

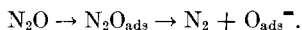
## LETTER TO THE EDITORS

The Oxygen Anion-Radicals on  $V_2O_5/SiO_2$ .

Our paper published in the *Journal of Catalysis* 11, 378 (1968) reported that oxygen adsorption on vanadium pentoxide supported on silica gel gives rise to the ESR spectrum ascribed by us to adsorbed  $O_2^-$  radicals. A more detailed investigation has shown, however, that the observed spectrum is more complicated and is due to two different anion-radicals  $O_2^-$  and  $O^-$ .

The  $O_2^-$  radical spectrum can be obtained in almost pure form by adsorbing oxygen at the temperature of liquid nitrogen. It represents an anisotropic line with the following constants:  $g_1 = 2.023$ ,  $g_2 = 2.011$ ,  $g_3 = 2.004$ , and  $A_1 = 9.7$  oe,  $A_2 = 6.8$  oe, and  $A_3 = 5.9$  oe (Fig. 1a). If the adsorption is carried out at a higher temperature, then on the background of this signal there arises another one that represents an octet with parameters  $g = 2.025$  and  $A = 14$  oe.

This spectrum that we ascribe to  $O^-$  can be obtained in its pure form by adsorbing oxygen at the temperature  $300^\circ\text{C}$  followed by pumping oxygen out of the gas phase and by cooling the sample down to liquid nitrogen temperature (Fig. 1b). Dinitrogen monoxide adsorption leads to the same spectrum, which is likely to be due to  $N_2O$  decomposition according to the equation:



If  $O_2^-$  anion radicals obtained at the temperature of liquid nitrogen are heated up to room temperature, a part of  $O_2^-$  radicals transform into  $O^-$  radicals. The adsorbed  $O_2^-$  and  $O^-$  radicals can be observed at temperatures as high as  $300^\circ\text{C}$  in oxygen atmosphere.  $O^-$  anion-radicals show extremely high reactivity; they react with hydrogen and methane at temperatures as low as that of liquid nitrogen. The results of this work will be published in more

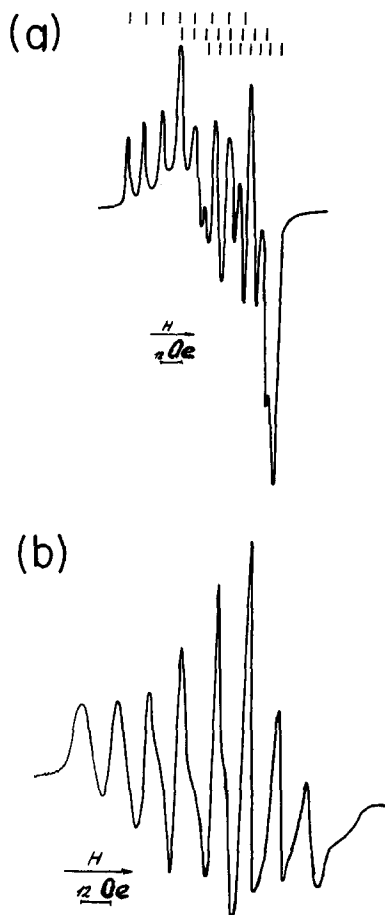


FIG. 1. X-band ESR spectra at  $77^\circ\text{K}$  of anion-radicals on  $V_2O_5/SiO_2$ . a)  $O_2^-$  radicals; b)  $O^-$  radicals.

detail in one of the ensuing issues of the journal "Kinetics and Catalysis."

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