## COLOR BLINDNESS AMONG STUDENTS OF MINERALOGY

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In teaching determinative mineralogy, the writer tries to impress upon the student the need of correctly identifying the properties exhibited by the specimen being determined. To facilitate checking the student's determinations, the writer provides each student with an outline form on which he writes the properties as he determines them in tracing down the mineral. In checking these sheets with the student, the writer discovered that certain ones made gross errors in identifying color and streak. While some errors of this type were due to a lack of color training, an appreciable number were found to be due to color blindness. This has led the writer to test every student in mineralogy for this eye defect soon after he enters the course.

For several years a numbered set of minerals covering the chromatic range were used with a multiple-choice type of question. The student simply had to select the correct color name for each specimen. It was found, however, that this test did not distinguish color blindness from color ignorance, and for the past few years the Ishihara test has been used.[1] This test simply requires the student to read a number. It is accurate and requires less than one minute per student.

According to Ishihara, 5 per cent of all males are color-blind. Females are rarely afflicted but are responsible for the transmission of the defect. The classes taught by the writer are composed only of males and the incidence of color blindness as determined by the Ishihara test is indicated in the following table:

TABLE 1

COLOR BLINDNESS AMONG STUDENTS OF MINERALOGY AT MISSOURI SCHOOL OF MINES

| Year | Students | | |
|---|---|---|---|
| | Total number tested | Color-blind | |
| | | Number | Per cent |
| 1937 | 56 | 3 | 5.36 |
| 1938 | 87 | 4 | 4.59 |
| 1939 | 72 | 7 | 9.72 |
| Total | 215 | 14 | 6.60 |

[1] Ishihara, Shinobu, *Tests for Colour-Blindness*, Kanehara and Co., Tokyo, Japan. (U.S. Agent: C. H. Stoelting Co., 424 North Homan Ave., Chicago, Illinois.)

All fourteen students found to be color-blind have the common red-green type of congenital color blindness. Of the seven found to be color-blind in 1939, four are green-blind, one is red-blind and two are incompletely red-green blind. The completely green-blind confuse green and purple with gray, the completely red-blind confuse red and bluish green with gray. The incompletely red-green blind have difficulty with certain red and green tints and shades while others can be distinguished.

The most interesting result of the test is that it reveals color blindness in individuals who did not know that they were afflicted. For example, of the seven color-blind in this year's classes only one definitely knew that he was afflicted. He had been tested before. Another knew that he could find a yellow wooden tee when playing golf but had difficulty in recovering a red one. The other five were not aware of their eye defects until they were tested in the mineralogy class. To these the test is helpful, for although nothing can be done to correct this defect, awareness of being color-blind is apt to make one more cautious where color is concerned. In determining minerals he will rely less on color and streak and more on other properties. The test also is of value to the instructor, for he becomes aware of the handicap under which some of his students work, and he is likely to be more tolerant toward them. The writer believes that the administration of this test is well worth the little time it takes and recommends it especially to instructors whose classes are so large that they cannot give the individual much personal attention.

## RADIOACTIVE STANDARDS*

A series of radioactive standards are being prepared under the direction of the Committee on Standards of Radioactivity of the National Research Council. These standards will be deposited at the National Bureau of Standards in Washington, D. C. to be issued as working standards to investigators who may desire them.

The standards under preparation at present are:

1) Radium Standards
   a) 100 cc. solutions sealed in 200 cc. pyrex flasks containing $10^{-9}$ and $10^{-11}$ grams of radium to be used as emanation standards either directly or by subdilution.
   b) 5 cc. solutions sealed in pyrex ampoules containing 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10, 20, 50 and 100 micrograms of radium to be used as gamma ray standards. If desired, these may be obtained in sets of 13 with two each of the 0.2, 2, and 20 microgram standards.

2) Thorium Standards

   Sealed ampoules containing sublimed $ThCl_4$. These may be used in preparing standard thorium solutions.

   Directions for use will be furnished with the standards.

* This work is being supported in part by a generous grant from the American Philosophical Society to the Massachusetts Institute of Technology.