X-RAY FLUORESCENT ANALYSES OF ZrO_2 IN THE RYOKE AND THE SANBAGAWA PELITES

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Chemical composition of Japanese Chichibu geosynclinal sediments have been studied by several investigators (Miyashiro and Haramura, 1962; Banno and Chappell, 1969). The aim of their studies were to determine chemical changes of metamorphic rocks accompanying with regional metamorphism and to find any systematic variations in chemical composition of sediments across the Chichibu geosyncline. Miyashiro and Haramura (1966) showed that pelitic rocks in Hitachi and other regions where volcanic activities were common in Paleozoic geosyncline were poor in K_2O and rich in CaO , FeO and MgO compared with the Ryoke metamorphic rocks. They suggested that such a chemical characteristic was a result of mixing of basic volcanic material into pelites.

The present writer determined the concentration of ZrO_2 in eleven pelitic rocks and one green stone from the Ryoke and the Sanbagawa metamorphic belts in order to elucidate the relationships between chemical composition of pelites and sedimentary environments.

ANALYTICAL PROCEDURES

Thin slabs of rock samples were pulverized by an agate motor. The weighed pulverized rocks were mixed with spectroflux of the same weight. Each mixture was heated in Pt crucible up to $950^\circ C$ by an electric furnace. Melt was poured onto hot graphite plate. The glass plates have an area of more than 3.14 cm^2 . The same method was used for the preparation of standard glass plates containing small amount of ZrO_2 powder. ZrO_2 concentration was measured with a Rh tube in X-ray fluorescent analysis. Measurements of the fluorescent radiations were made on a Rigaku X-ray spectrometer, operating under 50 kV and 50 mA. Variation in mass absorption coefficient of each glass plate for Zr radiation was assumed to be negligible because of a large amount of flux component

in glass plates of pelites.

The analyzed rocks are seven Ryoke pelites (three gneisses, two schists and two slates) from Takato-Shiojiri area and five Sanbagawa schists exposed along the Kurokawa river, southeast of Takato town. One Ryoke and four Sanbagawa pelites were

Table 1 Analytical results of Zirconium concentration (± 20 ppm)

Sample	ZrO_2 ppm	Sample	ZrO_2 ppm
R1	417	S1	269
R2	233	S2	312
R3	393	S3	224
R4	408	S4	237
R5	319		
R6	306		
R7	291	M1	101

R: Ryoke pelites, S: Sanbagawa schists, M1: green stone of the Sanbagawa metamorphic rocks, R2: slate associated with green stones.

associated with volcanic meta-sediments. Analytical results are listed in Table 1.

INTERPRETATION

Pelitic rocks in the Chichibu geosyncline show regional chemical variation in Na/K ratio, CaO and MgO+total iron. The chemical characteristics were interpreted in relation to volcanic activities in the geosyncline (Miyashiro, 1965). Recently, Rb-Sr isotopic analyses of pelites and quartz schists were made by Yamaguchi and Yanagi (1970) and Ueno (private communication). These data suggest that Ryoike pelites are higher in initial $\text{Sr}^{87}/\text{Sr}^{86}$ ratio than Sanbagawa schists, if the two metamorphic belts were formed at similar age as believed by many Japanese geologists. As volcanic materials are usually low in the $\text{Sr}^{87}/\text{Sr}^{86}$ ratio, Sanbagawa pelitic rocks may contain more abundant volcanic materials than Ryoike pelites.

Difference of Zr concentration in pelites from the two metamorphic belts will be explained by the same idea. Basaltic rocks are small in Zr contents as compared with pelites and granodiorites which are common felsic plutonic rocks (Table 1 and Ono, 1976). Hence, pelites containing significant amount of clastics of mafic rocks would be smaller in ZrO_2 content than ordinary pelites. Pelitic rocks in the Ryoike belt

are higher in ZrO_2 content than the Sanbagawa schists as given in Table 1. One Ryoike pelite has small ZrO_2 concentration, but this rock is associated with volcanic rocks. All the analyzed pelites in the Sanbagawa metamorphic belt are intercalated with thick green stones.

Volcanic activities in geosyncline is one of the important factors controlling the zirconium content of pelites.

ACKNOWLEDGEMENT

The author wishes to express his thanks to T. Nagashima for chemical analysis.

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螢光 X 線による領家・三波川泥質変成岩の ZrO_2 含有量の分析

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中部地方北部の領家・三波川変成帯の泥質岩の ZrO_2 を分析した結果、泥質岩の分布が火山活動に関連して形成された緑色岩と密接な場合に ZrO_2 の含有量が低いことがわかった。この理由として ZrO_2 含有量の少ない火山性物質が泥質岩に混入しているためと解釈した。