stress and velocity is to be expected on the basis of the second-order elastic theory.

The measured values of ρ_0 and c_0 were used to find λ and μ from the expressions:

$$c_{20}^2 = \frac{\mu}{\rho_0} \text{ and } c_{10}^2 = \frac{\lambda + 2\mu}{\rho_0} \quad (4)$$

The above values and the measured values of T and fractional velocity changes were then used to find the values of l, m, and n from equations (1). The values are compared in Table 1 with those obtained by other workers[3].

The values for nickel steel will be checked in the near future by making measurements with further types of wave/stress combinations, and it is also intended to extend the work to other metallic materials.

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CHEMISTRY

Similarity between Theories of Rhythmic Precipitations of Crystalloids and Specific Proteins

HEDGES[1] pointed out that critical condition and mobilization of material are factors common to the Liesegang phenomenon. Mobilization occurs when the critical condition is being approached, with the material diffusing from the zones which become clear spaces to those which become rings. Spiers and Augustin[2], in their theory of the one-dimensional immunodiffusional problem, assumed a zone of reaction in which antigen and antibody combine to form non-diffusing complexes, causing diffusion of the antibody into the zone. Here, experimental evidence is given that inward diffusion actually occurs during precipitation with specific proteins as well as with crystalloids, and results in the occurrence of the translucent zone.

The simple diffusion in two dimensions[3] with two sources of diffusion was used. Fig. 1 shows such an experiment. Normal human serum as antigen and rabbit's antiserum were used. The translucent zone without precipitate at the plane of separation between two precipitation patterns is visible.

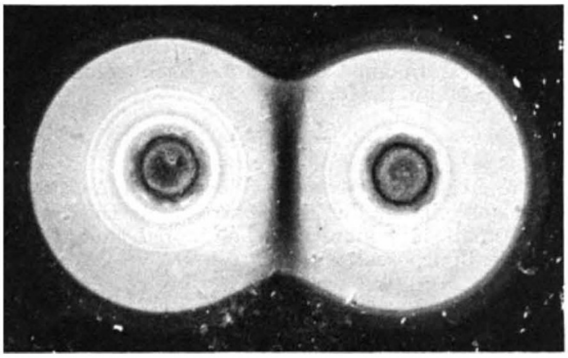

Fig. 1

There are two mechanisms which can possibly cause occurrence of the translucent zone: (1) dissolution of the precipitate or (2) decreased antibody concentration in this zone. Dissolution of the precipitate occurs in a case of excess of antigen[4]. In the system presented the diffusing reactants meet at the plane of separation, and in the absence of the concentration gradient across the plane the flow will be opposed. Therefore accumulation of the antigenic material will occur at this plane. Because the material always flows in the direction of a falling concentration gradient, the concentration of the antigenic material at the plane of separation cannot be higher than those at the points which are nearer to the sources of diffusion: and since intensity of the precipitate decreases in the direction of decreasing concentration, the mechanism of the dissolution of the precipitate cannot be responsible for the occurrence of the translucent zone. The remaining mechanism of decreased concentration of the antibody indicates inward diffusion.

Fig. 2 represents a diffusion experiment between equal concentrations of two sources of one salt. Gel of 0·5 per cent purified Difco-agar and 0·01 M solution of barium chloride was used as the indicator in the gel. A 1 M solution of ammonium sulphate was used. Here as in Fig. 1 the occurrence of the translucent zone also indicates inward diffusion.

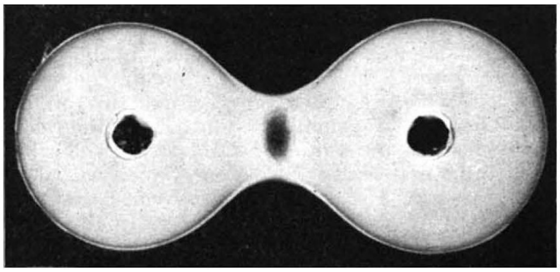

Fig. 2

Diffusion is defined as the mutual interdiffusion of at least two components. To explain the occurrence of the translucent zone this concept may be stated in the following way. In the system presented there is simultaneous movement, or inward diffusion, around two sources of diffusion. When at the given distance between sources of diffusion two zones of movement combine, the movement in this area is equal to the effects of both diffusing sources. Therefore, the concentration of the internal reactant is not distributed uniformly in the medium but is at the minimum concentration along a line of centres where combination first occurs, and gradually increases along other radii. This change in relative concentration of the internal reactant may also result in altered rate of diffusion of the reactants diffusing from adjacent wells[5].

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