

demonstrates that the chemical separation was in a large measure successful though for lack of material the niccolite was probably not entirely eliminated.

The following results were obtained on material from the same specimen:—

1. Hand-picked grains between 20 and 40 mesh selected for purity:—arsenic content = 11.23 per cent.
2. Grains with outer coating of niccolite removed by dilute nitric acid but still containing microscopic niccolite inclusions in the interior:—arsenic content = 5.83 per cent.
3. Material reduced to 100 mesh and again treated with dilute nitric acid:—arsenic content = 0.17 per cent.

The fact that this breithauptite though apparently pure and homogeneous to the naked eye contains nevertheless over five per cent. of arsenic, as microscopic niccolite inclusions is evidence of the importance of a microscopic examination of minerals which are to be submitted to analysis, since it may settle the question as to whether the presence of certain elements is due to isomorphous replacements or to admixture with another mineral in which they are contained.

*The Isolation of Niccolite.*—One of the largest, purest specimens containing relatively little breithauptite was sawn into slices about one sixteenth of an inch thick which were treated with concentrated nitric acid containing tartaric acid as previously described under etching methods. When all the breithauptite that could be reached by the acid had been removed, the pieces were broken successively to 20, 40, 60, 80 and 100 mesh and retreated after each sizing. In this way it was hoped that the breithauptite inclusions would be eliminated. The sample was finally treated with hydrofluoric acid to clear off oxides, rinsed and dried at 120° C. Under the microscope the grains appeared bright, clean and of good colour. The sample, however, still contained brilliant cubes of cobaltite which apparently had scarcely been effected by the acid.

Considerable experimenting had previously been done with a view to finding some re-agent which would dissolve the cobaltite without affecting the niccolite or breithauptite, but all these attempts proved unsuccessful. There is, therefore, no means of determining absolutely whether any of the nickel is replaced by cobalt in this niccolite. Analysis of the sample thus prepared yielded the following results:—

| Ni    | Co   | Fe    | As    | Sb   | S    | Total |
|-------|------|-------|-------|------|------|-------|
| 40.64 | 2.04 | trace | 50.78 | 4.95 | 1.47 | 99.88 |

Specific gravity of the sample at 20° C = 7.66.

The remainder of the sample after analysis was re-treated with acid and the final determination yielded 3.81 per cent. of antimony. From the result it would appear that the material analyzed still contained breithauptite, and the amount of possible replacing antimony is thus reduced to less than 3.81 per cent., though it seems likely that most of this represents breithauptite.