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## The Effect of Substituents in the Formation of Thiocarbanilides by Various Methods

L. Chas. Raiford  
*State University of Iowa*

G. Mervin McNulty  
*State University of Iowa*

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Recently a still more delicate color reaction for the permanganate ion has been suggested by Stratton, Ficklen and Hough by the use of benzidine hydrochloride. This is at least 10 to 20 times as delicate. When a drop of benzidine in 5 per cent HCl is added to 50 or 100 cc. of a solution containing the permanganate ion, a brilliant blue green color is produced. In contrast to the remarkable stability of the pink produced by  $KIO_4$ ; the blue-green fades rapidly. This reaction, which was investigated by Feigl in Vienna and by Olszewski in Dresden, was further examined, especially with regard to the rapid fading. In somewhat concentrated solutions a blue precipitate was obtained by coagulation through salts, but in dilute solutions, both this method and the variation of acidity failed to produce a stable color.

DEPARTMENT OF CHEMISTRY,  
IOWA STATE COLLEGE,  
AMES, IOWA.

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## THE EFFECT OF SUBSTITUENTS IN THE FORMATION OF THIOCARBANILIDES BY VARIOUS METHODS

L. CHAS. RAIFORD AND G. MERVIN MCNULTY

A study of thiocarbanilide formation by four different methods has been made for the purpose of testing the effect of substituents in the amines used as starting materials. From a limited number of the thiocarbanilides guanidine derivatives were prepared by modification of the methods described by Marckwald (Ann., 286, 363 (1895)) and by Alway and Vail, (Am. Chem. J., 28, 158 (1902)).

The results show that a bromine atom in the ortho position to an amino group of a primary amine hinders the reaction more than a chlorine atom similarly placed. A nitro radical in the ortho position causes complete inhibition of the reaction. An alkyl or a phenyl radical as a nuclear substituent in the ortho or para position in the amine produces but little hindrance. This seems to show that the hindrance is not dependent alone upon the weight and position of the substituent, but that its chemical character plays a rôle.

DEPARTMENT OF CHEMISTRY,  
STATE UNIVERSITY OF IOWA,  
IOWA CITY, IOWA.