Mathematical model and factors of source and sink of uranium migration

ZHANG-WEN[1] AND WANG YUDUO[2]

[1]Laboratory of National Defence Key Discipline of Radioactive Geology and Exploration Techniques (East China Institute of Technology), Jiangxi 344000, China
[2]Geo-Engineering Co., Ltd. Kelamayi of Xinjiang Uygur Autonomous Region, 834000, China

The precipitation from the mountain areas supplies water to the target layer of the sandstone uranium deposits stably, uniformly and continuously. They are always under the state of equilibrium in the destination layer for uranium exploration and the dissolution process of minerals in groundwater is carried out in the uniform constant flow field [1].

The x direction is in accord with flow direction, Vx = V = C, $D_{XX} = D_d T + \alpha_L V = D_L$, then the mathematical model is:

$$\begin{cases} \dfrac{\partial c}{\partial t} = D_{XX}\dfrac{\partial^2 C}{\partial X^2} - V\dfrac{\partial C}{\partial X} - c\left(\lambda - \dfrac{nF}{RT}\dfrac{\partial Eh}{\partial t}\right) \\ c(x,0) = 0 \,\|\, 0 < x < \infty, t > 0\| \\ C(0,t) = c_0 \,\|\, 0 < x < \infty\| \\ c(\infty,t) = 0 \,\|\, t > 0\| \\ \dfrac{\partial Eh}{\partial T} = q \,\|\, q \ is \ \text{constants}\| \end{cases}$$

The t_{max} can be obtained at x point under the condition of ($\partial C / \partial t \,|_{t = tmax} = 0$), at the same time, the maximum concentration appeared. When $t_p / t_{max} < 0.07$, $t_{max} \approx x / v + 0.5 t_p$, then

$$c_{max} = 0.5\left[erf\frac{vt_p}{\sqrt[4]{D_L(X/V + 0.5T_P)}} + erf\frac{vt_t}{\sqrt[4]{D_L(X/V - 0.5T_P)}}\right]$$

The main factors [2] of sources and sink are adsorption of solute by aquifer particles, solute precipitation, ion-exchange between surface of solid-phase particles and the solution, dissolution of certain substances in the solid-phase particles, the chemical reactions in solution, radioactive element decay, crop roots absorption of solute.

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New high-temperature and-pressure granulites in Amdo basement, central Tibet

X.R. ZHANG[1], R.D. SHI[1]*, Q.S. HUANG[1], D.L. LIU[1] AND S.L. CIDAN[2]

[1]Lcpu, Institute of Tibetan Plateau Research, CAS, Beijing, 100085, China (shirendeng@itpcas.ac.cn)
[2]School of Sciences, Tibetan University, Lhasa, 851000, China

High-temperature and-pressure granulites containing garnet, clinopyroxene, hornblende and quartz have been first found in Amdo basement along Bangong-Nujiang suture in central Tibet (Figure 1).

Fine grained symplectites composed of orthopyroxene + plagioclase ± spinel/hornblende + plagioclase ± orthopyroxene developed during the decompressing stages in the granulites. A metamorphic evolution of the largest granulite lens is determined from careful analyses of reaction textures. It shows a peak condition (860-920°C and 14.6-15.6kbar), which retrogressed from post-peak condition (820-890℃ and 8.8-11.5kbar) to Amphibolites facies condition (550-670℃ and 5.2- 6.5kbar). The three stages define a near-isothermal decompressional clockwise P-T path for Amdo granulites, suggesting that Amdo basement underwent initial subduction to lower-crust level, subsequent rapid exhumation or extensional faulting, and fast cooling and retrogression.

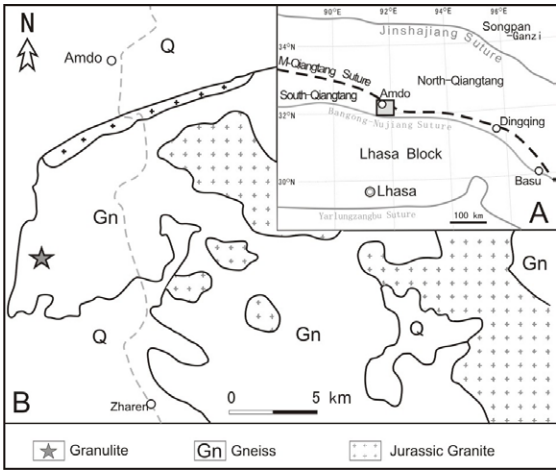

Figure 1: Location of the new granulite, Tibet

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