

it was depressed when mixed with a sample of the hydrochloride. Recrystallized from dilute hydrochloric acid, the free base gave the hydrochloride along with hydrolysis products. The cinnamylidene sulfapyridine hydrochloride was dissolved in cold 2% sodium hydroxide, and precipitated by neutralizing with acetic acid; pale yellow needles, m. p. 208–210° dec. The melting point was depressed by mixing with the hydrochloride. Calculated for $C_{20}H_{17}O_2N_3S$: N, 11.57. Found: N, 11.32.

FROM THE MEDICAL SERVICE AND THE
DEPARTMENT OF PATHOLOGY
HARLEM HOSPITAL, DEPARTMENT OF HOSPITALS
NEW YORK, N. Y. RECEIVED MAY 18, 1939

The Directive Influence of the Electric Moment on Substitution in the Benzene Ring

BY W. J. SVIRBELY

A few years ago¹ a comparison of the electric moments of the monosubstituted benzene derivatives which direct substitution to the ortho and para positions with those which direct substitution to the meta position resulted in the following rule: *in general, if the electric moment of a monosubstituted benzene derivative is greater than $\sim 2.07D$, the next substituted group will be directed to the meta position; if the moment is less than $\sim 2.07D$, the next group will be directed to the ortho and para positions.*

In Table I there are listed the monosubstituted benzene derivatives whose moments have been determined since 1935. The compounds are divided into two groups depending upon whether

TABLE I
ELECTRIC MOMENTS AND THE OBSERVED ORIENTING INFLUENCE

Ortho-para substitution compound, phenyl	$\mu \times 10^{18}$ e. s. u.	Meta substitution compound, phenyl	$\mu \times 10^{18}$ e. s. u.
$-\text{CH}_3-\text{C}_6\text{H}_5$	0.33	$-\text{CONHNHCOC}_6\text{H}_5$	2.63
$-(\text{CH}_2)_2\text{C}_6\text{H}_5$	.45	$-\text{CONHNH}_2$	2.70
$-(\text{CH}_2)_3\text{C}_6\text{H}_5$	.48	$-\text{CON}=\text{N}-\text{COC}_6\text{H}_5$	2.85
$-(\text{CH}_2)_4\text{C}_6\text{H}_5$	.50	$-\text{COCl}$	3.33
$-(\text{CH}_2)_5\text{C}_6\text{H}_5$	.52	$-\text{CONHNHCOC}_2\text{H}_5\text{CH}_3$	3.38
$-(\text{CH}_2)_6\text{C}_6\text{H}_5$	.52	$-\text{C}-\text{C}_6\text{H}_5$	3.45
$-(\text{CH}_2)_7\text{C}_6\text{H}_5$	.55	$\begin{array}{c} \parallel \\ \text{N}-\text{O}-\text{N} \\ \parallel \\ \text{CONHNHCOC}_6\text{H}_4\text{Cl} \end{array}$	3.82
$-(\text{CH}_2)_8\text{CHC}_6\text{H}_5(\text{CH}_2)_4\text{C}_6\text{H}_5$	.85	$\begin{array}{c} \parallel \\ \text{O} \\ \text{S}-\text{C}_6\text{H}_5 \end{array}$	4.08
$-(\text{CH}_2)_2\text{CHC}_6\text{H}_5(\text{CH}_2)_2\text{C}_6\text{H}_5$	.98	$-\text{SO}_2\text{Cl}$	4.47
$-(\text{CH}_2)_2\text{CHC}_6\text{H}_5(\text{CH}_2)_2\text{CHC}_6\text{H}_5(\text{CH}_2)_2\text{C}_6\text{H}_5$	1.51	$-\text{CONHNHCOC}_6\text{H}_4\text{NO}_2$	5.57
$-\text{CHOHCH}_3$	1.55		
$-(\text{CH}_2)_2\text{CH}_2\text{OH}$	1.71		
$-\text{CH}_2\text{COOH}$	1.75		
$-\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$	1.76		
$-\text{CH}=\text{CHCOOH}$	1.78		
$-\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$	1.78		
$-\text{OOC}_6\text{H}_5$	1.92		
$-\text{CH}=\text{CHCOOCH}_3$	1.93		
1- $\text{C}_{10}\text{H}_7\text{Cl}$	1.51		
2- $\text{C}_{10}\text{H}_7\text{Cl}$	1.65		

(1) Svirbely and Warner, THIS JOURNAL, 57, 655 (1936).

the second substituted group is directed to the ortho and para or to the meta position. An examination of the data shows that in all of these compounds the rule is obeyed. Compounds which contained unsaturated bonds in the monosubstituted group such as the styrenes, diazoaminobenzenes, cinnamyl derivatives, etc., where the side chain is first attacked, have not been included in the table although their moments are listed in the literature.

CHEMISTRY LABORATORY
THE UNIVERSITY OF MARYLAND
COLLEGE PARK, MD. RECEIVED JULY 24, 1939

The Solubility of Silicon Tetrafluoride in Organic Solvents. Behavior of Such Solutions

BY GRADY TARBUTTON, E. P. EGAN, JR., AND S. G. FRARY

In a search for practical solvents for silicon tetrafluoride, its solubility in a number of organic solvents at room temperature (27–33°) has been determined. Saturated solutions were prepared by circulating the purified gas through the various solvents, contained in an absorption tower or an Orsat pipet, in a closed system at atmospheric pressure until saturation appeared to be attained. The non-aqueous solvents, except absolute ethyl alcohol, were used as purchased without additional purification. The rate at which the gas dissolved seemed to depend largely on the fluidity of the solvent. The concentration of silicon tetrafluoride in the solutions was calculated from the determination of fluorine in weighed samples. The saturated solutions remained clear, showing no precipitation of silica, when allowed to stand overnight out of direct contact with air. The results obtained are given in the table below. Owing to lack of temperature control and the possibility that the more viscous solutions may have been incompletely saturated, the results are regarded as approximate, but of practical value.

The data show that the solubility of silicon tetrafluoride in the homologous series of monohydroxy alcohols decreases definitely and quite regularly with an increase in the number of carbon atoms and for the same number of carbon atoms with an increase in the number of hydroxyl groups. Compounds containing ether groups (diethylene glycol), carbonyl groups (acetone and pyruvic acid), and carboxyl groups (acetic and pyruvic acids) were found not to be very good solvents for silicon tetrafluoride.