

RUTHENIUM TETROXIDE OXIDATION OF N-ALKYL-LACTAMS

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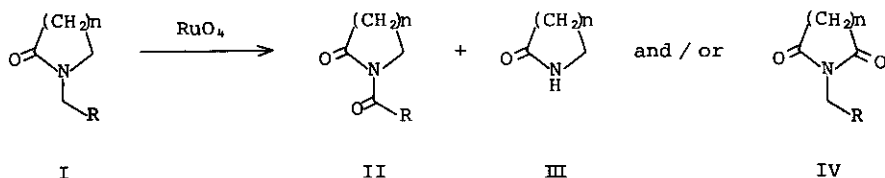
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Ruthenium tetroxide (RuO_4) has been exploited widely as an effective multipurpose oxidant. In order to obtain further informations on the RuO_4 oxidation of nitrogen-containing heterocyclic compounds, we investigated the oxidation of N-alkyl-lactams which have two α -carbon atoms to be oxidized adjacent to lactam nitrogen atom.

The oxidation of N-methyl- and N-ethyl-lactams (I) consisting of four- to eight-membered ring was carried out in aqueous or organic (AcOEt) phase using a catalytic amount of RuO_2 in combination with aqueous 10% sodium metaperiodate at room temperature. A completely regioselective oxidation depending on the ring size of lactam except seven-membered lactam was observed. Four- and eight-membered lactams were oxidized at the exocyclic α -carbon to the corresponding N-acyllactams (II). In the case of eight-membered lactams, NH-type lactam (III) was also obtained in addition to II, which might be produced from the precursor of II by loss of aldehyde (HCHO or CH_3CHO) and / or from II by hydrolytic deacylation. Five- and six-membered lactams were oxidized at the endocyclic α -carbon to the corresponding cyclic imides (IV). While, the oxidation of seven-membered lactams occurred at both of the α -positions to afford three products (II, III, and IV).

This regioselectivity was confirmed in the RuO_4 oxidation of various types of N-alkyl-lactams.



[$\text{R} = \text{H}, \text{CH}_3$; $n = 1, 2, 3, 4, 5$]