NOTES & NEWS

ARTIFICIAL SPHERULITES

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When a crystalline precipitate is formed by the diffusion of reacting substances in a gelatinous medium, the result is usually an aggregate having certain definite and reproducible properties which are independent of its size. The aggregate often takes spherical form. Figure 1 is a photograph of the "spherulitic figure"

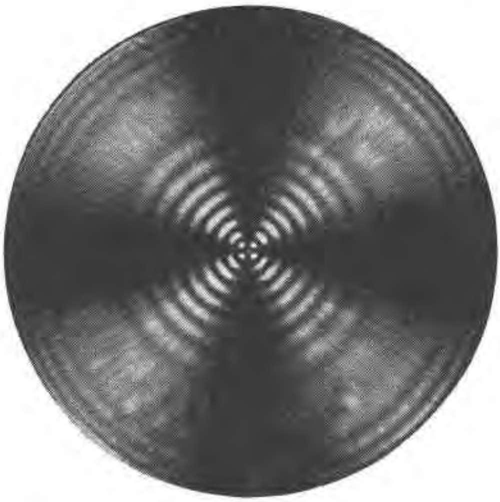

FIG. 1. Spherulite of Strontium Carbonate; x Nicols. $\times 700$. $\lambda = 605$. Photographed by H. W. Morse.

of a strontium carbonate sphere between crossed nicols, produced by allowing 0.5 N sodium carbonate solution to diffuse into pure 10 per cent gelatin solution containing 0.02 N strontium chloride. Magnification 700; nearly homogeneous light; $\lambda = 605$.

Such an aggregate is made up of a multitude of fibers radially arranged. If it is crushed it breaks along radii into acicular fragments. The indices of fragments are: $\epsilon = 1.516$; $\omega = 1.593$. The indices of the spherulite as a whole, measured by the method of

Spangenberg,[1] are the same as those of fibers. The spherulite is optically negative; the fibers show a corresponding negative elongation. Each fiber may be considered as a uniaxial entity, in this case optically negative, so oriented that its optic axis lies along a radius of the sphere. In polarized light, the birefringence is seen to be zero at the center of the figure and at its periphery, and a maximum at about two-thirds of the radius from the center. Although the path traversed in the aggregate is a maximum at the center, it there lies wholly in the direction of the optic axis; and while the phase difference is a maximum for unit path-length at the periphery, the distance traversed is there zero. In the figure the maximum birefringence is in the 9th order. Four decreasing orders are visible between maximum and periphery, where the others are crowded together and obscured by diffraction effects.

A discussion of the general properties of artificial spherulites and a detailed analysis of the optical properties of a spherical aggregate of strontium carbonate will be found in the *American Journal of Science*, [5], **23,** 421–461, May, 1932.

Some substances form isotropic, others anisotropic, spherulites, and the latter may be either positive or negative in character. In all the observed cases it appears that the sphere is made up of fibers and that the optic axis of each fiber lies in a radius of the sphere. Only one type of interference figure appears between crossed nicols but the insertion of a compensator proves the positive or negative character of the spherulite as a whole. As far as observation has gone there is no sign of anything "biaxial" in spherulite optics.

The sphere is only one of the many fibrous aggregate forms which can appear when precipitation of a slightly soluble substance occurs in a gelatinous medium. "Hour-glass" forms are common, as well as more complex shapes. These also are definite and can be reproduced. Maximum and minimum indices can be determined for the aggregate as a whole and these agree with the indices found for acicular fragments. It is possible to foretell the general appearance of the interference figure by means of the indices and the approximate dimensions of the aggregate.

[1] *Centralblatt für Mineralogie*, **1920,** 408-411