## RING CONTRACTION IN THE REACTION OF CYCLIC OLEFINS WITH IODINE(III)-CONTAINING REAGENTS

N. S. Zefirov, R. Caple,
 UDC 542.91:547.592.2:541.49:547.539.4:546.273'161
 V. A. Palyulin, B. Berglund,
 R. Tykvinskii, V. V. Zhdankin, and A. S. Koz'min

Although the reactions of cycloolefins, proceeding with a reduction in ring size, hold great importance in organic synthesis [1-3], the range of reagents for this purpose has been limited to thallium(III) salt [1-3]. In a continuation of our studies on the reaction of trivalent iodine with olefins [4], we found that such a conversion may be achieved by the action of available and nontoxic reagents (I)-(III). Thus, phenyl iodosulfate (I) [4] or the complex of iodobenzene with boron trifluoride etherate (II) [4] react with cyclohexane in  $CH_2Cl_2$  at -10 to -15°C over 10-15 min to give cyclopentylaldehyde (IV) as the major product as indicated by PMR spectroscopy. Aldehyde (IV) was isolated as its 2,4-dinitrophenylhydrazone in 20 and 60%, respectively.



The reaction of 2,3-dihydropyran with sulfate (I) leads to tar formation, but the use of (III) at about 20°C gives only 2-formyltetrahydrofuran (V) as indicated by PMR spectroscopy. Thus use of reagent (II) in  $CH_2Cl_2$  at -20°C gave (V) in 36% yield isolated as its 2,4-dinitrophenylhydrazone. Acyclic olefins undergo analogous reactions. Thus, the reaction of cis-stilbene with reagent (II) in  $CH_2Cl_2$  at -10°C gives diphenylacetaldehyde in 80% yield.

Thus, in contrast to other electrophilic trivalent iodine compounds [4], the addition of (I)-(III) to cycloolefins proceeds with ring contraction and the formation of aldehydes. This reaction may find use as a convenient method for the interconversion of rings.

## LITERATURE CITED

- 1. W. J. Layton, C. P. Brock, P. A. Crooks, et al., J. Org. Chem., <u>50</u>, 5372 (1985).
- 2. J. E. Byrd, L. Gassar, P. E. Eaton, J. Halpern, J. Chem. Soc., D, 40 (1971).
- A. McKillop, J. D. Hunt, E. C. Taylor, and F. Kienzle, Tetrahedron Lett., 5275 (1970).
  N. S. Zefirov, V. V. Zhdankin, Yu. V. Đan'kov, et al., Tetrahedron Lett., <u>27</u>, 3971 (1986).

M. V. Lomonosov Moscow State University and University of Minnesota, Duluth, Minnesota, USA. Translated from Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No. 6, pp. 1452-1453, June, 1988. Original article submitted February 25, 1988.