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A SIMPLE MICROSPECTROSCOPE*

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The microspectroscope, or spectroscopic ocular, has been known to mineralogists for many years, but because of its limited application it has never come into common use in the mineralogical laboratory. The value of the microspectroscope in mineral identification was pointed out by Wherry (1915, 1929), who described the technique employed in its use and recorded the absorption lines and bands for a large number of minerals. The type of instrument used by Wherry consisted of a small direct-vision prism spectroscope designed to replace the conventional microscope ocular. It contained a wave-length scale, and an auxiliary prism permitted the comparison of the mineral spectra with those of

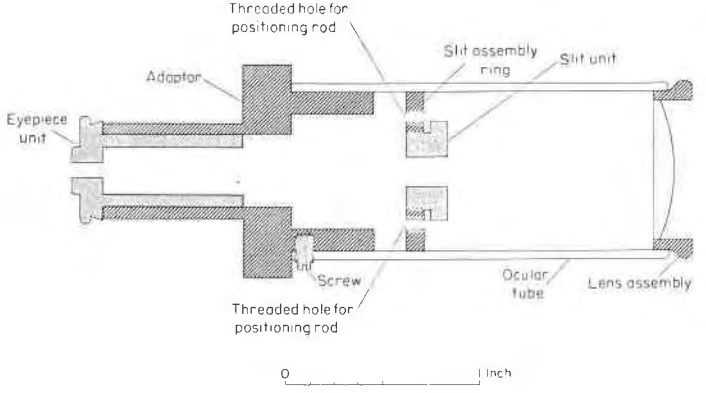

FIG. 1. Sketch showing construction of microspectroscope.

standard solutions. Microspectroscopes of that type, described and illustrated by Chamot and Mason (1948), are now difficult to obtain.

An easily constructed, inexpensive microspectroscope has been designed which the writer has found most useful in detecting the presence of rare earths in minerals. Parts from a small pocket grating spectroscope were combined with a microscope ocular as shown in Fig. 1. The upper lens of a low-power ocular from an old microscope was removed and replaced by a brass adaptor made to hold the eyepiece unit of the

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spectroscope, which contains the grating and is readily removed from the barrel of the spectroscope. The adaptor was attached to the ocular by the small screw originally used to position the ocular in the microscope tube. The unit holding the slit was unscrewed from the spectroscope barrel and fitted to a threaded ring made to slide by slight pressure inside the ocular, as shown in Fig. 1. Two holes were drilled and tapped in the ring so that small threaded steel rods could be attached temporarily and used as handles in moving the slit assembly to its correct position, which may conveniently be found by adjusting the slit assembly to obtain maximum definition of the mercury spectrum from a fluorescent lamp.

The microspectroscope can be used with either a petrographic or a binocular microscope, so that both small grains and hand specimens may be examined. Illumination, which may be by transmitted or incident white light, should be intense. A microscope lamp that can be focused is useful in directing a concentrated beam of light from above the stage. When substage illumination is desired, the upper condensing lens should be in place. It is important to remove the blue filter commonly used with microscope lamps, as the absorption spectrum of the filter may mask that of the mineral being tested.

The absence of a wave-length scale is not a serious defect, as the characteristic absorption-line pattern of many individual minerals can be recognized after a little practice using samples of those minerals described by Wherry (1929) as showing distinctive spectra.

The instrument has been found very useful in the rapid detection of monazite and xenotime in placer concentrates and in distinguishing between rare-earth minerals with similar optical properties but contrasting compositions, such as xenotime and bastnaesite.

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