Deep gratitude is expressed to Dr. T. Goto, Nagoya University, for his kind instruction in the excellent technique of the Serini reaction.

*Faculty of Pharmaceutical Sciences*
*Hokkaido University, School of Medicine,*
*Sapporo, Hokkaido.*

Hiroshi Mitsuhashi (三橋 博)
Yuzuru Shimizu (清水 譲)

December 18, 1961.

---

*UDC 615.412.1[616.33-008.8-085]-011*

## Acid Neutralizing Velocity of Antacids

A method for evaluating the antacid reactivities was devised from the standpoint of kinetics. Two equations were useful to analyse the acid neutralizing velocities. One, Eq. (1), might be applied for a calcium carbonate type antacid, for which the initial rate of increase of pH was convenient to evaluate the antacid reactivity. The other, Eq. (2), might be applied for a dried alumimum hydroxide gel (DAHG) type antacid, for which the final time, when the rate of increase of pH was maximum or theoretically infinite, was convenient.

$$-\frac{dH}{dt}=kSH^r \begin{cases} r=1 & (1) \\ 0\leqq r<1 & (2) \end{cases}$$

where $H$ is the hydrogen ion concentration of bulk liquid after time $t$, $k$ the velocity constant, $S$ the surface area of antacid powder, and $r$ the order of reaction.

The reaction between powdered marble and hydrochloric acid was examined and the activation energy was estimated to be about 6,000 calories. For the reaction between DAHG and acid, the velocity was different with regard to the kind of samples or acids used, and the activation energy was estimated to be about 20,000 calories.

The reaction between DAHG and acid was further studied. The velocity of reaction showed the additivity with respect to the composition of mixed samples of DAHG, i.e., the linear function of the composition. The examination on the mixed acids showed that the velocity of reaction between DAHG and hydrochloric acid mixed with sulfuric acid or nitric acid mixed with sulfuric acid became minimum at a certain mixing ratio, $R_m$, between the two (mixed in the identical normality), while the activation energy was not remarkably changed around $R_m$. $R_m$ was different with regard to the kind of test samples and the total amount of electrolytes and/or DAHG. Generally, the concentration of sulfate ion was much smaller than that of chloride or nitrate ion at $R_m$. The examination on the hydrochloric acid mixed with sulfates or nitric acid mixed with sulfates gave the same results as described above.

Details of this work will be published in the near future.

*Faculty of Pharmaceutical Sciences,*
*University of Tokyo,*
*Hongo, Tokyo.*

Hisashi Nogami (野上 寿)
Tsuneji Nagai (永井恒司)

March 3, 1962.