plain duties. Already this effect is indicated in the decisions of courts, in the altered tone of public offenders, and the general feeling that better times are at hand.

Let us, from the painful recollections of the era of epidemics out of which we hope soon to emerge, learn permanently the lesson that there is no safety in a society where morals are generally corrupted.

THE PRESENT STATUS OF ORGANIC CHEMISTRY.

The different compounds belonging to the vegetable and animal kingdoms, as well as those which, by chemical operations, may be obtained from the same, possess certain peculiarities which distinguish them, in many respects, from the compounds belonging to the mineral kingdom. Some years ago, the opinion prevailed that the cause of this difference was to be found in the fact that they were formed by so called vital forces; it was assumed that there is an essential difference between inorganic and organic compounds, and chemistry was therefore divided into inorganic and organic chemistry. It was found that, while, in regard to mineral compounds, the synthesis is just as easy as the analysis (that is, it is as easy to make them as to decompose them into their elements), in regard to organic compounds, on the contrary, their synthesis (formation out of their elements) was surrounded with difficulties which appeared for a long time so insurmountable that the hypothesis was adopted that the elementary substances followed other laws in living nature than they did in dead; and that it was only possible to change the products of living organisms into inorganic elements, but that it was utterly impossible to do the reverse, that is, to make an organic compound out of its inorganic elements.

The modern development of chemistry has, however, demonstrated that this view is totally erroneous; a more intimate knowledge of the organic substances has revealed methods to manufacture chemically those substances thus far only obtained by the intervention of organic life.

However, it must be remembered that certain organic substances possess a second peculiarity, namely, a certain structure called organization. The starch granule, the blood disk, or the simple cell, that first germ of all living organisms, shows this organization, which is the exclusive product of the so called vital processes; and this cannot be produced artificially. But homogeneous liquid compounds, or solids, either amorphous or crystalline, all thus far exclusively derived from organic sources, have now been made, by simple synthesis in the laboratory, in such enormous numbers that there is no more any doubt but that the rest of them will soon be made in a similar manner.

We have come, therefore, to the conviction that the same chemical laws prevail in living as in lifeless nature; and that the peculiar properties which characterize the compounds built up by living organisms are not owing to their organized origin, *but simply to the fact that they are carbon compounds* and that therefore the cause of those peculiar properties has to be sought in *the chemical nature of carbon itself.* And this is easily ascertained when we compare the chemical properties of carbon with those of the other elements. That there is a peculiar power in the carbon itself, was already recognized several years ago, when, by the most prominent chemists, carbon was designated as *the great organizer.*

In order to understand this peculiar property of carbon, we must first explain what is meant by the modern term "atomicity."

Without deciding the reality of the existence of the indivisible so called atoms, we need only accept the chemical fact that different elementary substances combine in definite proportions by weight; and that if there are atoms, and we suppose that they combine, atom with atom, the definite proportions referred to could be best accounted for by assuming that these atoms possess, for each elementary substance, a definite weight. Therefore, the name "atomic weight," if objected to by reason of the hypothetical basis on which it is founded, may be exchanged for "chemical equivalent," or "combining equivalent," and the word "atomicity" for "quantivalence."

Among all elementary bodies, hydrogen is distinguished by the simplicity of its combinations; and the latter are therefore adopted as types of all other compounds, which are simply formed by the substitution of the atom of another element for an atom of hydrogen. Hydrogen alone, pure, consists of a double atom, for one of which only the other substance may be substituted:

Hydrogen Gas. $\left.\begin{matrix}H\\H\end{matrix}\right\}$ Hydrochloric Acid. $\left.\begin{matrix}H\\Cl\end{matrix}\right\}$ Hydrofluoric Acid. $\left.\begin{matrix}H\\F\end{matrix}\right\}$

Hydrobromic Acid. $\left.\begin{matrix}H\\Br\end{matrix}\right\}$ Hydroiodic Acid. $\left.\begin{matrix}H\\I\end{matrix}\right\}$

Water. $\left.\begin{matrix}H\\H\end{matrix}\right\}O$ Sulphuretted Hydrogen. $\left.\begin{matrix}H\\H\end{matrix}\right\}S$ Seleniuretted Hydrogen. $\left.\begin{matrix}H\\H\end{matrix}\right\}Se$ Telluretted Hydrogen. $\left.\begin{matrix}H\\H\end{matrix}\right\}Te$

Ammonia. $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}N$ Phosphoretted Hydrogen. $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}P$ Arseniuretted Hydrogen. $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}As$ Antimonietted Hydrogen. $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}Sb$

Marsh Gas. $\left.\begin{matrix}H\\H\\H\\H\end{matrix}\right\}C$

The elements of the first group contain one atom of hydrogen combined with one atom of another substance. Therefore, chlorine, fluorine, bromine, and iodine, are called monatomic or univalent. In the second group, two atoms of hydrogen are combined with oxygen, sulphur, selenium or tellurium; the latter are therefore called diatomic or bivalent. In the third group, nitrogen, phosphorus, arsenic and antimony are each combined with three atoms of hydrogen; they are triatomic or trivalent; while, in the last group, carbon is combined with four atoms; it is, therefore, called tetratomic or quadrivalent.

Monatomic elements form among themselves but few and simple compounds, while polyatomic elements form different combinations. Chlorine forms but one compound with hydrogen, and the chemical affinities are satisfied; but when an atom of oxygen is combined with only one of hydrogen, one equivalent is unsatisfied, and this may be filled up by hydrogen, and form water, or by chlorine, and form hypochlorous acid, or again with oxygen; when again one affinity of oxygen will be unsatisfied, which can only be closed up by another atom of hydrogen.

$$\text{Water} = H - O - H$$
$$\text{Deutoxide of Hydrogen} = H - O - O - H.$$

This latter graphic representation is coming into great favor to represent the manner in which the atomicity of the elements is satisfied. The univalent hydrogen is only attached to one element, while the bivalent oxygen is attached to two.

The polyatomic elements have also the property of combining with themselves. It is very characteristic of the tetratomic carbon that the capacity in its atoms to satisfy its own affinities by combining with itself is developed in the highest degree. Therefore, a great number of carbon atoms may combine to a single group, and behave like a chemical unit. To this property a second one must be added, which makes it distinct from all other elements, namely: all free affinities of such an atom group of carbon can be satisfied by hydrogen. Therefore, most carbon compounds contain also hydrogen.

That part of chemistry ordinarily called organic is therefore now named *the chemistry of the carbon compounds and its derivations.* Their number is indeed something startling. Weltsien published in Brunswick, Germany, in 1860, a systematic review of the same, and described more than 3,000, and since that time we have become acquainted with several hundred more.

We ought here to remind our readers that, in the modern chemical theory on which the above speculations are based, hydrogen = 1 is considered as a double atom, and is written $\frac{H}{H'}$ so that H becomes in fact = $\frac{1}{2}$, or, what is the same, by taking H = 1, we have C = 12, O = 16, S = 32; also, Se and Te are doubled. Many other elements remain as they are. Not only does this theory agree better with the views of organic compounds explained above, but there are two other satisfactory reasons why the new numbers should be adopted. To these we may recur later.

IF a person "faints," place him on his back and let him alone; he wants arterial blood to the head; and it is easier for the heart to throw it there in a horizontal line than perpendicularly.

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