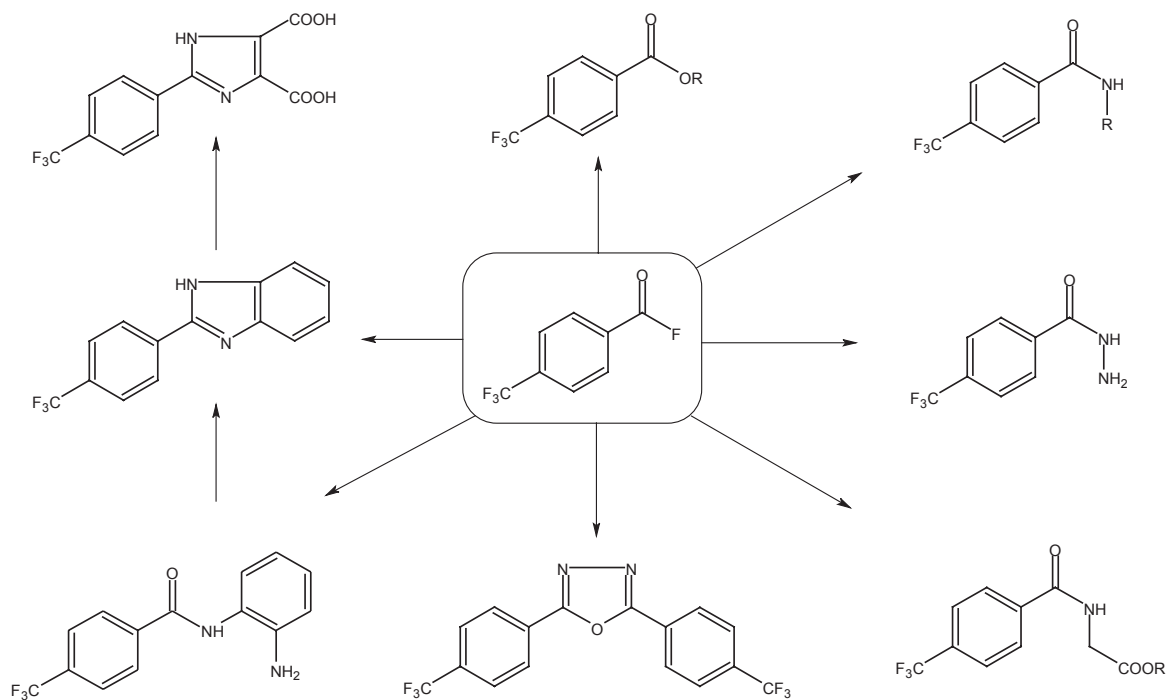
Synthesis of trifluorobenzoic fluoroanhydrate in liquid HF*



products

№ 24

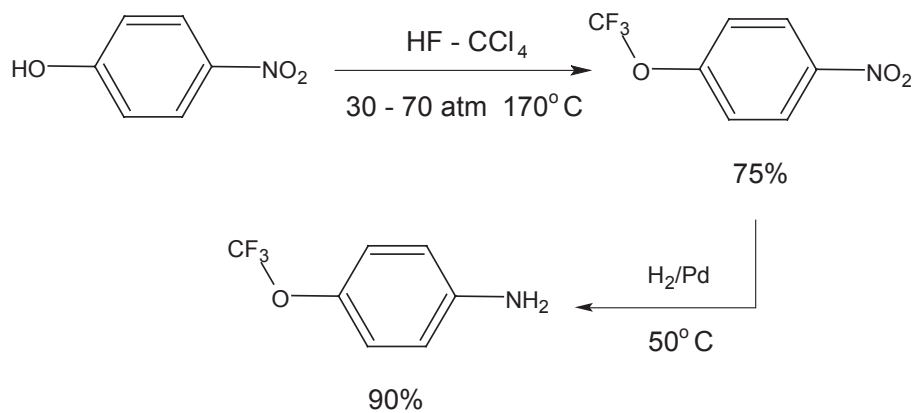
Synthesis of CF_3 -derivatives of aromatics and 5,6-membered heterocycles



Reactions

№ 25

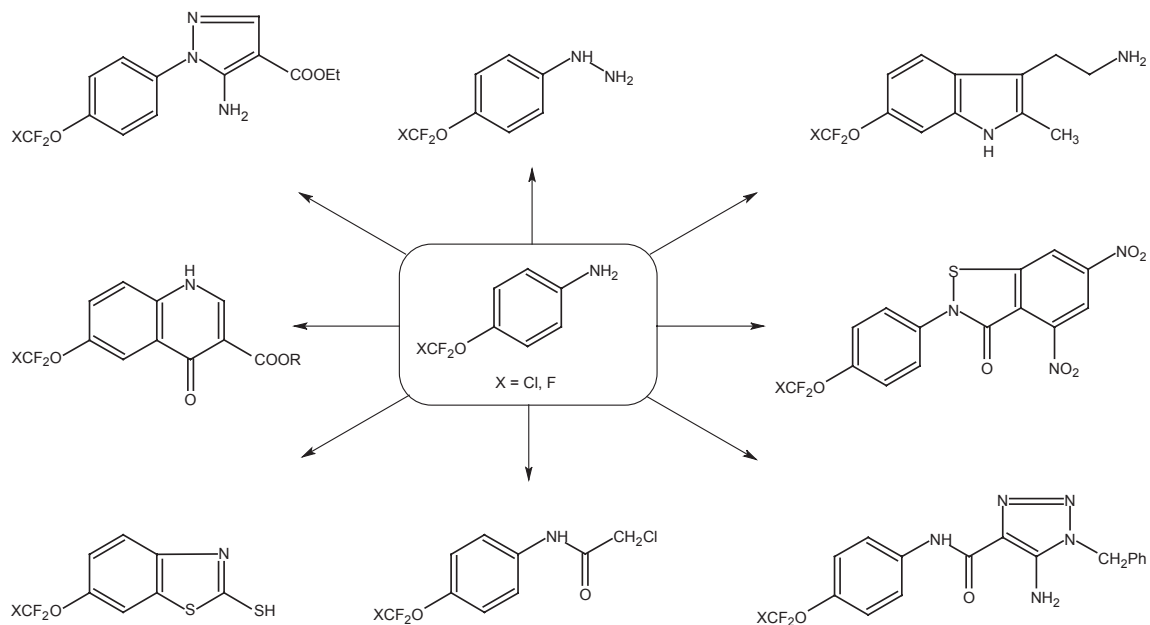
Trifluoromethylation of p-nitrophenol*



products

№ 25

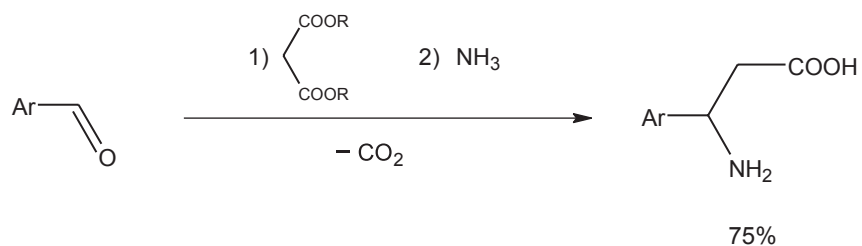
Synthesis of derivatives of trifluoromethoxyaniline



Reactions

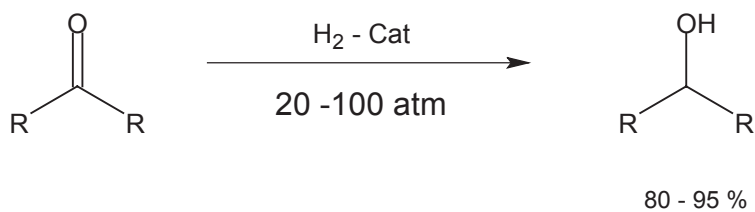
№28

Synthesis of β -aminoacids



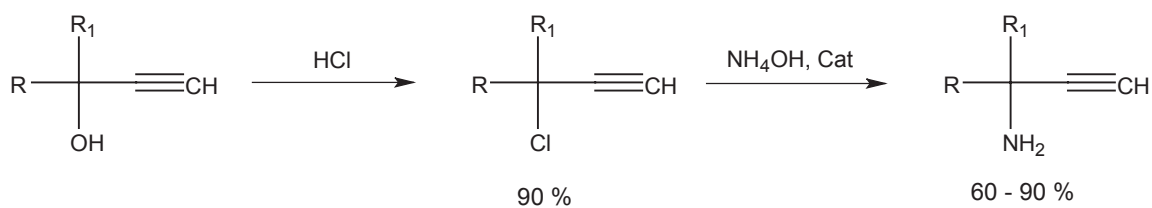
№29

Hydrogenation of ketones



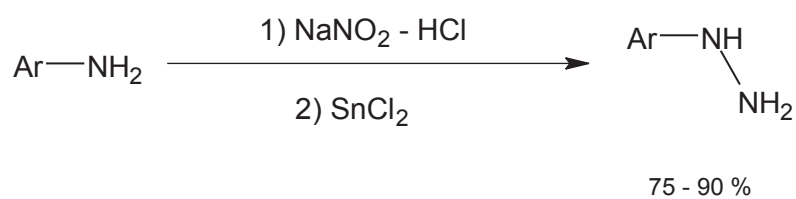
№30

Synthesis of propargylamines*



№31

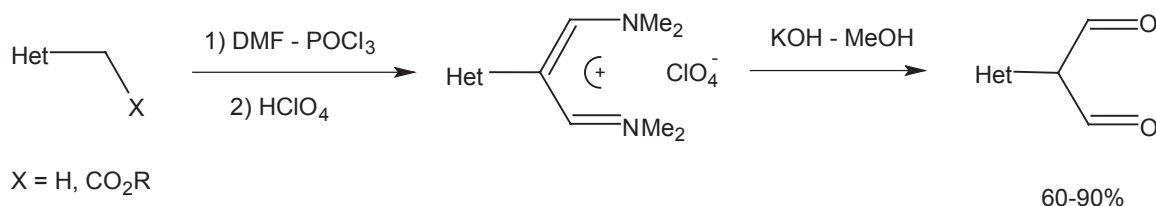
Synthesis of hydrazines



Reactions

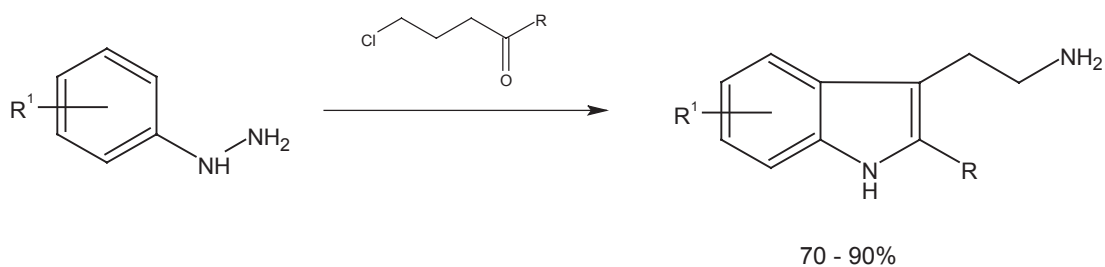
№32

Synthesis of heterylmalonaldehydes



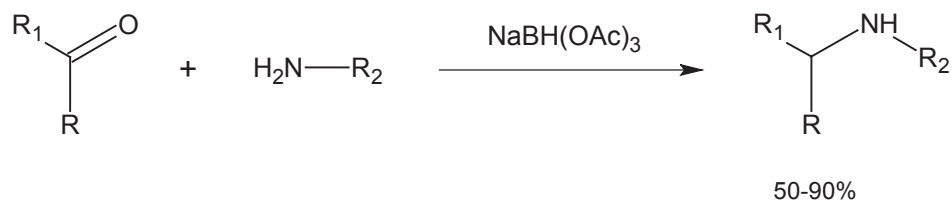
№33

Synthesis of triptamines (Fischer-Grandberg reaction)*



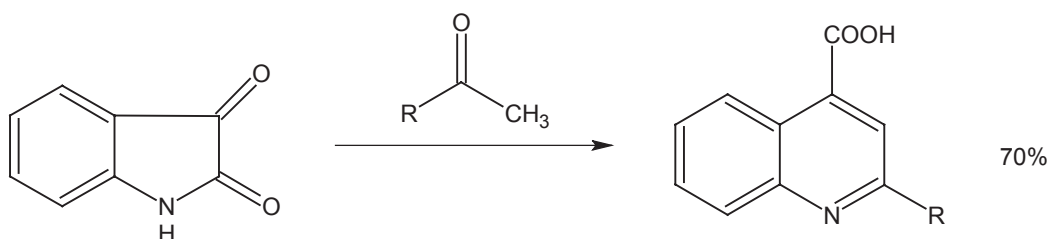
№34

Reductive amination



№35

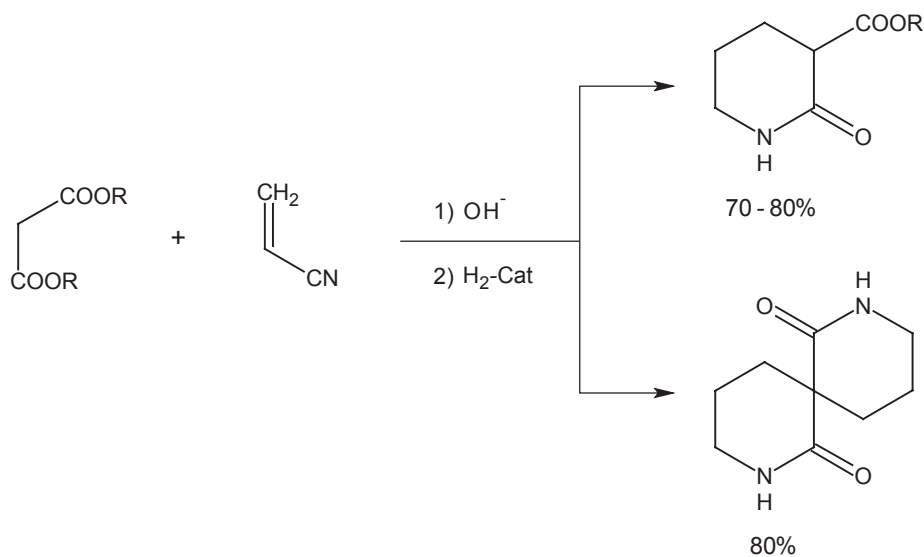
Synthesis of 4-carboxy-quinolines by isatin ring-opening*



Reactions

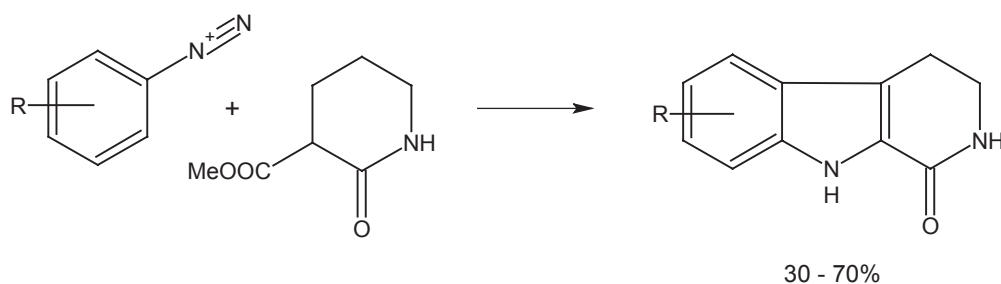
N^o 36

Cyanoethylation followed by hydrogenation*



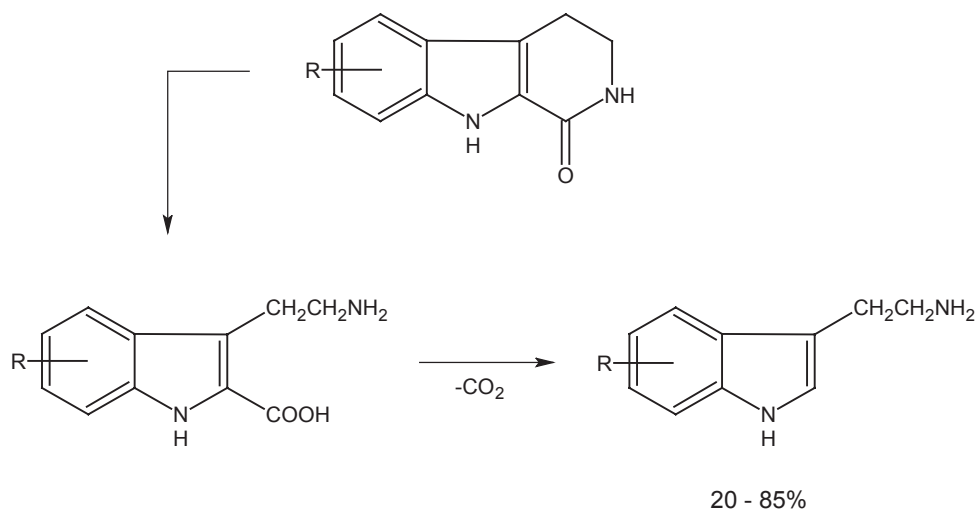
N^o 37

Jap-Klingemann reaction followed by Fischer rearrangement*



N^o 38

Triptamine synthesis by dihydrocarboline hydrolysis

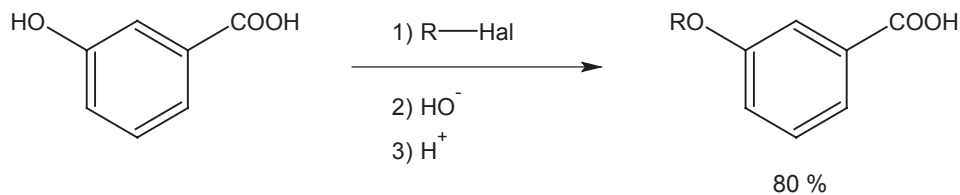


Reactions

N^o 39

Transformation of hydroxybenzoic acids to alkoxybenzoic acids*

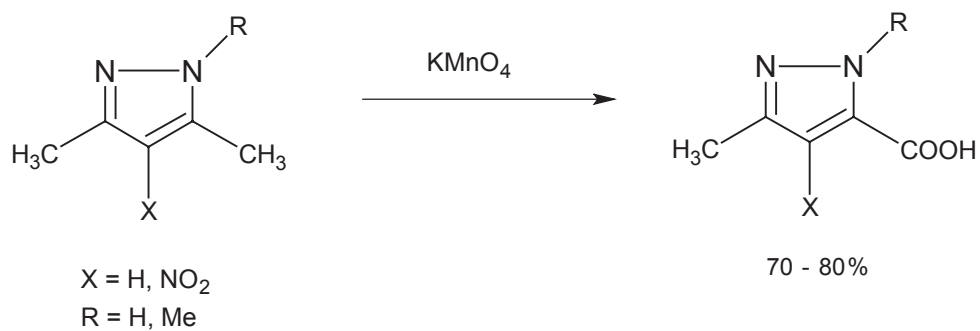
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N^o 40

Selective oxidation of one methyl group

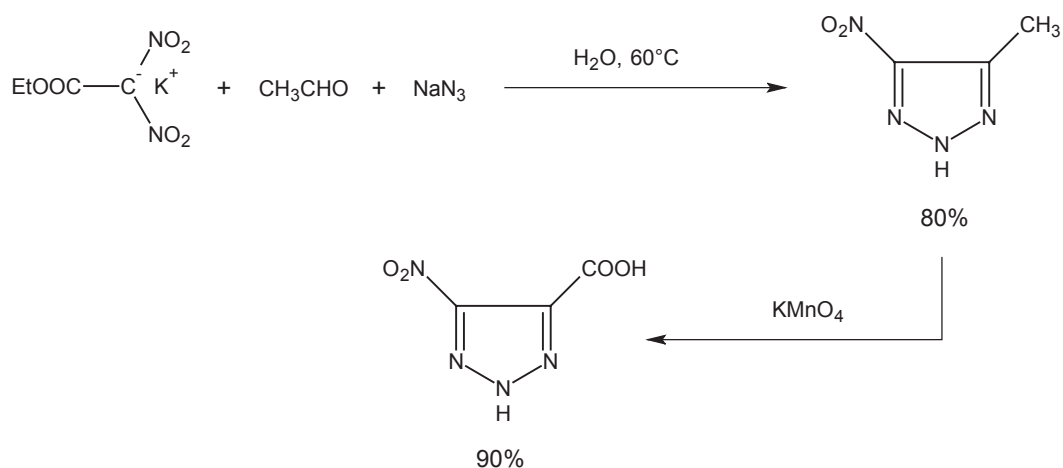
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N^o 41

Mannih condensation:
dinitroacetate with aldehydes and azide-ion

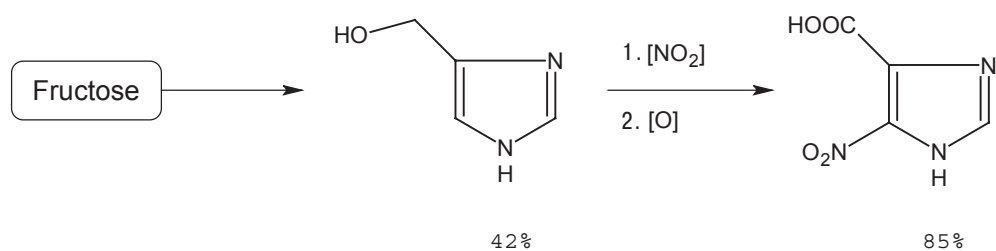
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Reactions

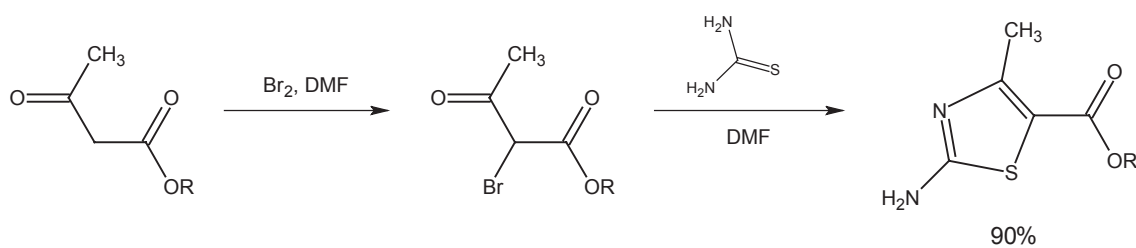
N^o 42

One-pot cyclo-nitration and Me-oxidation



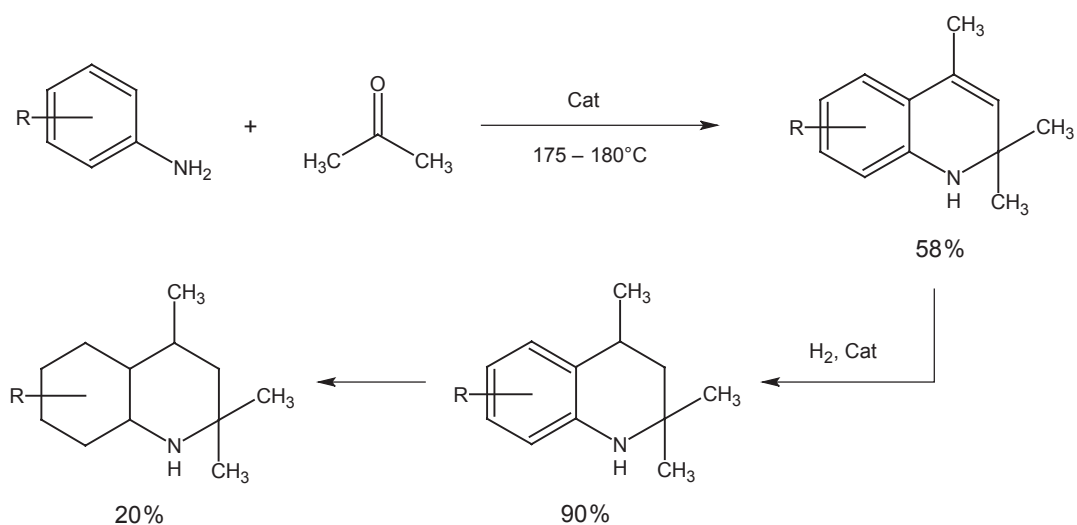
N^o 43

Synthesis of 2-amino-4 carboxythiazoles



N^o 44

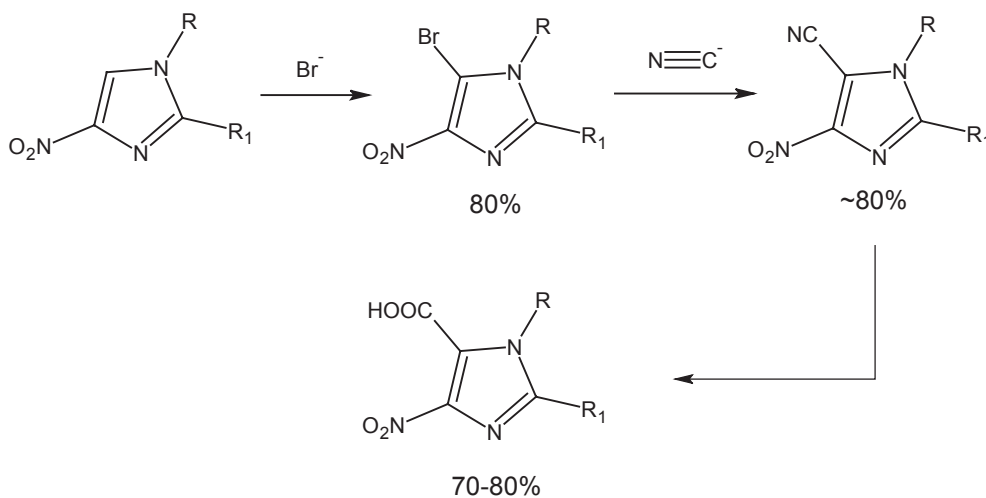
Modification of Riehm reaction followed by hydrogenation



Reactions

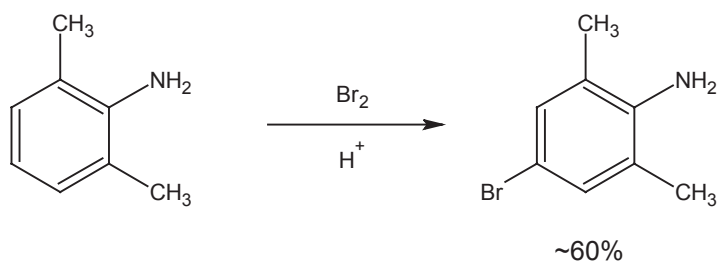
No 45

Transformation of 4-(5)-bromoimidazoles into 4-(5)-carboxyimidazoles



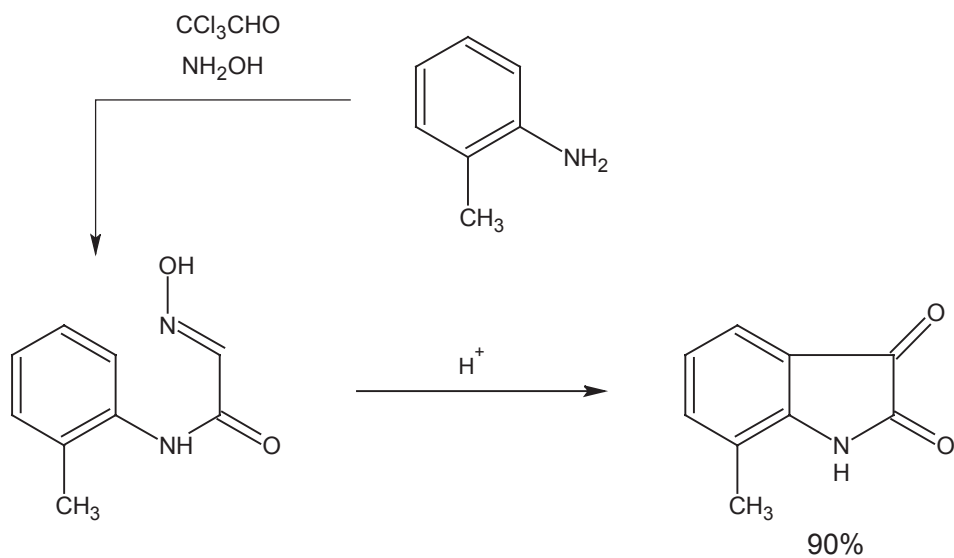
No 46

Bromination of anilines



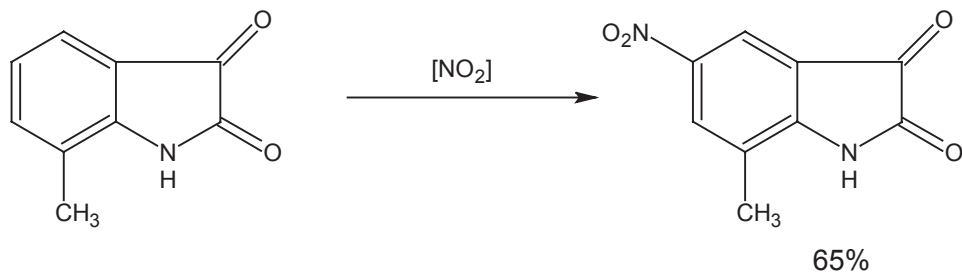
No 47

Isatin synthesis

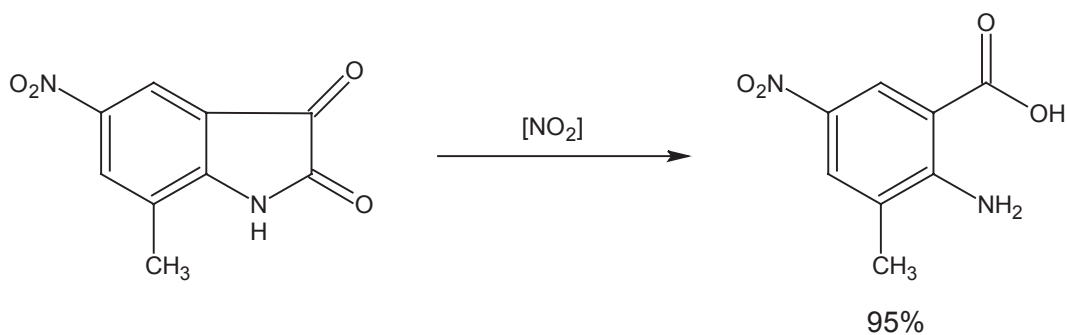


Reactions

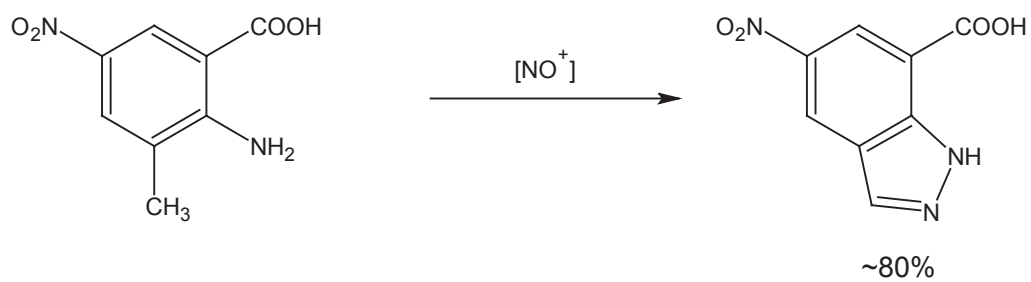
N^o48 Nitration of isatines



N^o49 Synthesis of antranilic acids from isatines

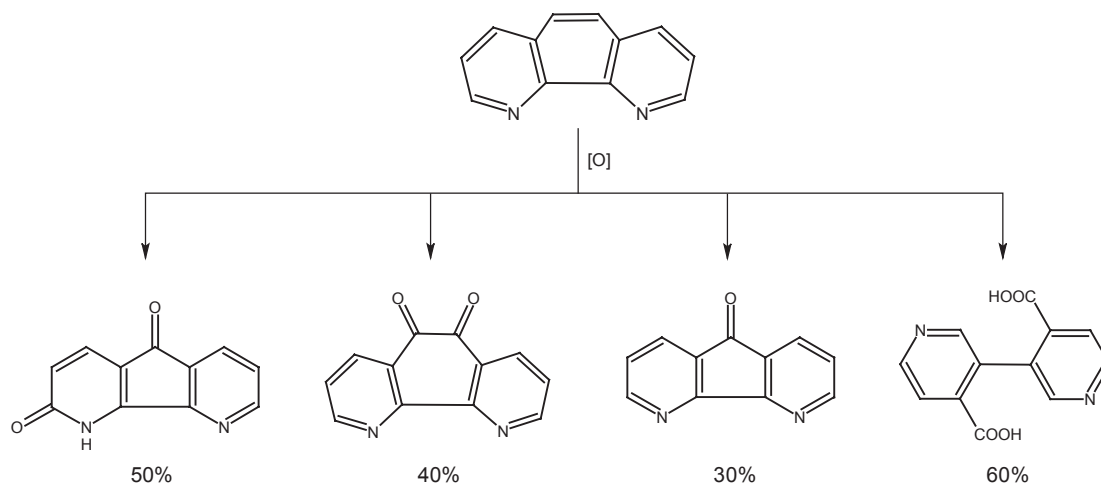


N^o50 Synthesis of indazoles from ortho-methylanilines

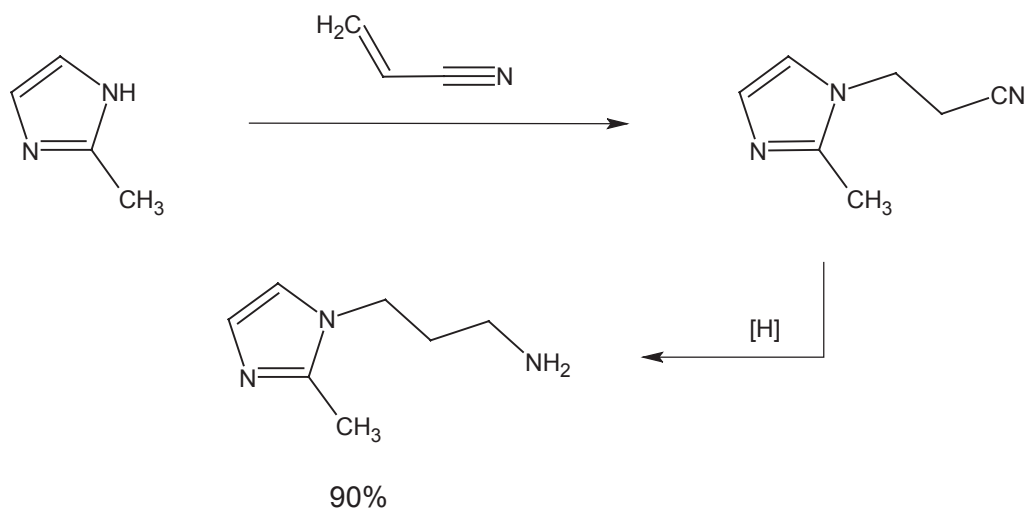


Reactions

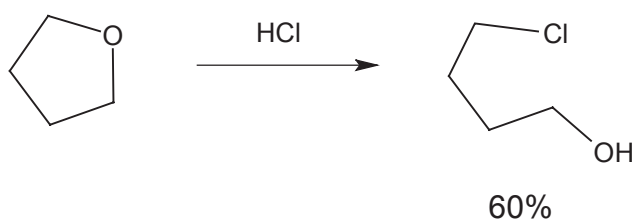
№ 51 | Oxidation of phenantroline



№ 52 | Introduction of 1-aminopropyl fragment into imidazoles*



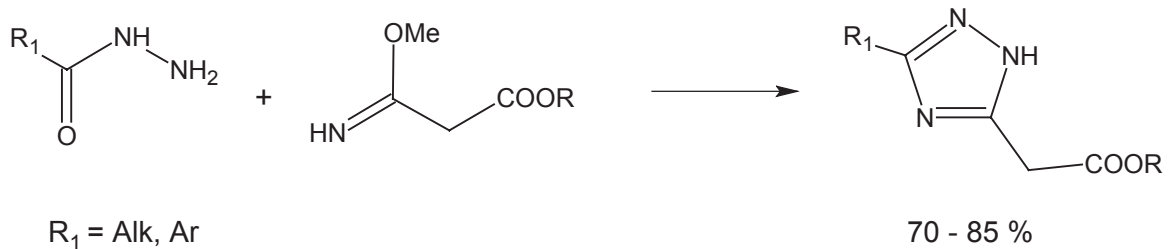
№ 53 | Synthesis of 4-chlorobutanol*



Reactions

№ 54

Synthesis of 3-(5)-1,2,4-triazolylacetic acids



№ 55

Synthesis of 5-carboxyisoxazoles with aldehyde function

