INFLUENCE OF GEOCHEMISTRY AND MINERALOGY OF Au AND PGE's IN MESOTHERMAL AND EPITHERMAL DEPOSITS ON METAL RECOVERY.

Abstract.

Mineralogy and geochemistry of Au, Pd and Pt in mesothermal-epithermal (below 250°C) are complex.

In Kupferschiefer Cu-Ag deposits, Poland, are present at the redox interface as a horizon from a dozen to 150 cm thick. The metal contents vary (ppm): Au 1-3000 (av. 7), Pt 0.3-340 (av. ca 1), Pd 0.2-1000 (av. 2). Au occurs as a continuous solid solution Ag-Au series (reduced side of the redox interface), gold of high fineness (oxidized side of the redox interface), and organometallic compounds (Au +1). Pt occurs as organometallic compounds and probably as arsenates. Pd occuirs mainly as arsenates, arsenides, organometallic compounds and substitutions in Ni-Co arsenides. Metal recovery by flotation is as follows (%): Au 70-80, Pd 35-40, Pt 25-30. Recovery by cyanisation is equal to (%): Au about 70, Pd 85 and Pt 80.

In Barberton, Transvaal, South Africa, gold occurs mainly in pyrite containing also inclusions of arsenopyrite, oxysulphides, chlorite, quartz and siderite. Minute chlorite inclusions contain (wt.%) from ≤0.04 to 3.01 (average 0.77) of Au and from ≤0.02 to 1.63 (average 0.29). Chlorite substituted gold is not recoverable and it controls 10-15% of the total gold budget in the samples studied.

In Maldon, Victoria, Australia, in high gold sections chlorites contain from 2.00 to 7.98 wt.% of Au and from 21.04 to 28.91 wt.% of As_2O_3. Au in chlorite has valence +3. Amount of this irrecoverable gold is 15-20% of the total gold budget in Maldon.

In Mitterberg, Austria, tetrahedrite separates contain from 18.7 to 52.5 ppm of Au. Au is present as native metal, as substitutions in the host tetrahedrite (valence +1), in pyrite (valence +1) and as gold thiosulphate (Au, Cu^{1+},Cu^{2+})S_2O_3 (Au valence +1). About 20-25% of gold budget is controlled by thiosulphates, which would be lost during recovery process.

Gold occurs also as substitutions in sulphides, antimonides and arsenides as both metallic nanoinclusions with valence 0 (metallic gold) as well as valence +1 (chemically bound gold)

A treatment of such ores requires prior geochemical and mineralogical study to design optimal technology of the ore treatment.