4.62.16

Hydrogeochemical properties of Gümüşhacıköy well waters

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In this study hydrogeochemical properties of the well waters in Gümüşhacıköy (Amasya) were investigated. Study covers in Merzifon-Gümüşhacıköy plain. However, in this part of the study, the water wells in Gümüşhacıköy were studied. Gümüşhacıköy is located in Çorum G-34 section of a map. The wells were drilled Center, Budak, Doluca, Güblüce, Çetmi, Eslemez, Çavuş, Keçiköy and Gümüş villages. Waters get in the well are used for drinking and irrigations. These waters were analysed by "VII th Regional Directorate of State Hydraulics Works".

The electrical conductivity values of the well waters are between 509-1276x106 mhos/cm and the pH values are between 6,8-8. According to the pH values these waters are suitible for drinking and irrigations. Considering hardness values; the well with number 14583 has the highest hardness with 577,5 FS. The well with number 52990 is the lowest hardness value with 220 FS.

According to the Schoeller Diagram that is prepared by using chemical analyse results, well waters have the same origin but Na+ and K+ cation values in the well with number 17156 are higher than others. Beside, the its pH values is 8 and it is the highest value among others. According to the Piper Diagram the analyse results of the well with number 17156 is different than others. But all water samples are calcium carbonate waters and its carbonate hardness bigger than non-carbonate hardness. These waters have carbonate hardness bigger than %50.

In this investigation, pollution of well waters also studied. NH4+ values are above the standard value on the wells 22191, 53806, 20175, 14581, 14583, BK, ST. For the prevent the contaminated well waters, protecting measures should be evaluated.

4.62.17

Source zone dynamics in the Río Tinto, SW Spain

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The Río Tinto in SW Spain is one of the most extreme examples of acid mine drainage in the world, annually transporting over 1500 tonnes of dissolved Fe and 200 tonnes of Zn from the mining region in its headwaters to the Huelva estuary some 90 km downstream [1]. However, relatively little work has focussed on the mining region itself [2,3], yet understanding weathering and transport processes and identifying the most significant sources is vital if any remediation work is ever to be carried out.

Over 5000 years of mining activities in the headwaters region of the Río Tinto has left an extensive legacy of spoil heaps, settling ponds and disused mining pits. Drainage from these sources is highly acidic and varied in composition. Typical examples are given in Table 1. This spatial variability is further complicated by temporal variations. For example, seasonal fieldwork and *in-situ* monitoring has demonstrated that the pollutant flux from the most important source of Zn (Tunnel 16, Table 1) is controlled by seasonal to inter-annual changes in solute concentrations (e.g. 780-1800 mg/L Zn) and cyclical sub-daily variations in discharge (14-43 L/s, August 2003).

Source	pH	Fe	Cu	Zn
Settling pond	3.36	130	4	7
Mine water, Tunnel 16	2.53	2,600	630	800
Waste heap leachate	1.26	23,000	380	480

Table 1: Examples of point sources discharging into the Río Tinto. Data from November 2003. Concentrations in mg/L.

We have investigated the potential of employing a multivariate mixing scheme to determine the relative contributions of different sources to the river based upon their chemical compositions and preliminary results are presented. Limitations of the technique are that it does not model non-conservative behaviour and can only be used when all major sources are quantified but it does show, for the first time, indicative pathways and source areas.

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