NOTISER

Native Bismuth in the Molybdenite Deposit at Skjoldevik, Haugesund Peninsula, Western Norway.

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During a spectrochemical survey in search for host minerals for tellurium it was found that one molybdenite crystal — from Skjoldevik (1) — contained Te in excess of 100 p.p.m. This rather surprising fact naturally lead to the examination of further molybdenites. Molybdenite samples from 20 deposits in various parts of Norway were searched for Te. However, in none of these Te could be detected spectrochemically. The Skjoldevik sample was then searched for other elements. This at once revealed the presence of strong Bi lines, which were, like the Te lines, absent in all the other molybdenite spectrograms. A spectrogram of a second molybdenite crystal from the same Skjoldevik specimen also exhibited Bi and Te lines, but these were considerably weaker than those recorded in the first case. These observations strongly indicate that the Skjoldevik molybdenite does not contain Te by itself, but is contaminated by varying amounts of some Bi-rich mineral which contains considerable quantities of Te. This mineral could not be observed directly by means of a loupe, so it must be rather finely dispersed in the molybdenite. It is highly probable that this association of molybdenite with Bi and Te is more or less incidental, not due to the presence of exsolution products of a molybdenite originally rich in Bi and Te. This is further confirmed by the following observations.

On careful inspection of the same Skjoldevik specimen it was found to contain, in addition to the abundant molybdenite, small very soft and sectile mineral grains with a bright metallic luster, embedded in a fine grained mass of quartz. The size of these metallic grains or clusters is usually much less than a millimeter. One single grain was much larger, exhibiting a surface of a few square millimeters. The luster of this larger grain is nearly white with a reddish or yellowish tint, while the smaller grains seem to be more greyish. Therefore it was suspected that two different mineral species were represented. However, spectrograms did not reveal any important difference. The only abundant element observed is Bi in both cases. In addition there is some Te, somewhat more in the small grains than in the larger one.

Other components (Ag, Pb, Sb) vary in quantity but are quite subordinate in both cases; these are probably mainly constituents of associated other minerals, e.g. galena. In the same way Mo lines, which are more or less intense in all spectrograms in question, may be explained: they are almost certainly due to contamination by molybdenite. Thus the larger grain must obviously consist of native bismuth. Considering the higher Te content and the greyish colour of the small grains, these might possibly be tetradymite. But X-ray powder photographs have established beyond doubt that the main substance of both large and small grains is one mineral species — native bismuth. The colour difference can be explained by the fact that the small grains are rather rich in Mo, so that their colour may be partly due to molybdenite.

Because of the small quantities available — far smaller than our usual samples for arcing — it was not possible to interpret the spectrograms in terms of quantitative data. But the Te contents of the bismuth are probably of the order of a few per cent, apparently about 5 times higher in the small grains than in the larger one. It is fairly obvious that it is this Te-rich native bismuth which is also found hidden in the molybdenite crystals a few centimeters away.

According to the description by J. Schetelig (1) the molybdenite is found in quartz-rich veins in the vicinity of a granite body. In a vein at the immediate granite contact the Bi-rich galena described by him was found. It is possible that Pb has been introduced locally into a medium containing Bi and Te, thus giving rise to the Bi-rich — and Te-rich(2) — galena. Microscopic examination of this galena has indicated that it has been subjected to exsolution, some of the supposedly exsolved mineral grains being almost certainly native bismuth (3). Since the independent occurrence of native bismuth in the deposit has now been established, it is a possibility that the native bismuth found within galena crystals may be remnants of pre-existing bismuth crystals which have been partly consumed during the formation of the Bi-rich galena.

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