Oxidation of naphthalene on Co-Mo-O, NiMoO₄ and Mg-Mo-O catalysts gives phthalic anhydride, its maximal yield being about 40% on nickel molybdate. On bismuth molybdates and the Sn-Sb-O system, naphthalene is mainly oxidized to carbon oxides.

Oxidation of naphthalene has been performed on these two types of catalysts in order to find to what extent the olefin oxidation catalysts are capable of activating the aromatic ring. This reaction has been studied on vanadia.
catalysts /2/, recognized as active and selective in the formation of phthalic anhydride by naphthalene oxidation. The scarce data concerning this reaction on other oxide systems report the small activity and high selectivity of MoO$_3$ and WO$_3$, whereas most of other transition metal oxides are not selective /3/.

EXPERIMENTAL

The samples of the preparations used were the same as those used in Ref. /1/: the same paper gives the detailed description of the preparation method. In addition to the olefin oxidation catalysts a sample of vanadia-titania catalyst used in o-xylene oxidation was also included for comparison.

Oxidation of naphthalene was studied in a fixed-bed reactor in the temperature range of 300-500 °C. 4 ml samples of catalysts diluted (1: 1) with quartz beads were used: the concentration of naphthalene in air was 30 g/m$^3$, the contact time 1 second. Analysis was performed gas-chromatographically: partial oxidation products were analyzed on a column filled with 5% oil F 50 on Chromosorb G at 180 °C and CO and CO$_2$ on molecular sieves 13 X and Chromosorb 104, respectively.

RESULTS AND DISCUSSION

Table 1 gives the comparison of activities of the samples in terms of the temperature of 50% conversion and of maximal yield and selectivity to partial oxidation products. In Table 2 the distribution of products at selected temperatures is given.

As is seen, two different types of behavior are again observed. Cobalt and nickel molybdates as well as the Mg-Mo-O system and MoO$_3$ are active in the partial oxidation of naphthalene, producing phthalic anhydride with the maximal selectivity of 50% for the Co-Mo-O system. This result shows that not only vanadia catalysts are capable of breaking a condensed aromatic ring with relatively high activity.