

THE APPLICATION OF THE SULFUR ISOTOPE COMPOSITION IN THE  
INVESTIGATIONS OF THE ORIGIN OF THE SULFIDE ORE DEPOSITS

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Abstract

The sulfur isotope composition in specimens of ore minerals from some Yugoslav sulfide ore deposits was determined using the mass-spectrometric method. The results of  $\delta^{34}\text{S}$  measurements were used to explain the origin of sulfur in these deposits.

The deep seated source is postulated for the sulfur in ore minerals of the copper ore deposit Bor and the lead-zinc ore deposits Stari trg and Dobrevo. The hydrothermal solutions did not absorb either light or heavy sulfur isotopes. This is proved by the results of  $\delta^{34}\text{S}$  which varies in the narrow limits between + 3.93 and - 6.44%. Therefore we suppose this sulfur is of biogenic origin which is characteristic for the "red beds" type of copper ore deposits. The sulfides of the Mežica lead-zinc ore deposit also contain more of the light isotope and the  $\delta^{34}\text{S}$  value varies within wider limits (from - 6.85 to - 20.81%), which is typical for hydrothermal ore deposits. However, for the present, it is not possible to say whether the sulfur investigated is only of hydrothermal origin or if it is from a mixture of sulfur from hydrothermal solutions and that of mobilized biogenic sedimentary deposition.

The isotopic composition of sulfur of mineral sulfides of the mercury ore deposit Idrija confirm the hydrothermal origin:  $\delta^{34}\text{S}$  from - 2.52 to - 9.18% except for metacinabarite ( $\delta^{34}\text{S} = - 21.34\%$ ) which is supposed to be of biogenic origin. Mineral sulfides of the uranium deposit Žirovski vrh are also of the same origin ( $\delta^{34}\text{S}$  varies from - 10.64 to - 33.74%). As we do not have enough information on

the isotopic composition of sulfur in ore minerals to classify precisely the origin of the antimony ore deposits Izlake and Lepa Njiva as well as some others (Litija, Puharje and Rogoj), further investigation of this topic is necessary.