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Adsorption of Hydrogen on Tungsten Sulfide

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1. Preparation of WS_2

The WS_2 used in the adsorption tests has been prepared from ammonium sulfotungstenate, reduced with hydrogen at 350°. Oxygen was kept off most carefully. The hydrogen used in the bomb has been freed from O_2 over a platinum catalyst, purified with concentrated sulfuric acid and dried. At the temperature in question the reduction took 400 hours. Even after this period (very slight traces of) H_2S will be generated. In the reduction container is a permanent hydrogen gauge pressure of about 150 mm Hg.

2. Adsorption at about 25°C.

An appreciable progress in the amount absorbed takes place up to 48 hours. The final value is rather constant up to pressures of less than 100 mm, being 1 cm^3H_2/1g WS_2. If the pressure drops to less than 100 mm pressure, less H_2 will be adsorbed. When the pressure was 13 mm Hg, only 0.45 m^3H_2 have been adsorbed. To be sure, the test period was shorter in this latter test.

Final Pressure	cm^3H_2/g WS_2	Period of observation
466 mm	1.05	16 hours
~~[illegible] mm~~	~~1.16~~	48 "
109.5 "	0.96	16 "
45.3 "	0.74	20 "
13.2 "	0.45	4 "

If atmospheric air, or even traces of it, reach the catalyst, its activity goes immediately substantially down (to less than one-half). The values obtained with poisoned WS_2 are rather scattered. We tried to subject them to a renewed regeneration with H_2 at the given temperature, but the former activity could not be completely restored. It is not yet quite sure whether the poisoning is due to O_2 adsorption.

The tests are being continued.

Meier

Dr. Beth
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