STEREOCHEMISTRY OF HETEROGENEOUS CATALYTIC REACTIONS. DEHYDROGENATION AND DEHYDRATION OF STEREOISOMERIC CYCLOHEXANEDIOLS ON COPPER*

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Transformations of six isomeric cyclohexanediols on copper catalysts were studied. The transformation rate sequence is 1,4 < 1,2 < 1,3. 1,3-diols selectively yield cyclohexanone (and cyclohexanol). On Cu/Al, 1,2- and 1,4-diols give several products, mainly cyclohexanone and hydroxycyclohexanones. On Cu, these latter are formed with much higher selectivity. A correlation was found between the diol stereostructures and reaction directions.

INTRODUCTION

The transformations of isomeric cyclohexanediols in the presence of metal catalysts have not as yet been studied systematically. Only a few literature data

* Part XLI of the series "Study of the transformations of diols and cyclic ethers"
are to be found in which accounts are given of the transformation of 1,2- and 1,4-cyclohexanediols on Ni /1,2/ Pd /3/ and Cu /4/ catalysts.

We set out to study the transformations of all three cyclohexanediol epimer pairs (I-VI) in order

![Chemical Structures]

...to establish how the spatial arrangement of the hydroxy groups influences the directions of transformation of the individual cis-trans isomer pairs, what differences can be observed in the reaction as a consequence of the different structures of the two catalysts, and to compare the reactions occurring with the transformations of the open-chain diols /5,6/.

EXPERIMENTAL

The cyclohexanediols were prepared by literature methods /7-10/.

The studies were carried out on Cu/Al catalyst of Raney type, and on a Cu catalyst prepared from CuO by reduction, in a continuous system /11/. GC and IR techniques were used for product identification.