

CATALYTIC PROPERTIES OF Tc/support
IN THE REACTIONS OF TRANSFORMATIONS OF
HYDROCARBONS, CARBON OXIDES AND HYDRAZINE.

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Our interest in study of catalytic properties of Tc has arisen from the analysis of its position in the Periodic table. Tc belongs to transitional elements, which are good catalysts with high activity. The analogs of Tc in VII group - Mn and Re are catalyst too. One would expect Tc to behave similarly to its neighbours in the Periodic table. In this connection the investigation of catalytic properties of Tc and some its compounds (TcO_2 , TcS_2) in the reactions of different types (dehydrogenation of alcohols, cyclic hydrocarbons, dehydrocyclization of n-hexane, n-heptane, hydrogenation of CO, CO_2 , benzene, decomposition of hydrazine) was initiated (table). Supported technetium catalysts revealed sufficiently high activity and selectivity.

Processes of dehydrogenation, dehydrocyclization and hydrogenation of benzene followed the classic course without concurrent reactions. Hydrogenation of carbon oxides proceeds mainly to give methane. In all cases the activity depends upon the nature of support. As example for dehydrogenation reactions the following order may be put according of decreasing activity: $Tc/MgO > Tc/rare\ earths > Tc/Al_2O_3 > Tc/ZrO_2 > Tc/TiO_2 \gg Tc/SiO_2 = Tc/C$.

Investigation of some physico-chemical properties of catalysts (by adsorption measurements, optical spectroscopy, electron microscopy technique etc.) allowed us to determine the character of technetium distribution and its states on the surface of support. In the active catalysts the interaction between the deposited technetium and carrier was observed. This interaction causes the formation of ionic forms of Tc and results in the formation mechanically firm catalysts.

Investigation of chemisorption of H_2 , O_2 and CO on technetium catalysts has enabled us to determine the method of estimation of specific surface and dispersion of supported Tc, to find the spillover effect on catalysts with low concentration of Tc (<1%). Under action of low amount of supported Tc the carrier adsorbs anormally high amount of gases.

Higher activity of Tc in comparison with its analogs - Mn and Re was established in all reactions. One of the possible reasons of this phenomenon may be the influence of ^{99}Tc radiation. Continuous irradiation by β -particles is the reason of appearance of new adsorption centres in support - electrons and holes.