activity. The rate varies nearly a million-fold and is dependent on the acidity or basicity of the medium. The maximum rate is at $P_{H}^{(HAc)}$ -4.5, the minimum at about $P_{H}^{(HAc)}$ $+2.0$; over this range the rate is approximately proportional to the hydrogen ion activity. Between $+2.0$ and $+5.0$ the rate increases again showing that the process is one which is subject to both acid and basic catalysis.

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NOTE

A Simpler Derivation of the Cook Formula for the Determination of the Acetyl Value of Fats and Oils.—It is now generally conceded that the André–Cook[1] method of determining the acetyl number is more accurate and more rapid than the older method of Lewkowitsch.[2] The André–Cook method consists merely in determining the saponification value of the oil before and after acetylation. The acetyl value is then calculated by means of the formula

$$A = \frac{S' - S}{1 - 0.00075S}$$

where A is the acetyl value, and S and S' are the saponification values before and after acetylation. The derivations of this formula given by André and by Cook are rather involved.

In this note the same formula is derived by a simpler method. Let x represent the weight of acetylated oil which will contain 1 mole (59 g.) of *acetate* radical. Then x g. of acetylated oil will yield one mole of acetic acid on hydrolysis, and this quantity of acetic acid will require 1 mole or 56,000 mg. of potassium hydroxide for neutralization. Therefore, the acetic acid from 1 g. of acetylated oil will require $56{,}000/x$ mg. of potassium hydroxide, and

$$A = \frac{56{,}000}{x} \text{ or } x = \frac{56{,}000}{A} \qquad (1)$$

By definition of x it is obvious that x g. of acetylated oil was derived from a quantity of original oil which contained 1 mole (17 g.) of hydroxyl radical. The gain in weight during the acetylation of this quantity of oil was $59-17$ or 42 g. Therefore x g. of acetylated oil was derived from $(x-42)$ g. of original oil.

Since A is equal to the number of mg. of potassium hydroxide needed to neutralize the acetic acid from 1 g. of acetylated oil, Ax mg. of potassium hydroxide will be needed for the acetic acid from x g. of acetylated oil. Similarly $S'x$ mg. of potassium hydroxide will be needed to saponify x g. of acetylated oil; and $S(x-42)$ mg. will be needed to saponify $(x-42)$ g. of

[1] André, *Bull. soc. chim.*, [4] **29**, 745 (1921); Cook, THIS JOURNAL, **44**, 392 (1922).

[2] Lewkowitsch, *J. Soc. Chem. Ind.*, **16**, 503 (1897).

original oil, which is equivalent to x g. of acetylated oil. In other words, x g. of acetylated oil require $S(x-42)$ mg. of potassium hydroxide to react with the glycerol esters, Ax mg. to react with the acetate esters and $S'x$ mg. for complete saponification. Therefore

$$S(x - 42) + Ax = S'x \qquad (2)$$

Substituting (1) in (2)

$$S\left(\frac{56{,}000}{A} - 42\right) + A\,\frac{56{,}000}{A} = S'\,\frac{56{,}000}{A}$$

Multiplying by $A/56{,}000$

$$S(1 - 0.00075A) + A = S'$$

Solving for A

$$A = \frac{S' - S}{1 - 0.00075S} \qquad (3)$$

Equation (3) is identical with the Cook formula.

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NEW BOOKS

Das Periodische System in Neuer Anordnung mit Tabellen über Fünfzehn Physikalische Konstanten in Anordnung nach der Ordnungszahl der Elemente und nach der Grösse der Konstanten. (The Periodic Table in a New Form with Tables of Fifteen Physical Constants Arranged According to the Atomic Numbers of the Elements and the Magnitude of the Constants.) By Dr. Darwin O. Lyon. Franz Deuticke, Leipzig and Vienna, 1928. vi + 40 pp. Illustrated. 17.5 × 26 cm. Price, unbound, M 8; bound, M. 10.

In an introduction the author first discusses rather broadly the origin and structure of matter. Next there is a cursory presentation of the Thomsen-Bohr arrangement of the elements followed by a brief discussion of several other arrangements of the elements particularly spiral ones. Special attention is devoted to magnetic relationships.

In the concluding section there are thirteen diagrams where curves are drawn connecting thirteen physical properties such as density, melting point, specific heat, electrical conductivity, entropy, etc., plotted against atomic numbers. There is then a large table where the numerical values of all these properties and the atomic numbers and atomic weights are arranged in fifteen columns with increasing values downward.

There is a clear tendency for the elements to occur at about the same level in the various columns of this table, although almost every element shows marked and violent irregularities. The most regular of all the elements is tin (No. 50) which comes at almost precisely the same level in all the columns except that for the melting points. It is not clear, however,