

# THE CHARACTERISTICS AND ORIGINS OF ULTRABASIC VOLCANIC ROCKS AND THEIR XENOLITHS FROM LIXIAN AREA, GANSU PROVINCE, P.R. OF CHINA

Ye, <sup>(1)</sup>Weikun and Lu, <sup>(2)</sup>Fengxiang.

(1) *Fujian Institute of Geosciences, Fuzhou 350011, P.R. of China;* (2) *China University of Geosciences, Wuhan 430074, P.R. of China.*

Many of small Cenozoic ultrabasic volcanic rocks and their ultramafic xenoliths from Lixian area, Gansu Province, China, are found. These volcanic rocks are belong to foidite group with lower SiO<sub>2</sub> (38-41, wt% ) and Al<sub>2</sub>O<sub>3</sub> (7-8), higher MgO (11-18), CaO (12-16), Na<sub>2</sub>O+K<sub>2</sub>O (3-8), and TiO<sub>2</sub> (3-4). They are divided into 1) olivine nephelinite: olivine + clinopyroxene + nepheline; 2) sub-mafurite: olivine + clinopyroxene + kalsite, and contains phlogopite, Ti-K-richierite and melilite. Their transitional element distribution patterns all are strongly depletion in Cr and Ni, enrichment in Ti. Their REE distribution patterns are high total REE contents (340-570 ppm ), enrichment in LREE and depletion in HREE ( $La_n/Yb_n=34-56$ ).

Most of the ultramafic xenoliths in the volcanic rocks are spinel lherzolites belong to peridotite series, a few of them are harzburgite, dunite and pyroxenite. Moreover a rare kind of calcite pyroxenite was found. These spinel lherzolites are richer in Al<sub>2</sub>O<sub>3</sub> (2.6-3.3, wt% ), CaO (3.0-4.6), and Na<sub>2</sub>O+K<sub>2</sub>O (0.4-0.9), lower in SiO<sub>2</sub> (43-45) and MgO (38.3-38.5) on the chemistry with slightly depletion feature. There are fine corresponding relationship between xenoliths and the host rocks on major elements. Petrogenesisly they are considered to be related to the host magma and to be residual materials after the upper mantle underwent partial melting by 3-4%. By estimated, this kind of ultramafic xenoliths formed at 23-26 kbar pressure and 1060-1100 °C temperature, and from 76-86 km depth.

Compared with the same kind of rocks from other areas in the world and estimated, it is suggested that the kind of magma in this area was originated under the conditions: 1260-1300 °C temperature, 26-28 kbar pressure and 85-90 km depth. These host rocks widely contain calcites and some calcite pyroxenite xenoliths are found, these are also suggested that the host magma originated under the environment of richer CO<sub>2</sub> or CO<sub>2</sub> makes main rule among volatile components, and begin to cryst.

On the aspects of geology, petrology, chemistry and origined conditions from these volcanic rocks, there are obvious regular transitional relationships correspond to their geographic distributions, and the extreme direction distinct features of compositions; moreover the distributions of these rocks bodies are controlled obviously by both NNE blind fractures and NWW fractures. These characters reflect the possible mechanism of the ultrabasic magma in this area is that the subduction of Shongpan-Ganzhi ocean crust forward northern direction in Mesozoicera lead to cause the enviroment of richer  $H_2O$  and  $CO_2$ , deeper depth from south to north, then activity of Cenozoic NNE within-plate tension deep fractures cause to happen small degree partial melting of wedge-shaped upper mantle, thus formed the magma in this area.

Furthermore, the paper has studied the clinopyroxene complex zones in the host rocks.

Keywords: Gansu China, Cenozoiea, ultrabasic volcanic rock, foidite, nephelinite, sub-mafurite, xenolith, petrogenesis, Ti-K-richerite, clinopyroxene zone.