sponsored by the American Academy of Ophthalmology and Otolaryngology; Lymphatic Tumor Registry (1925), sponsored by the American Association of Pathologists and Bacteriologists; Bladder Tumor Registry (1927), Kidney Tumor Registry (1940), and Prostatic Tumor Registry (1943), sponsored by the American Urological Association; Registry of Dental and Oral Pathology (1933), sponsored by the American Dental Association; Registry of Otolaryngological Pathology (1935), sponsored by the American Academy of Ophthalmology and Otolaryngology; General Tumor Registry (1937), sponsored by the American Society of Clinical Pathologists; Registry of Dermal Pathology (1938), sponsored by the American Academy of Dermatology and Syphilology; Chest Tumor Registry (1942), sponsored by the American Society of Thoracic Surgeons; Registry of Neuropathology (1943), sponsored by the American Association of Neuropathologists; Registry of Orthopedic Pathology (1943), sponsored by the American Academy of Orthopedic Surgeons; Registry of Veterinary Pathology (1944), sponsored by the American Veterinary Medical Association; and Registry of Gerontology (1945), sponsored by the Gerontological Society, Inc. Plans for additional registries are under consideration. A professional scientific society wishing to sponsor a registry should communicate with the Director, Army Institute of Pathology, 7th Street and Independence Avenue, S.W., Washington 25, D. C. A society appoints a committee to work with the director in supervision of the activities of the registry and makes an annual contribution to the budget, which is administered by the National Academy of Sciences.

All specimens in the Registry are available for review and research by competent investigators. Sets of slides and accompanying syllabuses on special fields are available for loan to the civilian professions and officers in the Federal services. Physicians, dentists, and veterinarians are urged to send unusual specimens together with an abstract of the history to the Registry. The contributor receives a report on each specimen and is asked to keep the Registry informed of the follow-up on the patient.

With the reorganization of the Army Institute of Pathology, to be completed during 1946 and 1947, a full-time scientific director of the American Registry of Pathology will be appointed, and sufficient clerks and technicians will be available to assure adequate use of the registries for diagnosis, research, training of young men, and education of the professions.

In the Laboratory

The Composition of Streptomycin Reineckate

J. Fried and O. Wintersteiner

Division of Organic Chemistry, Squibb Institute for Medical Research, New Brunswick, New Jersey

In a previous publication (*2*) we briefly described a crystalline reineckate of streptomycin which was obtained from highly purified preparations of streptomycin sulfate, and the analyses of which suggested the composition $(C_{10}H_{19}O_{7-8}N_3)n$ for the free base. This is not in accord with the formula $C_{21}H_{37-39}N_7O_{12}$, which was subsequently deduced by Peck, *et al.* (*3*) from the analysis of the crystalline hydrochloride-calcium chloride double salt. Since the latter formula has since received support from degradation studies (*1*), a reinvestigation of the composition of the reineckate was undertaken. It was found that in all specimens of the reineckate crystals which had been prepared from streptomycin sulfate a small but constant proportion of its total sulfur content was present as sulfate ion. Thus, three independently prepared and recrystallized samples showed a sulfate content of 3.41, 3.54, and 3.85 per cent, respectively. It therefore appears that sulfuric acid is an integral part of reineckate crystals derived from streptomycin sulfate. Recalculation on this basis of the analytical data previously published (*2*) as well as of the analyses of recently prepared specimens showed that the data are in accord with the formulation $(C_{21}H_{37}O_{12}N_7)_2 \cdot 4(HCr(SCN)_4(NH_3)_2) \cdot H_2SO_4$, indicating that this type of reineckate represents a double salt of the base with two molecules of Reinecke's acid and one equivalent of sulfuric acid. Thus, the complete analysis of a new specimen gave the following values: Found: C, 27.06; H, 4.50; N, 20.8; total S, 21.2; SO_4, 3.54; Cr, 8.20. Calculation for above formula: C, 27.45; H, 4.29; N, 20.96; total S, 21.43; SO_4, 3.79; Cr, 8.20. While it is true that on account of the encumbrance by the Reinecke's acid portion the carbon and hydrogen numbers cannot be deduced accurately from the experimental data, there is no question now that the composition of the reineckate is compatible with the formulation of the free base as $C_{21}H_{37}O_{12}N_7$.

In view of the composite nature of the salt a brief

description of its preparation and of the appearance of the pure crystals may not be superfluous. A freshly

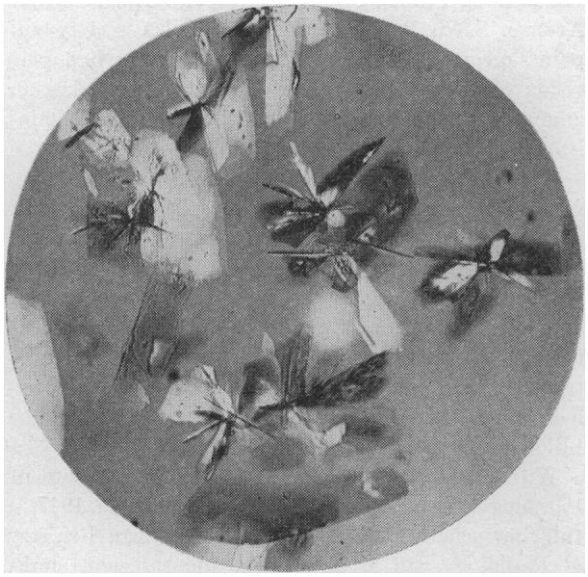

FIG. 1. Streptomycin reineckate sulfate viewed under polarized light. Magnification: 90 ×.

prepared solution of ammonium reineckate (300 mg.) in water (16 cc.) was added to water (5 cc.) containing streptomycin sulfate (230 mg.; potency, 600 units/mg.). Both solutions were warmed to 40° before mixing. A small amount of an amorphous precipitate was removed by filtration and the filtrate allowed to cool very slowly to about 20°. After collecting the resulting crystalline deposit, the filtrate was cooled slowly to 4° and yielded an additional crop of crystals. Recrystallization of the fractions from warm water (not above 40°) yielded very thin, long (1–2 mm.) plates of the habitus shown in Fig. 1. If starting material of lower potency is used, several recrystallizations may be necessary until clear-cut crystals of this size and appearance and possessing a potency of approximately 400 units/mg. can be secured.

Various specimens of streptomycin hydrochloride, including substantially pure streptomycin trihydrochloride, when treated with ammonium reineckate, as described above, likewise yielded crystalline products. However, recrystallization under conditions identical with those employed in the purification of the reineckate sulfate produced aggregates of small, needle-shaped forms which were generally less well defined than the large plates exemplified in Fig. 1. These preparations were found to be free of chloride ions. The analytical composition of a preparation derived from the pure trihydrochloride was significantly different from those of the reineckate sulfate. With the exception of the low-nitrogen and chromium figures, the data would seem to speak for a trireineckate of $C_{21}H_{37}O_{12}N_7$: Found: C, 26.13; H, 4.28; N, 22.0; S, 24.8; Cr, 9.38. Calculation for $C_{21}H_{37}O_{12}N_7 \cdot 3(HCr(SCN)_4(NH_3)_2)$: C, 25.79; H, 3.80; N, 22.77; S, 24.99; Cr, 10.15.

References

1. BRINK, N. G., KUEHL, F. A., JR., and FOLKERS, K. *Science*, 1945, **102**, 506.
2. FRIED, J., and WINTERSTEINER, O. *Science*, 1945, **101**, 613.
3. PECK, R. L., BRINK, N. G., KUEHL, F. A., JR., FLYNN, E. H., WALTI, A., and FOLKERS, K. *J. Amer. chem. Soc.*, 1945, **67**, 1866.

Infrared Emission Spectra of Liquids[1]

S. FREDERICK KAPFF

Distillation Products, Inc., Rochester, New York

Although the characteristic infrared absorption spectra of organic liquids are well known, the corresponding emission spectra do not appear to have been reported. The failure to find emission spectra may arise from the use of too great a thickness of liquid. Just as a thick layer is entirely opaque to the infrared, so a thick layer of hot liquid emits only black body radiation. When the layer of heated liquid is thin enough to be partially transparent in the wave

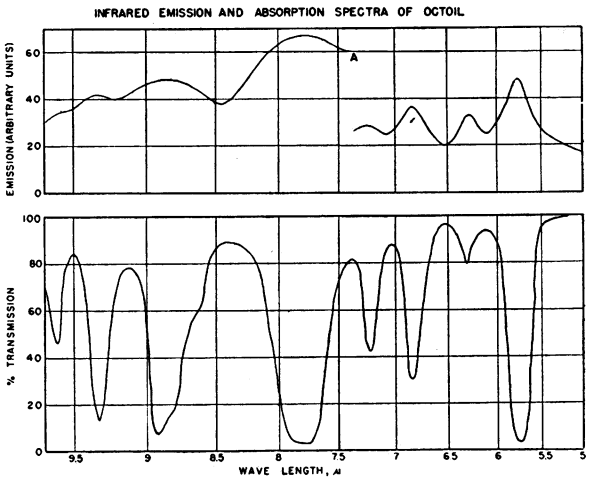

FIG. 1

lengths under study, the liquid emits characteristic bands which are the exact inverse of its absorption bands.

This concept has been confirmed with the liquid di(2-ethyl-hexyl)phthalate (octoil) in a cell .001 inch thick held at temperatures of 50–200° C. with a Perkin Elmer Infrared Spectrometer at slit widths of .500–.700 mm.

The results are shown in Fig. 1, which gives a plot of the emission (at 150° C.) and absorption curves.

[1] Communication No. 103.