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СУЛЬФОАРСЕНИДЫ И АРСЕНИДЫ КОБАЛЬТА, ЖЕЛЕЗА И НИКЕЛЯ В РУДАХ ИШКИНИНСКОГО КОБАЛЬТО-МЕДНО-КОЛЧЕДАННОГО МЕСТОРОЖДЕНИЯ (ЮЖНЫЙ УРАЛ)

I. Yu. MELEKESTSEVA, V. V. ZAYKOV, S. G. TESALINA. SULFOARSENiDES AND ARSENIDES OF Co, Fe AND Ni IN ORES OF ISHKININSKOE COBALT-COPPER MASSIVE SULFIDE DEPOSIT (THE SOUTH URALS)

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The Co-bearing Ishkininskoye massive sulfide deposit is connected with ultramafic rocks of the Main Urals fault, and its ores are peculiar by increased grades of Ni (up to 0.3 %), Co (up to 0.2 %) and Cr (up to 0.3 %). Sulfoarsenides are represented there by cobaltite, arsenopyrite, and gersdorffite; arsenides — by nickeline, löllingite, safflorite, rammelsbergite, and krutovite. The last four minerals have been detected in the Urals massive sulphide deposits for the first time. Relations between minerals show that they were formed in the following sequence: nickeline — gersdorffite — safflorite, löllingite, rammelsbergite — cobaltite and arsenopyrite. Nickeline is the «purest» one, without zonality and admixtures — (Ni0.99–1.01Co0.01)1.00–1.01As1.00. Löllingite, (Fe0.50–0.56Ni0.49–0.35Co0.13–0.06)1.03(As1.96S0.04)2.00, contains up to 11.12 % Ni. Composition of safflorite (with up to 10.08 % Ni and 12.77 % S) corresponds to formula (Co0.83–0.96Ni0.19–0.08Fe0.06–0.04)1.08(As1.96–1.92S0.04–0.08)2.00. Rammelsbergite, (Ni0.49–0.88Co0.29–0.10Fe0.23–0.04)1.01–1.02(As1.96–1.92S0.04–0.08)2.00, has increased contents of S, Fe and Co: up to 1.34 %, 1.37 % and 7.64 %, respectively. Krutovite, (Ni0.76–0.91Co0.17–0.08Fe0.06–0.02)0.99–1.01(As1.54–1.74S0.46–0.26)2.00, has also increased contents of Fe, Co and S: up to 2.29 %, 5.03 % and 8.27 %, respectively. Moreover, rammelsbergite and krutovite have increased contents of Bi (up to 0.97 %) that could be recalculated on formulae units. Cobaltite, (Co0.84–0.43Ni0.12–0.42Fe0.08–0.17)1.04–1.02As0.98–1.03S1.02–0.97, and arsenopyrite, (Fe0.89–0.49Co0.10–0.07Ni0.05–0.45)1.04–1.01As1.02–0.39S0.98–0.61, despite their varying compositions, both are very rich in Ni: up to 14.69 % and 14.66 % respectively. Their unit cell parameters reflect the increased amounts of Ni and Fe in the structure and are as following: cobaltite — a = 5.599(3) Å; b = 5.607(1) Å; c = 5.610(2) Å, V = 176.1; arsenopyrite — a = 5.747(3) Å; b = 5.687(1) Å; c = 5.776(3) Å, V = 174.5(2). Gersdorffite, (Ni0.30–0.72Co0.24–0.20Fe0.22–0.16)0.97–1.08As1.10–1.15S0.90–0.85, has the increased Co and Fe contents — up to 12.68 % and 18.53 % respectively. All sulfoarsenides have zonal structure.