A brief word of explanation may be given for those unaccustomed to the physicochemical methods of expressing the reaction of a solution. A solution is acid when it contains an excess of hydrogen over hydroxyl ions, neutral when hydrogen and hydroxyl ions are in equal numbers, and alkaline when hydroxyl ions predominate. An acid of "normal" strength contains, in one liter, a gram of hydrogen capable of forming hydrogen ions,[2] and its strength may be expressed as 1 N. Diluting such a solution ten times, we would have 1/10 N or a solution containing 1/10 gram of actual or potential hydrogen ions to the liter. Continuing the process of dilution until 1/10,000,000 normal acid is obtained, we would have in such a solution 1/10,000,000 gram of hydrogen ions. Pure water, however, dissociates to form hydrogen and hydroxyl ions, and at 20° C. contains approximately 1/10,000,000 gram of hydrogen ions to the liter and an equivalent amount of hydroxyl ions (that is, 17 gm.). That is to say, pure water, our standard of neutrality, is 1/10,000,000 N acid and also 1/10,000,000 N alkaline. To avoid writing large figures it is customary to use the logarithmic notation and to express 1/10,000,000 N as 10^{-7}N or, more conveniently, as suggested by Sörensen,[3] to drop the 10 and minus sign and say[4] p117. If we have less than 1/10,000,000 gram of hydrogen ions to the liter, the solution is less acid than water, that is, it is alkaline—so, p118 means actually 1/1,000,000 N alkali. The higher the exponent the more alkaline, or what is saying the same thing, the less acid is the solution.

To sum up:

p111 = N/10 acid.
.
.
.
p116 = N/1,000,000 acid.
p117 = *NEUTRALITY.*
p118 = N/1,000,000 alkali.
.
.
.
p1114 = N/10 alkali.

The reaction of the blood serum varies approximately between p117 and p118, the neutral point, p117 being reached only in severe uncompensated acidosis, and a reaction of p118 being attained perhaps only after administration of alkalies.

The measurement of the pH of the blood as compared with that of inorganic solutions presents many difficulties. The standard gas chain electrometric method has been applied to the blood by a number of investigators. A full review of the literature up to 1910 is to be found in an article by Botazzi.[5] More recent determinations have been made

2. For the sake of simplicity we will consider here only a "strong" acid and assume it to be completely ionized in dilute solution.

3. Sorensen: Ergebn. d. Physiol., 1912, xii, 401.

4. C117 and $[H^+] = 7$ are synonymous expressions. Intermediate values, as, for example, between p117 and p118, are commonly expressed in one of two ways, as 0.25×10^{-7} or pH = 7.6. The latter method is used in this paper. The conversion of one expression into the other is simple. For example, log. 0.25 = − 0.602, then $0.25 \times 10^{-7} = 10^{-0.602} \times 10^{-7.0} = 10^{-7.602}$ or pH = 7.602.

5. Botazzi: Der Harn sowie die übrigen Ausscheidungen und Körperflussigkeiten, edited by C. Neuberg, Berlin, 1911.