THE TOXIC ACTION OF ANTISEPTICS.

BY

CHARLES G. L. WOLF.

Antiseptic technique consists essentially in bringing micro-organisms in contact with a solution, usually aqueous, and containing a certain quantity of a metallic salt. This may be varied as in the case of phenol or boric acid, by the salt being replaced by a substance having acid properties. The use of other solvents, such as alcohol or acetone has for the most part been restricted to experimental work. In the exceptional case of formalin, the substance is neither acid nor alkaline, but is an aldehyde. Hydrogen peroxide and potassium permanganate act as oxidizing agents, and fall out of the class of antiseptics embraced by the salts of the heavy metals. It must also be noted that the time during which the organism is in contact with the solution is, on the whole, short. This applies more particularly to hand disinfection, and the flushing of suppurating wounds. In very rare instances, indeed, is it possible to bathe the infected surface for an extended length of time. For that reason, antiseptics are generally chosen for the rapidity with which they kill, rather than for their power of inhibiting the growth of micro-organisms.

Since the initial bringing together by van't Hoff (*Zeitsch. f. physikal. Chem. 1, 481,* [1887]), of facts which had accumulated regarding the properties of solutions, these have received an enormous amount of attention from physical chemists on all sides. The connection, however, between the antiseptic power, and the physical properties, has been given comparatively little attention by pathologists and the medical public generally. That such a connection exists, and intimately, it is the purpose of the following paper to show.

When sodium chloride dissolves in water, a clear homogeneous solution results which differs both from the original solid salt, and from the water in which it is dissolved. It conducts electricity. (Arrhenius, *Zeitsch. f. physikal. Chem., 1, 631,* [1887]). It differs markedly from a similar aqueous solution of substances such as cane or grape sugar in that these do not conduct the electric current. The difference in these solutions is also marked by other striking phenomena in connection with their freezing and boiling points, (Raoult, *Annales de Chim. et Phys.* (6), *VIII., 320*), and Beckmann (*Zeitsch. f. physikal Chem. IV., 543* [*1889*]), and their osmotic pressure (Pfeffer, Osmotische Untersuchungen, 1887), which cannot be more than mentioned here. This difference in the behaviour is due to the splitting up of the sodium chloride molecule into sodium and chlorine in the form of