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# AN IRON-SENSITIVE STAIN FOR IRON-RICH SPHALERITE

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ABSTRACT

An ammonium dichromate–hydrochloric acid solution serves as an iron-sensitive stain on polished surfaces of iron-rich sphalerite.

During the course of an investigation of pyrrhotite-pyrite-sphalerite ores from Cerro de Pasco, Peru, the author found that an ammonium dichromate solution developed by A. J. Naldrett (personal communication, P. B. Barton, Jr., 1964) for the differentiation of hexagonal-monoclinic pyrrhotites in polished section also preferentially stains iron-rich sphalerite.

The staining solution is prepared by dissolving 400 mg of $(NH_4)_2Cr_2O_7$ in 25 cc of 15 percent HCl. The stain was achieved by immersing the polished section in the solution for two minutes and then carefully blotting on fine absorbent paper. The surface stain deteriorates in five to ten minutes.

The iron content of sphalerite was determined with an electron microprobe (Applied Research Laboratories—EMX) in the Department of Geological Sciences, Harvard University. Analytical conditions were as follows: accelerating voltage, 20 kV; specimen current, 0.05 $\mu$A; and probe diameter, 1 $\mu$m. Six synthetic sphalerite standards, supplied by P. B. Barton, Jr. and ranging from 0 to 50 mole percent FeS, were used to establish empirical working curves.

Figure 1a shows a polished thin section of strongly zoned sphalerite in transmitted light. Figure 1b shows this same section, after staining, in reflected light. The variation in iron content across this zoned crystal, as determined by step-scanning at 2 $\mu$m intervals with the microprobe, is shown in Figure 2. The following correlation of iron content with stain color was found: 0–12 mole percent FeS, no stain; 12–17 mole percent FeS, light brown; 17–25 mole percent FeS, dark brown; and greater than 25 mole percent FeS, shades of purple and blue.

The zonal distribution of iron in sphalerite single crystals, as well as replacement textures due to several generations of sphalerite with different iron contents, is brought out in detail by the ammonium dichromate stain. The surface stain results in better resolution of composition banding than a thin section due to its restriction to a two-dimensional surface. The method enables the investigator to quickly delineate iron-rich zones for quantitative study by electron probe analysis.

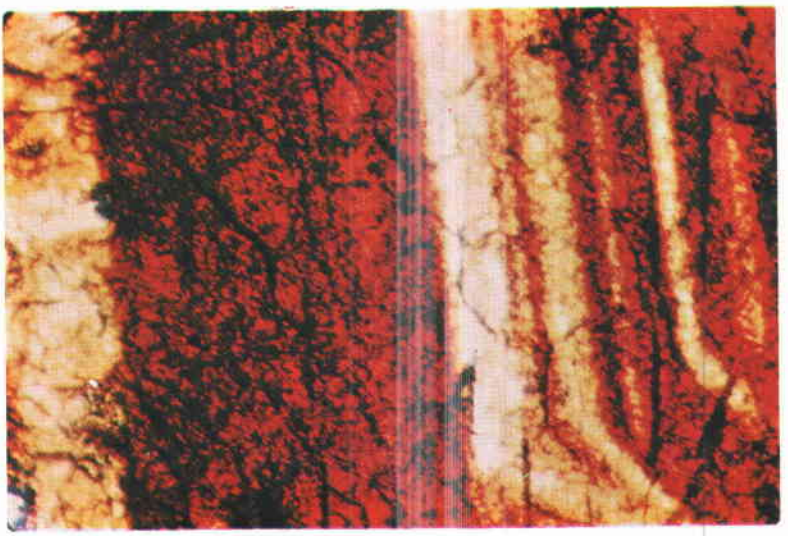

FIG. 1 (a) Strongly zoned sphalerite from Cerro de Pasco, Peru. Transmitted light. The length of the photograph is 330 $\mu$m.

(b) The same area and scale as Figure 1(a), in reflected light after staining with the ammonium dichromate solution.

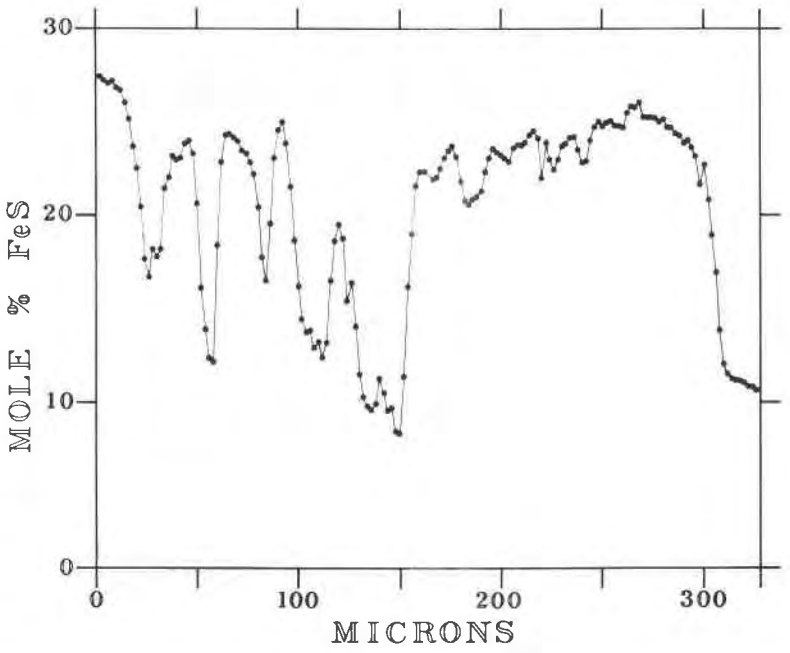


FIG. 2. The iron content of the zoned sphalerite crystal shown in Figure 1, as determined by step scanning at 2 $\mu$m intervals with an electron microprobe.

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## SCANDIUM CONTENT OF ORE AND SKARN MINERALS AT FRANKLIN, NEW JERSEY

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ABSTRACT

Skarn zones in the Franklin orebody contain scandium chiefly in andradite (5–50 ppm), pyroxene (12–95 ppm) and amphibole (18–40 ppm), with very small amounts present in hendricksite, rhodonite, hyalophane and idocrase. The partition ratios for various mineral pairs in different specimens vary widely, indicating non-equilibrium conditions. Volumetrically, the great bulk of the scandium in the deposit is present in substitution for $Fe^{3}$ in the franklinite of the normal ore and in the andradite of the skarns.

[1] Mineralogical Contribution No. 473.