Kinetic study of syenite-water interactions at temperatures from 20°C To 435°C And at pressures up to 36mpa

XUETONG ZHANG*, RONGHUA ZHANG AND SHUMIN HU

Laboratory of Geochemical Kinetics, MLR Key Laboratory of Metallogeny and Mineral Assessment, Institute of Mineral Resources, Chinese Academy of Geological Sciences, Baiwanzhuang Road 26, Beijing 100037, P.R.China (*correspondence: zhangxuetong@cags.ac.cn)

The kinetics experiments of syenite in water are performed in the temperature range of 20-435ºC and at pressures of 23-36MPa using flow through packed bed reactor. The results indicated that the release rates of Si, Al, K and Na of the syenite increase with increasing temperature, and reached maximum values at 400°C. The release rates of Ca, Mg reached maximum values at 200°C. The release rates of Fe reached maximum values at 374°C. Another important impact factor of the reaction between syenite and water is pressure. The release rates of Si did not vary with pressure, as pressure was changed from 23 to 36 MPa. The release rates of K and Al in seynite increase with increasing pressure.

Dissolved metallic elements are abundant in aqueous solutions after water reacted with syenite. The maximum release concentrations and maximum release rates of most metals (Si, Al, K, Na, Fe, Ni, Zn, Cu, Mo, V, Ag, Pb and Ti) are observed at T≥300 °C, Ca, Mg, Mn, Sr and Ba at 200°C. As a result, fluids that have reacted with syenite are metal-rich fluids. The most metals (Si, Ca and ore-forming elements) easily release in to aqueous solutions at 23 MPa. If increasing pressure from 23 to 36 MPa, most molar concentration ratio of metal Mi vs Si, Mi/M_{Si} in the effluent solutions decreases with pressure.

The in situ measurements of electric conductances of the water-rock interaction system at temperature range from 20-435°C, 23-36MPa were performed using the flow system. The in situ measurements of electric conductances combined the kinetic experiments found that the maximum electric conductances are present at 374-390°C, 23-36MPa, and simultaneously the maximum release rates of Si, Al, K are reached at the same temperature range. This project is supported by the project of k[2013]01-062-014,SinoProbe-07-02-03, SinoProbe-03-01-2A and 2010G28.

Geology and geochemistry of basic intrusive rocks in the eastern fault depression of Liaohe Basin

YAN ZHANG,[1] WEIHUA BIAN[1], YULONG HUANG[1], XIAOJIAN YU[1], YOUFENG GAO[2] AND HUAFENG TANG[1]

[1] College of Earth Sciences, Jilin University, China, yan_zhang@jlu.edu.cn[2] Research Center of Palaeontology Stratigraphy, Jilin University, China

Basic intrusive rocks are widely developed in the third member of Shahejie formation in the eastern fault depression of Liaohe Basin. Their heat accelerated source rocks maturity, and themselves can be reservoirs. In fact, lots of oil and gas shows have been found in intrusive rocks in eastern fault depression of Liaohe Basin.

According to core of wells, main lithology in the region is diabase. Samples are chosen for geological and geochemistry investigation. Through rock-mineral identification, diabase mainly consist of plagioclase and pyroxene, some pyroxene are altered into chlorite, a small amout of amphibole, quartz, biotite and alkali feldspar.

The composition of diabase shows that diabase in the eastern fault depression of Liaohe Basin is sodic alkaline series rocks. REE appear to negative anomaly ofδEu, light REE enrichment, obvious crystallization differentiation, crystallization differentiation degree of light REE is higher than heavy REE. Based on the analysis of geological setting and geochemical characteristic, the intrusive rocks might form in the settings of continental intraplate.

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