

## Metasomatic alteration associated with regional metamorphism in the Almabulage Complex, NW IRAN

Mahboobeh Jamshidibadr\*<sup>1</sup>, Jamshid Ahmadian<sup>2</sup>

<sup>1,2</sup>Department of Geology, Payame Noor University, P.O. Box19395-3697 Tehran, Iran

### Abstract

Almabulage Complex is located in northwestern part of Sanandaj-Sirjan zone of Zagros orogen in western Iran. This area is Located 15 Km to west of Hamadan, Iran, is an example of geological region that has been significantly altered by metasomatic mass-transfer processes associated with regional metamorphism. Examples of metasomatically altered rocks in the Almabulage Complex are ubiquitous and include epidote-rich alteration zones, hydrothermal tourmaline veins, replacement ironstones and albite-rich alteration zones in metasediments and intrusive rocks. Almabulage Complex shows that metasomatism is typically associated with formation of calcic, sodic and/or iron-rich alteration zones and development of oxidised mineral assemblages containing one or more of the following: quartz, albite, actinolite–tremolite, epidote, magnetite, hematite and tourmaline.

**Keywords:** *Almabulage Complex, Metasomatic, Hydrothermal fluids.*

### Main text

The Almabulage Complex presentation in Tuyserkhan geological Map [1] mainly consists of metamorphic rocks and different igneous rocks. Three main geological units have been defined in the metamorphic rocks, consisting of volcanic-sediments (Almabulage sequence) at the lower part, carbonate (Chenarsheikh sequence) in the middle, and slate (Hamadan slate) at the upper part identified. The rocks that metamorphosed at green schist facies have exposed in a dome structure.

Another rock unit are different igneous rocks that based on their lithological features and different compositions, two suites of plutonic rocks (felsic & mafic rocks) can be distinguished.

*Mafic intrusion*, the diorite to gabbro intrusion, which are crop out in the northwest and central to west of the Almabulage complex. Dating of mafic intrusive rocks by Rb-Sr emplacement age 144 Ma [2].

*Felsic intrusion*, the syenogranite to alkali granite intrusions, which crop out in the central of the Almabulage complex that a longed from south to north. These massive, dome structure and have contact metamorphism and metasomatism with the surrounding meta-volcanic-sediments and meta-carbonate. Types of mineralization are the proximity of syenogranite intrusive bodies to ore mineral, metasomatism and the existence of calc-silicate minerals such as epidote and actinolite. Exsolution textures perthite and granophyric with together in felsic intrusion related to magmatic condition and low pressure H<sub>2</sub>O (less than 5 Kbar). The geochemistry of Syenogranite shows high anomalies of alkaline especially Na. Their trace elements trends normalized to the primary mantle and chondrite have similar anomaly with negative Nb, Ta, Ti that related to

subduction environments and I-type granite. Chemical of feldspar composition shows anomalies of Na.

Metamorphic rocks consist of calcshistes, mica-schist, semi-shist and amphibolites. A metamorphic rock has three schistosity (S1, S2 and S3) that S1, S2 related to M1, M2 respectively and metamorphosed at green schist facies. M3 is a retrograde metamorphism. This Regional metamorphism contains hydrothermal tourmaline and quartz veins, hematite and magnetite minerals and epidote-rich alteration zones.

Evidence Metasomatic alteration associated with regional metamorphism in the Almbulage Complex is the same as another research that reported by [3,4,5] shows epidote-rich alteration zones, hydrothermal tourmaline and quartz veins, and replacement ironstones in metasediments and albite-rich alteration in intrusive rocks suggests that the majority of metasomatic alteration was broadly contemporaneous and involved the action of hydrothermal fluids.

### Reference

- [1] Eshraghi & Gharai., Quadrangle Geological Map of Tuyserkan, Scale 1:100,000. Geological Survey of Iran (2003).
- [2] Valizadeh M.V., Cantagrel J.M., Premières données radiométriques (K-Ar et Rb-Sr) sur les micas du complexe magmatique du mont Alvand, près d Hamadan (Iran occidental). Comptes Rendus I<sup>er</sup>. Acad. Sci (1975) Paris D 281: 1083–1086.
- [3] Ashley P.M., Lottermoser B.G., Westaway J.M., "Ironformations and epigenetic ironstones in the Palaeoproterozoic Willyama Supergroup, Olary Domain, South Australia", Mineral. Petrol 64 (1998) 187–218.
- [4] Skirrow R.G., Ashley P.M., "Cu–Au mineral systems and regional alteration, Curnamona Province", Minfo 62 (1999) 22–24.
- [5] Kent A.J.R., Ashley P.M., Fanning C.M., "Metasomatic alteration associated with regional metamorphism: an example from the Willyama Supergroup, South Australia", Lithos 54 (2000) 33–62.