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DIFFERENT MOBILITY OF HEAVY METALS IN HYDROQUARTZITE AND IN SEDIMENTS OF TEILING POUNDS (BANSKÁ ŠTIAVNICA, WESTERN CARPATHIANS, SLOVAK REPUBLIC)

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The pit quarry at the south slope of Malý Šobov Hill is situated in lense of hydrothermal quartzite (HQ). Fine grained waste from flotation plant of Banská Štiavnica Ore Mine State Plant is deposited in setting pit Sedem Žien at the contact of village landmark of Banská Štiavnica and Banská Belá.

The average sample of HQ (A) was prepared by homogenization of crushed material from three bore holes for bench blasting in the low level of the quarry and from sediments of setting pit (B) after mixing of mentioned three samples from the external part of the dam. Nine portions of grain size <1 mm with volume <25 cm^3 from each sample were washed by 250 ml solutions of destilled water (pH 6.5), solution H_2SO_4 + HNO_3 and $NaHCO_3$ in destilled water (pH 4.5) and in rainwater (pH 4.5). Contents of selected heavy metals in leaching were determined by atom absorption spectrometry.

The primary source of Fe, Cu, Zn, Pb, Ag and Cd in HQ in the sediments of the setting pit are sulphide minerals and sulphosalts. Source of the Mn are in both cases carbonates and silicates.

The important reason of the intensive leaching of the selected elements from HQ is caused by lower carbonate content in comparison with sediments of the setting pit. The second reason is the long time activity of three species of thio-bacteria and of products of their metabolism on the high reactive mineral phases of HQ. In the sediments of the setting pit dam was isolated already only Thiobacillus ferrooxidans.

Table 1: Contents of the most important oxides in wt.% in HQ and in sediments from the setting pit

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5
A	92.32	0.44	0.97	3.26	0.26	0.02	0.04	0.11	0.05	0.08	0.12
B	71.68	0.31	7.72	2.36	2.20	1.03	1.14	2.28	2.22	3.79	0.10

Table 2: Contents of selected heavy metals (g/t) in HQ and in sediments from the setting pit

	Cu	Zn	Pb	Ag	Cd
A	25	52	64	8.27	0.10
B	478	3632	1138	5.50	18.40

Table 3: Average contents of heavy metals (mg/l) in leachings from samples A and B

	Fe	Mn	Cu	Zn	Pb	Ag	Cd
xA	330	8.10	0.52	5.70	2.30	0.23	0.018
xB	1.10	14.20	0.06	3.40	1.04	0.03	0.045

Table 4: Overview of thio-bacteria from Šobov and Nová šachta dumps and from setting pit Sedem Žien

Locality	Samples Medium	Sample number	pH	Bacteria		
				Tf	Lf	Tt
Šobov quarry and dump	drainage water	6	2.0-2.4	+	+	+
Nová Šachta dump	drainage water	3	5.6-6.8	+	+	+
Setting pit Sedem Žien	leaching from sand	1	5.7	+3	–	–

Explanations: Tf – Thiobacillus ferrooxidans, Lf – Leptospirillum ferrooxidans, Tt – Thiobacillus thiooxidans
+ present, – not present