Since sulphur is present in excess of the amount required to combine with the cobalt to form cobaltite, we must assume the presence of isomorphous sulphur to the extent of 0.37 per cent., if we consider all the cobalt to exist as cobaltite of theoretical composition.

Here again in the case of niccolite is demonstrated the usefulness of a microscopic examination. We know definitely that any antimony in excess of 3.81 per cent. exists as breithauptite, and also that a large proportion of the cobalt is present in the form of cobaltite.

A determination of antimony in 20-40 mesh grains of niccolite from the same specimen, carefully selected by hand and in which no breithauptite was visible to the naked eye yielded 17.76 per cent. Had there been no microscopic examination this would probably have been reported as an arite with the above percentage of antimony replacing arsenic. Thus it is possible that certain so-called arites may be in reality relatively pure niccolite containing minute inclusions of breithauptite. Similarly a sample of breithauptite containing a high percentage of very minute niccolite inclusions might also be reported as arite, though the enclosing breithauptite itself might be almost of theoretical purity. In this way an entirely fictitious series of arites containing any proportion of arsenic and antimony might be obtained.

Isolation of Cobaltite. Examination of the hand specimens showed that those in which the calcite gangue was relatively prominent with the breithauptite as rather small and scattered areas, were richest in cobaltite. Such a specimen was selected, reduced to 40 mesh and after the calcite had been dissolved out was treated with aqua regia. In this way the breithauptite and niccolite were dissolved away, leaving the cobaltite as a relatively very small amount of finely divided residue. As previously noted, the cobaltite is apparently scarcely acted on until the breithauptite and niccolite have disappeared. It was found that the cobalt residue contained no nickel, so that the very delicate dimethylglyoxime test could be used to ascertain when all breithauptite and niccolite had been removed. When fresh quantities of the aqua regia solvent, therefore, no longer reacted for nickel, the separation was complete and the residue was washed, dried and examined under the microscope. The whole amount readily passed the 100 mesh. It was seen to consist partly of material without crystal form, derived, no doubt, from the layer coating the niccolite, and partly of very perfect cubic crystals which still retained their sharp edges and corners and brilliant metallic lustre. Accompanying the cobaltite were grains of yellow, rose-coloured, white and colourless quartz derived from the calcite gangue, and a few minute particles of silver. In order to get rid of the quartz grains the residue was treated with hydrofluoric acid until they were all dissolved. This was followed by dilute nitric acid to dissolve the silver.

In this way about three grams of apparently pure and in part crystallized material were obtained. The sample had a specific gravity of 6.35 at 20° C.

Analysis of this material dried at 120° C. yielded the following result:—

CO	Ni	Fe	As	S	Ag	Total
34.83	nil	.63	46.97	17.48	.04	99.95