# Synthesis of β-Phenyl-α,β-dioxo-propionanilide. Peptide-Like Polyoxo Compounds. III*

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In the first communication of this series[1] it was shown that 2,3,4-triketo-tetrahydropyridine exercises a diabetogenic activity on white rats, the same as alloxane. It, was, further, suggested, that the grouping -COCOCONH- may be responsible for this activity of 2,3,4-triketo-tetrahydropyridine, as for that of alloxane. To strengthen this assumption, we prepared compounds of the type III.

$RCOCH_2CONHR_1$
I

$NC_6H_4(CH_3)_2$—p
||
$RCOCCONHR_1$
II

$RCOCOCONHR_1$
III

a, $R = R_1 = C_6H_5$

For this synthesis the methylene group of substituted acyl-acetamides (I) was converted into the keto group according to the procedure of Sachs and coworkers[2–4] through the condensation of I with p-nitrosodimethylaniline. The condensation product II was hydrolysed to compounds of the type III. As an example of this synthesis,** in this paper the preparation of β-phenyl-α,β-dioxopropionanilide (IIIa) is described.

## EXPERIMENTAL

All melting points are uncorrected.

*Benzoylacetanilide* (Ia)

was prepared according to Kibler and Weissberger.[5]

*β-Phenyl-α-(p-dimethylaminophenylimino)- β-oxo-propionanilide* (IIa)

To a boiling solution of p-nitrosodimethylaniline[4,6] (4.5 g., 0·035 mole) and benzoylacetanilide (7.2 g., 0.03 mole) in absolute ethanol (40 ml.), a 33% aqueous sodium hydroxide solution (0.6 ml.) was dropwise added. During the exothermic reaction condensation occurred, and the colour of the solution turned from green to deep red. After the mixture was refluxed for five minutes, it was cooled under running water and then allowed to stand at —20° for at least one hour. The separated *β-phenyl-α-(p-dimethylaminophenylimino)-β-oxopropionanilide* was filtered

* Communication No. 52 from the Chemical Institute. Paper II of this series, K. Balenović and Ž. Fuks, *Arhiv kem.* **26** (1954) 229.

** Further examples of this reaction, and the description of the chemical and biological properties of N,β-disubstituted-α,β-dioxopropionamides III will be found in the Dr.'s thesis, M. Laćan (in preparation).

off, washed with absolute ethanol, and dried. Yield 6.4 g. (58%), m. p. 186°. After recrystallization from absolute ethanol orange prisms were obtained, yield 5.8 g. (52%), showing the constant m. p. 191—192°.

*Anal.* 7.14 mg. subst.: 19.44 mg. $CO_2$, 3.96 mg. $H_2O$
$C_{23}H_{21}N_3O_2$ (371.42) calc'd.: C 74.37; H 5.70%
found: C 74.30; H 6.20%

*β-Phenyl-α,β-dioxo-propionanilide* (IIIa).

β-Phenyl-α-(p-dimethylaminophenylimino)-β-oxopropionanilide (IIa, 4.2 g., 0.01 mole) was triturated in a mortar with cold dilute sulphuric acid (0°, 23%, 80 ml.) and then allowed to stand at room temperature for 2 hours. The crude *β-phenyl-α,β-dioxo-propionanilide* was filtered off, yield 1.7 g. (63%), m. p. 106—107°. Recrystallization from benzene gave hygroscopic pale yellow needles of the constant m. p. 115°.

*Anal.* 3.93 mg. subst.: 10.22 mg. $CO_2$, 1.67 mg. $H_2O$
4.03 mg. subst.: 0.206 ml. $N_2$ (17°, 752 mm.)
$C_{15}H_{11}NO_3$ (253.25) calc'd.: C 71.14; H 4.38; N 5.53%
found: C 71.06; H 4.76; N 5.95%

*2-Phenyl-quinoxaline-3-carboxyanilide.*

A solution of β-phenyl-α,β-dioxo-propionanilide (IIIa, 0.7 g.) in ethanol (5 ml.) was mixed with a solution of an equimolar amount of o-phenylene diamine (0.3 g.) in ethanol (3 ml.). After the reaction mixture was left at room temperature for an hour, the precipitation of *2-phenyl-quinoxaline-3-carboxyanilide* was completed. It was filtered off, and showed the m. p. 179—180° which remained unchanged after recrystallization from benzene (white needles). For analysis, the compound was sublimed at 130°/0.01 mm.

*Anal.* 3.76 mg. subst.: 0.421 ml. $N_2$ (16°, 762 mm.)
$C_{21}H_{15}N_3O$ (325.35) calc'd.: N 12.92%
found: N 13.28%

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## IZVOD

### Sinteza β-fenil-α,β-dioksopropionanilida

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Na primjeru β-fenil-α,β-dioksopropionanilida opisana je po shemi I—III sinteza spojeva parcijalne strukture -COCOCONH-.

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