ous species, as well as their stability after they are formed. A detailed study of the stability relations of the isomorphous series of copper, iron and zinc sulphates is now in progress, and the writer hopes to present data for the equilibrium relations of several members of the series at a later date.

NOTES AND NEWS

OCCURRENCE OF RUBIDIUM, GALLIUM AND THALLIUM IN LEPIDOLITE FROM PALA, CALIFORNIA

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Lepidolite from the Stewart mine at Pala, Calif., has been reported to contain about 0.3% Cs_2O.[1] Various lepidolites from this locality have been analyzed by Schaller, who, however, makes no mention of rubidium, cesium, gallium or thallium.[2] It is interesting to note that the element rubidium was originally discovered in a lepidolite from Saxony, by Bunsen.[3] Traces of gallium have been reported in lepidolite from San Bernardino County, Calif.[4,5]

A sample of grayish white lepidolite obtained from the Sickler mine at Pala was examined spectrographically, using an electric arc as the source of excitation of the spectra, which were photographed by means of a large Gaertner quartz spectrograph. Examination of the plate revealed spectral lines due to rubidium, cesium, gallium and thallium, as well as other elements. (Fig. 1.)

Rubidium chloride and cesium chloride were subsequently prepared from the lepidolite. The method in brief consisted of decomposing sintered lepidolite with sulphuric acid, concentrating the rubidium and cesium first as alums and then as chlorostannates. The rubidium and cesium were freed from potassium by fractionally recrystallizing as rubidium cesium chlorostannate, and were

[1] R. M. Santmyers, *Information Circular No.* **6215**, *U. S. Bureau of Mines*, 1930.

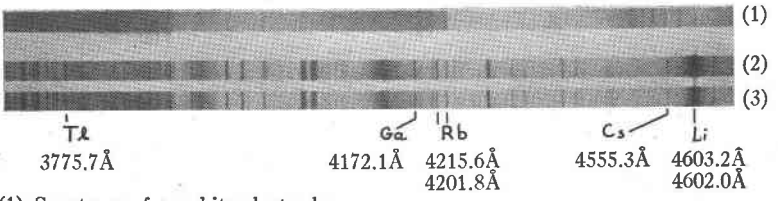
[2] W. T. Schaller, *U. S. Geol. Surv., Bull.* **419**, p. 287.

[3] R. Bunsen, *Ber. Akad. Berlin*, 273, **1861**, *Chem. News*, **3**, 357, 1861; *Phil. Mag.*, [4], **22**, 55, 1861.

[4] J. Papish and D. A. Holt, *J. Phys. Chem.*, **32**, 142, 1928.

[5] Since submitting this article for publication, there has come to the author's attention an article by W. J. Schiefflen and T. W. Capon (*J. Soc. Chem. Ind.*, **27**, 549, 1908), in which it is stated that during the preparation of lithia from Pala lepidolite, rubidium and cesium alums were obtained in one stage of the process. Schiefflen and Capon do not state, however, that rubidium and cesium occurred in the lepidolite.

separated from each other by crystallizing as rubidium bitartrate and cesium antimony chloride, respectively, from which rubidium chloride and cesium chloride were prepared. The spectrographic examination and chemical procedure are described by us more fully elsewhere.[6]



(1) Spectrum of graphite electrodes.
(2, 3) Spectrum of Lepidolite. FIG. 1

The quantities of rubidium chloride and cesium chloride obtained correspond to 0.67% Rb_2O and 0.16% Cs_2O in the raw lepidolite. The actual cesium and rubidium content of the lepidolite was presumably slightly higher, since traces of these elements were lost in the process of extraction and purification. The gallium and thallium were present in traces only, the amount being estimated from the intensities of their spectral lines.

The occurrence of the rubidium, cesium, gallium and thallium in the lepidolite may be explained on the basis of isomorphous replacement, in which the rubidium, cesium and thallium replace part of the potassium, and the gallium replaces part of the aluminum. Similar replacement of potassium by rubidium and thallium, and of aluminum by gallium, has been described for various minerals, other than lepidolite, from the Katzenbuckel Mts. in Odenwald.[7]

[6] Article submitted to *Ind. Eng. Chem.*

[7] F. Schröder, *Neues Jahrb. Mineral., Geol.*, Abt. A, **63**, 215, 1931.

THE CRYSTAL STRUCTURE OF POTASSIUM DITHIONATE, $K_2S_2O_6$

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Because of criticisms[1,2] of some of the results reported in a paper having the above title by Huggins and Frank[3] the writer has re-

[1] Hägg, *Zeit. Krist.*, (A) **83**, 265, 1932.

[2] Helwig, *Zeit. Krist.*, (A), **83**, 485, 1932.

[3] Huggins and Frank, *Am. Mineral.*, **16**, 580, 1931.