Hydration of Carbon Dioxide and its Influence on Germicidal Activity of Hypochlorite Aerosols

WE are interested in the suggestion put forward by E. O. Powell in his recent communication[1], in which he stated that the effective bactericidal life of hypochlorite aerosols is dependent on "the velocity of changes occurring between the collision of carbon dioxide molecules in the air with droplets of the aerosol and the appearance of the corresponding H ions". The hydration process, it was suggested, might be slow compared with the former, thus becoming the rate-controlling factor in the bactericidal action of the aerosol.

When using an aerosol produced from a solution containing 1 per cent NaOCl, 16·5 per cent NaCl and 0·05 per cent Na_2CO_3, we were unable to detect any difference in the killing rate or the mean percentage kill (over a 30 min. period) of aerially dispersed *E. coli*; whether the tests were carried out in normal atmospheres, those to which 1 per cent carbon dioxide had been added, or from which the carbon dioxide had been removed[2]. (Our conditions may not have been entirely free from carbon dioxide, but the concentration must have been very much reduced.)

If the hydration of carbon dioxide is a slow process and the liberation of free HOCl dependent on this alone, then it might be expected that the hypochlorite aerosol would show a slow initial rate of kill which accelerates with time. Our experiments have shown that a good kill is obtained in the first five minutes and that the subsequent rate becomes slower; this is not necessarily in opposition to Powell's mechanism, which might take place within five minutes and have the effect of maintaining a fairly constant concentration of HOCl in the droplet owing to loss of the acid by evaporation. Evaporation of the water will, of course, reduce the amount of carbon dioxide absorbed by the droplet.

We have shown also that hypochlorite aerosols become decreasingly effective in acid, neutral and alkaline solution, although the neutral solution gave the best all-round results when the persistence of the action is taken into account. It was also found that HOCl as vapour is relatively ineffective. The action appears to depend upon the presence of free HOCl in the droplet, but not on either ClO^- or H^+ ions alone, since alkaline NaOCl or weakly acid solutions (free from NaOCl) are much less effective.

The addition of glycerol to hypochlorite solutions for use as aerosols seems to be of doubtful utility; it reduces the bactericidal activity of the mist, but generally increases its persistence, the increase given being governed by the particle size of the droplets. We have attributed the effect of glycerol to its effect upon the evaporation of water from the droplet. In bulk it was found that the presence of glycerol reduces the stability of hypochlorite solutions, especially if some acid is also present. The presence of a salt (for example, NaCl) has an effect somewhat similar to that of glycerol by retarding the evaporation of water from the droplet.

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Portslade. Nov. 1.

[1] Powell, E. O., NATURE, **146**, 401 (1940).
[2] Baker, Finn and Twort, *J. Hyg.*, **40**, 560–582 (1940).

Ionospheric Observations during the Solar Eclipse of October 1

DURING the total solar eclipse of October 1 ionospheric observations were made at three points in South Africa by the following three institutions: Cruft Laboratory, Harvard; Commonwealth Solar Observatory, Canberra; Bernard Price Institute for Geophysical Research, Johannesburg.

The results have revealed a marked ultra-violet light effect in the F_2 region. The maximum electron density in that region showed a decrease of about 20 per cent, reaching a minimum about 30 minutes after totality. There was no evidence for corpuscular effects. The behaviour of the E and F_1 regions was similar to what has been observed at previous eclipses.

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A. J. HIGGS (Commonwealth Solar Observatory).
E. C. HALLIDAY (Bernard Price Institute).
Oct. 14.

Termination of Optic Fibres in the Lateral Geniculate Body

IN a recent letter[1], Prof. Le Gros Clark directed attention to the evidence that crossed and uncrossed fibres of the optic tract each terminate in three alternating layers of cells in the lateral geniculate body in the monkey. Hitherto, however, this has been an inference based on the indirect evidence of transneuronal atrophy. It has now been finally established in this laboratory by the study of axonal and bouton degeneration, following section of one optic nerve. Seven days after this operation, the corresponding cell laminæ of the lateral geniculate body are filled with enlarged and grossly degenerating terminal boutons which are so conspicuous that they can readily be observed under low magnifications, and the affected laminæ thus contrast strongly with the normal laminæ.

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[1] NATURE, **146**, 558 (Oct. 26, 1940).

Molecular Fields of Force

MY article on "Molecular Fields of Force"[1] contains a misrepresentation of Prof. J. E. Lennard-Jones's work on this subject, which I much regret and wish to correct. In referring to the degree of ambiguity in his molecular models inferred from gas data, I stated that it remains uncertain whether the distant field is attractive or repulsive; this applies only to the determinations from viscosity data (and then only in certain cases); but not to his main and more important determinations from the equation of state. It is on these that he has based his valuable *applications* of the force-data, to explain many physical properties of solids and liquids as well as vapours.

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[1] NATURE, **146**, 607 (1940).