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Geological and Geochemical Characteristics of Akesayi Iron Deposit in Western Tianshan Mountains, Xinjiang

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1 Introduction

Akesayi iron deposit is a medium-sized iron deposits which was recently discovered and lied in Awulale iron-copper metallogenic belt, Xinjiang, China. Four large-scale iron deposits in this belt, Chagangnuoer, Zhibo, Dunde and Beizhan (Fig.1), are characterized by development of skarnization alteration, and lack of clear spatial relationship with intrusive rocks . the orebody is controlled by the irregular fracture control, and the magnet mineralization is dominated，whose genesis are recognised as volcanoic-subvolcanic fluid metasomatism type or iron ore slurry type (Zhang et al.，2012；Duan *et al.*，2014；Jiang et al.，2014). Akesayi iron deposit is obviously different from other iron deposits in Awulale iron-copper metallogenic belt in the geological features,

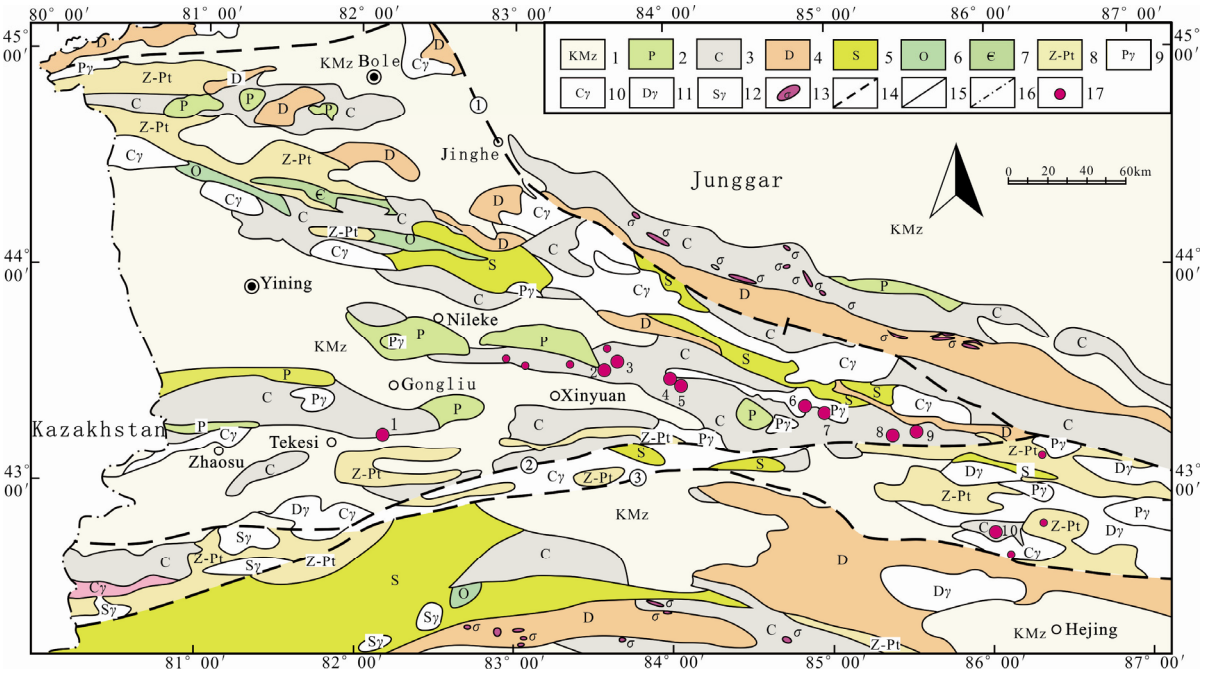

Fig. 1. Geological sketch map and distribution of iron deposits in Western Tianshan Mountain（After Hong et al.，2012a）.
1-Cenozoci-Mesozoic; 2-Permian; 3-Carboniferous; 4-Devonian; 5-Silurian; 6-Ordovician; 7-Cambrian; 8-Precambrian; 9-Permian granitoids; 10-Carboniferous granitoids; 11-Devonian granitoids; 12-Silurian granitoids; 13-Mafic-ultramafic rocks; 14-Fault; 15-Geological boundary; 16-Iron deposit. Number of iron deposits: 1-Kuolasayi; 2-Shikebutai; 3-Songhu; 4-Nixintage; 5-Akesayi; 6-Chagangnuoer; 7-Zhibo; 8-Dunde; 9-Beizhan; 10-Motuosala. Number of faults: ①-Yilianhabierga Fault; ②-Nalati beipo Fault; ③-changAwuzi-wuwamen Fault.

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and of which the genesis is unknown. According to the wild research and indoor experiments, we preliminary draw the conclusion that Akesayi iron deposit may be, closely related to volcano active, volcanic-subvolcanic hydrothermal metasomatic iron deposit.

2 Geological and Geochemical Characteristics of Akesayi Iron Deposit

2.1 Geoligical characteristics of Akesayi iron deposit

The iron ore bodies are mainly hosted in basalt, trachyandesite, andesite and andesitic tuff of Lower Carboniferous Akeshake Formation, a few in tuff of the Lower Carboniferous Dahalajunshan Formation. The ore bodies are controlled by secondary faults of volcano structure, the shape of which occur vein, lenticular and wall rock alteration develop, chloritization and carbonatization are the main, silicification and epidotization are less (Fig.2). The structure of ores \is mainly disseminated and vein, some is also massive and brecciated structure. Mineral formation can be divided into three stages：magnetite stage, quartz-sulfide stage and chlorite-carbonate stage.

2.2 Geoligical characteristics of Akesayi iron deposit

Basalt and andesite of the Akeshake Formation enrich LREE and LILE (such as Rb, Th, K), lack HREE and HSFE (Nb, Ta, Ti), the distribution patterns of REE is right slope (Fig.3). Combined with Th-Ta-Hf/3, Zr/4-Y-Nb*2 and Th-Nb diagrams for discrimination of tectonic setting (Fig.4), they show that these volcanic rocks could be formed in island arc environment. Formation of Akesayi iron deposit is related to volcanic mechanism which developed on the island arc .agnetites of Akesayi iron desposit are low TiO_2 (range from 0% to 1.7%, average of 0.2%), Cr_2O_3 (range from 0% to 0.2%, 0.06% in average) , significantly different from TiO_2 content of

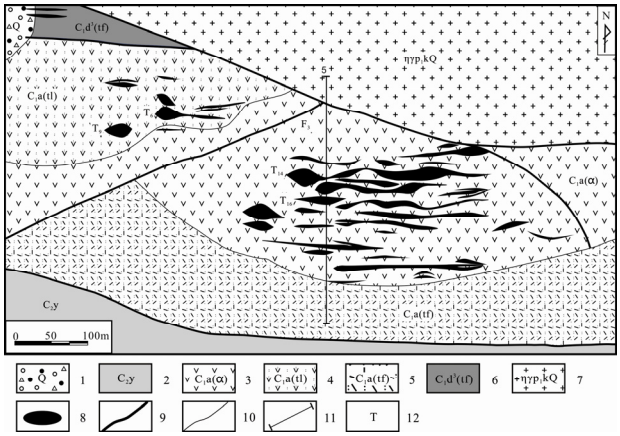

Fig. 2. The briefly geological map of Akesayi iron ore district （After the four 0 five team of the Bureau of Geology and Mineral Resources development of Sichuan，2011）.
1-Gravel, sandy soil, sand loam of Quaternary; 2-Tuff of Yishijilike formation; 3-Basalt and andesite of Akeshake formation; 4-Andesitic tuff(lava) of Akeshake formation; 5-Tuff of Akeshake formation; 6-Tuff of Dahalajunshan formation; 7-Monzonitic granite of Kuoerku mass; 8-The industrical ore body; 9-Fault; 10-Geological boundary; 11- Position of exploration line; 12-Number of ore body.

magnetites in magmatic crystal fractionation deposit(≥ 5.4%) , but similar to magnetite of the hydrothermal and contact metasomatic type iron deposit，TiO_2, Al_2O_3, MnO content (TiO_2 average from 0.18% to 0.33%) . Pyrite Co/Ni were higher (>1) , with characteristic of volcanic genesis pyrite and hydrothermal genesis pyrite；Sulfur isotope $\delta^{34}S$ range from -0.6‰ to 0.4‰, which imply that ore-forming fluid take magmatic sulfur characteristic. Through comprehensive analysis, this paper preliminarily draw the conclusion that Akesayi iron deposit may be volcanic-subvolcanic hydrothermal metasomatic iron deposit.

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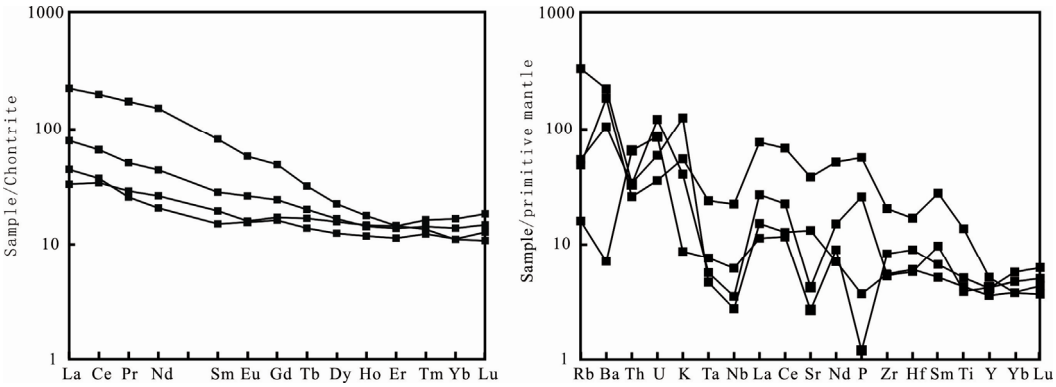

Fig. 3. Chondrite normalized REE and primitive mantle normalized trace element spider diagrams of the volcanic rocks from Akesayi iron deposit（normalization values after Sun et al.，1989）.

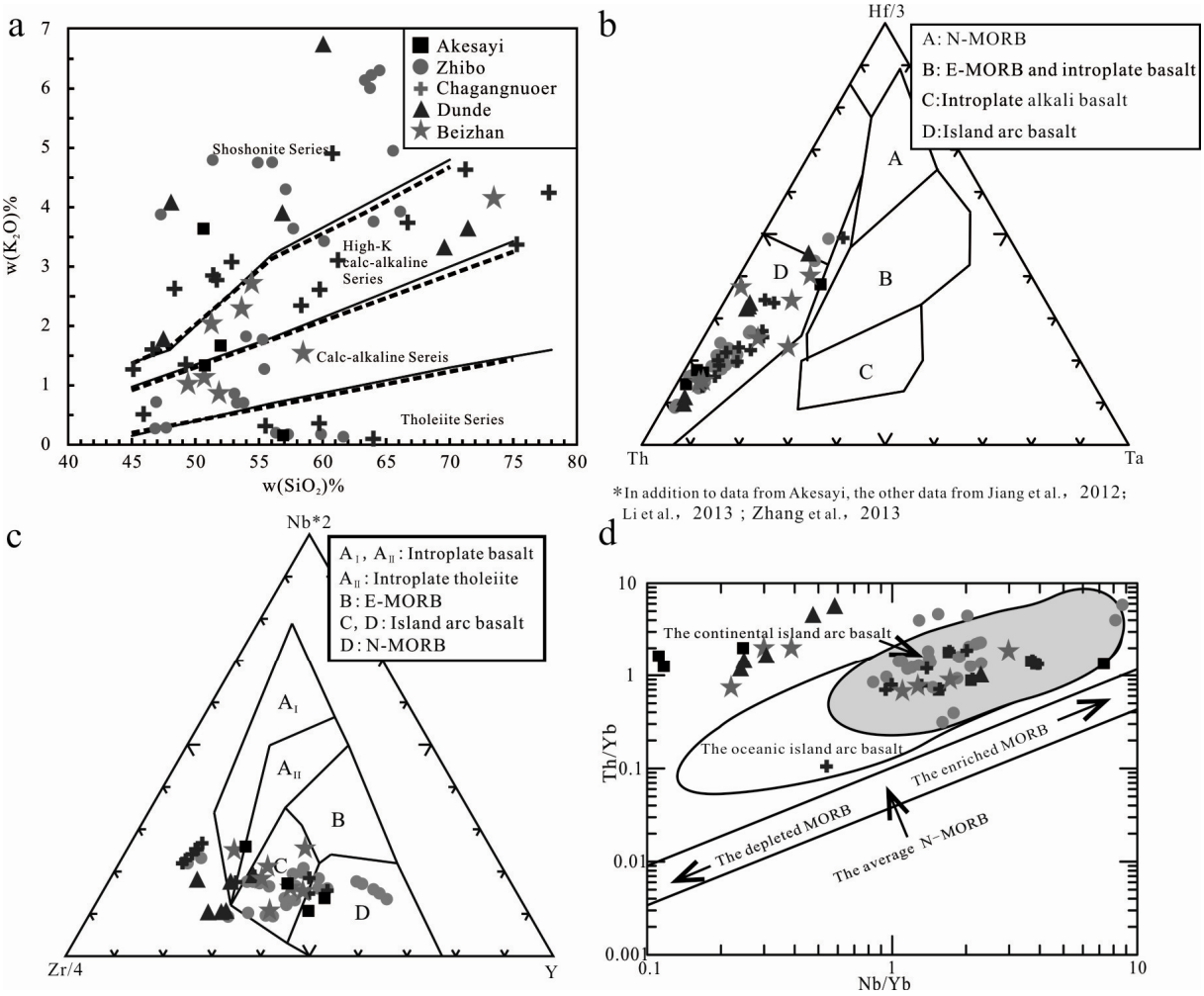

Fig. 4. SiO_2-K_2O diagram（Peccerillo et al.，1976） and discrimination of tectonic setting for the volcanic rocks from the Akesayi，Zhibo，Chagangnuoer，Dunde and Beizhan iron deposits（after Wood，1980；Meschede，1986；Pearce et al.，1995）.

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