

minutes, it is cooled and hydrolyzed with dilute hydrochloric acid. The ether layer is washed again with dilute hydrochloric acid and evaporated. The crude toluidide is purified by crystallization from dilute alcohol.

Table I summarizes the results obtained in this laboratory. The method failed when applied to the following dibasic esters: benzyl succinate, ethyl malonate, methyl oxalate, and methyl phthalate.

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RECEIVED APRIL 3, 1933  
PUBLISHED JULY 6, 1933

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## COMMUNICATIONS TO THE EDITOR

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### PLATINUM OXIDE AND CARBON MONOXIDE

*Sir:*

In a previous publication [THIS JOURNAL, **54**, 4498 (1932)] it was shown that the reduction of palladium oxide by carbon monoxide requires a higher temperature than is necessary for reduction by hydrogen. A cause was found in the exceptional adsorption of carbon monoxide and dioxide by the palladium oxide. Since Langmuir [*ibid.*, **40**, 1398 (1918)] and also Taylor and Burns [*ibid.*, **43**, 1282 (1921)] found a much stronger adsorption of carbon monoxide and oxygen on platinum than on palladium it was reasonable to suppose that platinum oxide might reduce in the usual manner.

We have prepared samples of platinum oxide using the procedure and apparatus previously described and have established that platinum oxide reduces with carbon monoxide at 0°. The reaction is autocatalytic in type, having an induction period, and is similar in all ways to the reduction of copper oxide described by Jones and Taylor [*J. Phys. Chem.*, **27**, 623 (1923)]. A powdery 2-g. sample at 0° in a tube of 1 cm. diameter at a flow rate of 20 cc. of carbon monoxide per minute had an induction period of twelve minutes followed by an extremely rapid reaction. A sample first washed free of air by nitrogen gave no reaction in one hour at 0°, nothing at 10° in thirty minutes, but at 25° reacted immediately. A layer of recently reduced platinum practically eliminated the induction period. Platinum oxide thus shows none of the exceptional behavior found in the case of palladium oxide.

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RECEIVED MAY 15, 1933

PUBLISHED JULY 6, 1933