Mineralogy. — *A Reaction for Beryllium in Minerals and Rocks.* By H. L. J. ZERMATTEN. (Communicated by Prof. J. VERSLUYS.)

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In the course of the qualitative *Al*-examination of some *Al*-containing minerals, according to the method described by FEIGL [1]), with Morin ($C_{15}H_{10}O_7 . 2H_2O$), it appeared accidentally that this reagent also very well meets the demand of serving as a specific reaction for the determination of beryllium.

In a white Beryll $Be_3Al_2(SiO_3)_6$ from Limoges was tried to indicate *Al* according to the method mentioned above. The clear yellow-green fluorescent colour, which, however, appeared, was so strikingly different that a mistake in the course of the examination was thought of. It appeared, that the *Al*-containing solution was slightly basic, instead of being neutral or weakly acid as is prescribed [2]).

After acidifying the bright green colour disappeared in order to change at the transition-point into the specific blue-green fluorescent colour of the Morin-alumina salt.

It was soon ascertained that this yellow-green fluorescence, which appeared in basic solution and completely disappeared after acidifying, has to be considered as dependent on the presence of Beryllium.

Consequently a specific method of determination for *Be* had been found, which so far had not yet been mentioned in literature and was worth a closer investigation.

The course of the examination for the presence of *Be* in minerals then can be described as follows.

The very finely powdered mineral is fused with $NaKCO_3$ to a bead on a magnesiarod of 1 m.m. diam. After fusing, this bead is stroken off in molten state into the hollow of a black drop-plate and powdered there with a small pestle. It is dissolved in 3 drops of $^5/_1$ N . *HCl* and after addition of one drop of a saturated methyl-alcohol solution of Morin, 4 drops of $^5/_1$ N. *NaOH* produce a very clear yellow-green flurescence.

Upon acidifying drop by drop with $^5/_1$ N . *HCl* or 30 % acetic acid this colour disappears completely or changes into a blue-green fluorescence indicating the presence of alumina.

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[1]) FRITZ FEIGL: "Qualitative Analyse mit Hilfe von Tüpfelreaktionen". Leipzig 1931, p. 218.

[2]) F. P. TREADWELL: "Lehrbuch der Analytischen Chemie". 14te Auflage. Leipzig-Wien 1930, p. 119.

Colour:

On a white background	On a black background	
green-yellow	blue-green (acid solution)	*Al*
chromate-yellow	clear yellow-green (basic solution)	*Be*

The yellow-green fluorescent colour of *Be* is very similar to that of a solution of fluoresceine in a diluted base.

The following reactions were done with $Be(CO_3)_2$ (Merck, Darmstadt) while the limits of determination are also indicated with regard to this salt.

Limit of determination. 1 : 50.000 is visible in the hollow of a black drop-plate, containing about 1 cc. On dilution to 1 . 1.000.000 the yellow-green fluorescence is still visible in a layer of liquid of 20 c.m.

Beryllium may perhaps also be determined quantitatively colorimetrically by means of this reaction, if one starts from standard solutions of $BeCl_2$. However it has this disadvantage that after staying for some time the colour is no longer fluorescent, especially in very diluted solutions. A method, depending on this reaction which gives a fairly accurate determination has not yet been worked out completely.

It scarcely makes any difference whether *NaOH* or *KOH* is used as base (*NaOH* probably gives a somewhat brighter colour), nor whether an aethyl- or a methyl-alcohol solution of Morin. The chemically pure substances, containing the elements: *Al, Mg, Li, Ca, Sr, Ba, Ti, Zr, La, Dy, Ce, Yt* and *Th*, behave perfectly negatively according to the method described above. A few pneumatolytic rocks showed upon examination to have a distinct *Be* content.

It is beyond the scope of the author to trace the nature of the green fluorescence.

The discovered reaction is of importance for the solution of some mineralogical problems of present interest [1]) and may be useful in the metallurgy of the light-metals as a speedy method of quantitative determination for the presently much used beryllium.

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[1]) HENRY S. WASHINGTON: "Beryllium in Minerals and Rocks" American Mineralogist. Vol. **16**, N^{0}. 1. pp. 37—41. Jan. 1931.