

LI Bo and PENG Xiuhong, 2014. The Study on Ore-forming Elements Information by Different Capture Agent. *Acta Geologica Sinica* (English Edition), 88(supp. 2): 1252-1253.

## The Study on Ore-forming Elements Information by Different Capture Agent

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### 1 Introduction

The study on the origin of ore deposit, which is one aspect of the ore deposit study, studies the distribution regularity of mineralization and the geological factors of controlling the distribution. It is of great significance on improving the efficiency of prospecting. The origin of ore deposit, which causes the formation of ore deposits and forming process, is from the point of view to study the mineralization distribution. The main problem involved is that the space distribution of mineralization in the earth's crust within a certain area and the period of mineralization because of geological conditions change in the history of the earth's crust. Therefore, the deep mineral information collection, is very important. As a kind of prospecting method can provide the target element information directly, geogas prospecting method has unique advantages in obtaining deep mining information (Guo et al., 2007).

Swedish scientists, Kristiansson and Malmqvist (1987), proposed the geogas prospecting method in the early 1980s. Since introduced into China, the method has made great development with Chinese geochemists' unremitting, systematically researching, its prospecting effectiveness has been gradually recognized (Gao, 2006). This method has the following characteristics: (1) It can analyze metallogenic elements and associated elements, reflect the mineralization type in the deep directly and indicate the underground concealed structures. (2) It is influenced little by covering layer. (3) Its detecting depth is large.

Trapping is an important part in geogas prospecting which affects the whole measurement process directly. The choice of capture agent is the key to improve the

efficiency of capture. The liquid capture agent is used widely at present (Liu et al., 2003). The nitric acid and aqua regia solution is used as capture agent to compare aqua regia with nitric acid of the capture performance.

### 2 Experiment

(1) The preparation of acid solution: prepare certain acidity nitric acid solution and aqua regia solution in the date of the experiment.

(2) The method of field work: adopt active sample method, and the whole device is mainly composed of a sampling drill, filter, trap and a pump. At each sample points, pump 60 L (the flow rate of gas is 2L/min, lasting 30min).

(3) The data analysis of sample : analysis of samples tested by mass spectrometry analysis laboratory of Chengdu University of Technology, with the use of ELANDRCe type inductively coupled plasma mass spectrometry (ICP-MS) manufactured by Perkin-Elmer.

### 3 Sample Test and Analysis

The element contents of nitric acid geogas samples and aqua regia geogas samples from abnormal areas and background areas were analyzed under the same experimental conditions. The elements measured includes 15 rare earth elements and Cu, Pb, Zn, Cr, Mn, Ni, Co, Au, Ag, As, Hg, U, Th, Li, Sc, Rb, Sr, Cd, Cs, W, Mo, Bi etc. In order to further strengthen the reliability of geogas prospecting, repeated sampling and repeated measurement were done to check the quality of the sample.

(1) Most elements content in aqua regia solution is higher than the elements content in nitric acid solution.

(2) For Au, Ag, As etc., the very low content of ore-

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forming elements, the corresponding elements content of aqua regia solution and nitric acid solution were detected in quite. Especially Au and As, restricted by the analysis accuracy of ICP-MS, the samples' elements content of abnormal areas and background areas were at the detection limit near. It had no significance in data analysis.

(3) The contents of main ore-forming elements and associated elements in the aqua regia solution, such as Cu, Zn, Cr, Tl, Pt, Pd, Co, Sr, Ni, Pb, W etc. were higher than the corresponding elements in nitric acid solution. It was 1.5–3 times generally. Especially W, Pb, the elements contents of aquaregia solution were much higher than the elements contents of nitric acid solution.

#### 4 Conclusions

The conclusions from experiment data obtained was similar to the conclusion of work at Dashui gold field. It further verified the reliability of the experiment.

(1) For most elements, the trapping efficiency of aqua regia was higher than that of nitric acid, therefore, as capture agent, aqua regia's applicable scope is wider. The ability of different capture agents to capture the different elements in geogas are different. For example, the aqua regia's capture ability to Cu, Zn, W, Pb and other elements is stronger than nitric acid's. In the actual work in the future, the appropriate capture agent should be selected according to the specific deposit type.

(2) Geogas prospecting method can satisfy the part requirement of deep mining information collection. It can provide element information in the deep and reflect the features of element distribution. It is a new direction to discuss the gas - solid exchange forms of ore body and formation mechanism of ore deposit.

#### Acknowledgements

The National Natural Science Foundation of China (No.41103025) and the cultivating program of middle-aged backbone teachers of Chengdu University of Technology.

#### References

- Guo Wei, Lai Wanchang and Ge Liangquan, 2007. The development history and relevant issues of geogas measurement. *Guangdong Weiliang Yuansu Kexue*, 14(2) (in Chinese with English abstract).
- Gao Yuyan, 2006. Tracing the sources of the metals in geogas from metal deposits by Pb isotopes, trace elements and REE. *China University of Geosciences* (in Chinese with English abstract).
- Gao Yuyan, Wang Mingqi, et al., 2011. *The study of geogas measurement of concealed metallic ore in alluvial plain district*. 26(3) (in Chinese with English abstract).
- Kristiansson, K., and Malmqvist, L., 1987. Trace elements in the geogas and their relation to bedrock composition. *Geoexploration*, 24: 517-534.
- Liu Xiaohui, Zhou Sichun, Tong Chunhan and Hu Bo, 2012. The method of increase the sensitivity of geogas exploration. *Geophysical & Geochemical Exploration*, 36(6) (in Chinese with English abstract).
- Liu Yinghan, Ren Tianxiang, et al., 1995. The geogas measurement and effects in concealed ore. *Geological Exploration for Non-ferrous Metals*, 4(6) (in Chinese with English abstract).
- Liu Yinghan, Kong Mu, et al., 2003. The study of liquid collector of Nanometer material measurement. *Geophysical & Geochemical Exploration*, 27(6) (in Chinese with English abstract).
- Wang Mingqi, Gao Yuyan, et al., 2006. Prospecting breakthrough hand meanings of geogas measurement in North Qilian basin district. *Geophysical & Geochemical Exploration*, 30(1) (in Chinese with English abstract).