Azeri Barites; Deformation Evidences from Late Precambrian

B. P. Vusuq[1], B. Hajalilou[1], M. Moayyed[2]

[1] Department of Geology, PayameNoor University, Mashrooteh St.,Tabriz, PC 51746, Iran.
(E-mail: coalminer1848@yahoo.com)

[2] Department of Geology, Tabriz University, 29-Bahman Sq., Tabriz, Iran

Abstract

The Studied area is located in Morow and Mishow mountain, NW of Iran which is a part of central Iranian structural zone. There are some barite-galena mineralizations in this area which some of them developed for barite mining. The host rock of mineralization is transitional zone of sandstone facies to black shales facies in upper Proterozoic Kahar formation. The characteristic of this mineralization host rock is low green schist metamorphic facieses. Field and microscopic investigations have been done for this area. Microscopic investigation of micro-textures indicated that the mineralization at least has been affected from 3race deformation stress processes.

Key Words: *Barite, deformation, galena, Kahar formation, metamorphism, Precambrian.*

Introduction

Mineral deformation investigations as beneficial equipment for regional geologic interpretations are carried by [6] & [7]. Some microstructures in ore and gangue minerals are indicators of metamorphism, deformation and stress. The results of deformation depended on stress quality and the mineral behavior under stress. Some of them are showing the crushing and others are showing the plastic deformation. The Studied area is located at Morow and Mishow mountains, NW Iran. According to structural zoning of Iran, and based on gravimetric Bougouer anomaly maps (By mi. Gal) this region has some similarities with central Iran crust. In Precambrian, this area located in NE margin of Gondwana super continent. [1]

The studied case is located at NW of Iran. Based on structural zoning of Iran [11] this area is a member of Central Iranian zone (Fig.: 1). The mentioned area endured various stresses (Fig.: -2), some of them probably existed from Katangan orogenic phases. The Qaradash rhyolite is one of the evidence for it. [1] & [5]

The upper Proterozoic black shales (Kahar formation), like the lower stratigraphic unite in Morow and Mishow Mountains is the host rock of barite-galena mineralization. Kahar formation is a much factorized arkosic sandstone, shale and rhyolite facieses. Kahar sandstone is consisted of quartz, serisitized alkali feldspars and lithic particles. Shale facies have sharp lamination with stillolite structures. Existence of diagenetic pyrite and pterophabrical deformations are main characteristics of these facieses.

The mineralization occurred in host rock unconfirmed vein and veinlet shapes. Based on exclusive limitation of this mineralization into upper Proterozoic and their bed cutting status, they are stratabound and non-stratiform mineralization. Kahar black shales are showing some changes under effect of burial diagenetic phases. Alteration of clay minerals to illites(Fig.: 3-A)[9]and existence of diagenetic pyrite mineral(reduce of sulfur contents and composition

with Fe components) as diagenesis production(Fig.: 3-B) are some evidences of the diagenetic burial event.[4]

Discussion

- Baroque dolomites: There are some baroque dolomites are found in lower parts of a few veins, which they have altenatinan with barites. (Fig.: 4-A, B). They are characterized with their pale brown color and wavy silence. These dolomites are being formed in high temperature, including a high Fe contents (in some cases = Ankerite). Mg ejection from clay minerals under lithostatic pressures in burial environments, as a main factor of Mg preparation, has the main role for baroque dolomite formation. Ankerite existence is the best evidence of burial facies condition indication. [2] & [3] & [10]

- Calcite twinning: Calcite twinning as a famous evidence for mineral deformation is abundantly observable event in Sofiyan barite mineralization. I-type and II-type calcite twining observation in various samples, indicated 200ºC-250ºC temperature for deformation processes.[5] & [8] & [12] (Fig.: 4-C, D)

- Rupturing and Shearing: There are various existences of rupturing and shearing in Azeri barites. (Fig.: 4-E, F, G). Plastic flows of barite and bayonet shape in galena crystals of Sofyan deposit are indexing it. The galena as soft mineral can be ruptured and plastic deformation behaviors.

- Triple Junctions in Barites: This structure formed in mineral grains contact area that it caused annealing processes. This event is observable in various samples of Morow and Mishow barite mineralizations. (Fig.: 4-H)

- Polysynthetic twinning in Barites: Barite minerals slips-rotating in studied mineralization zone formed as polysynthetic twining. In first stage these slips is in molecular scale, but in progressive stages the polysynthetic twining formed. (Fig.: 4-I)

- Annealing of Barites: Annealing is named for tying of little size minerals together and formation of phenocrystals that it usually occurred in triple junction status. [7](Fig.: 4-J)

- 3race of deformation: There is 3race deformation in studied mineralization barites. At first stage, the wavy silence formed in this barite. It may be depended on compressional stress endurance that caused crushing of a big crystal and production of countless micro crystals as well as their various optical activities in different trends. In second stage, polysynthetic twining under D2 phase formed in barite minerals. Finally in third stage, the polysynthetic twining lamellas were broken and they moved away like graben – horst shapes. (Fig.: 4-K)

- Zoning in Barites: Barite minerals in some locations have zoning. There are many observation of it into a few veins. This event probably rooted from chemical factors, as element migration under pressure or over growth of new barite unites cells on a primitive barite core with different chemistry. (Fig.: 4-L)

Conclusion

Mineral deformation depended on various factors. The studied area has complex tectonic evaluation history. The North Tabriz Fault (NTF) as a main fault is crossing from studied area and makes an active zone in this area. The existence of rhyolite is showing attractive zone of rifting events which we have Qaradash alkali rhyolites in studied area. [5] Existence of different microstructures into mineral masses indicates wide deformation events on

mineralization and its host rock. There are at least 3 race deformation evidences in studied mineralization. Independent of tectonic trends on Kahar formation and mineralized zone from upper lithologic unites led us to an upper Proterozoic unconformity event. Existence of green schist in Kahar black shales and carbonate twinnings into veins are the main deformation evidence. Azeri barites are the best evidences for old low metamorphism evident in upper Precambrian-Cambrian periods. These events probably can be describable with Katangan-Hijazian orogeny or an old rift existence, which is happened before Bayondor formation deposition event.

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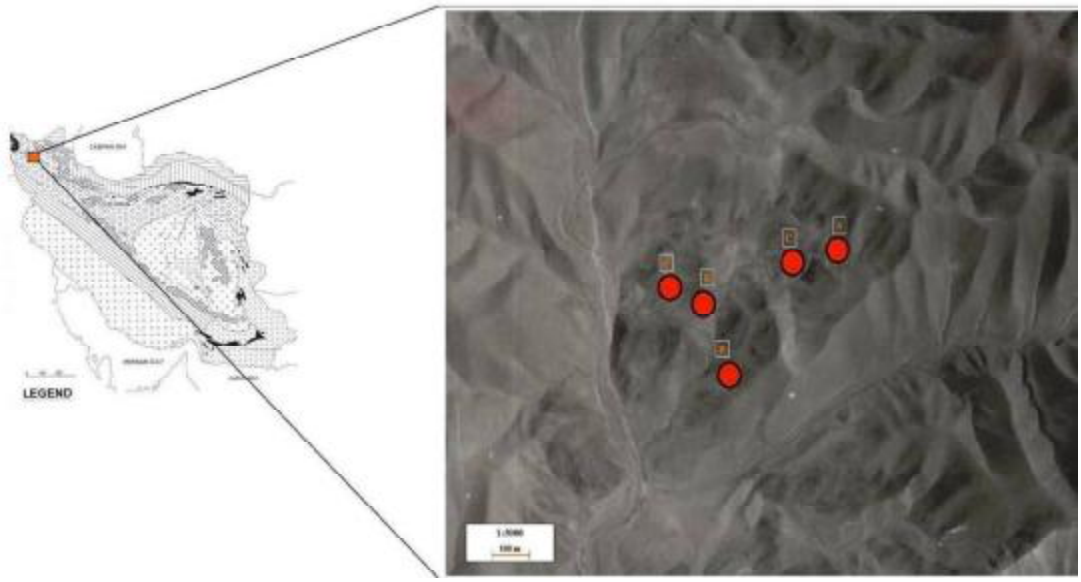

Fig.-1: The studied area in Structural zoning of Iran [11] and on 1:5000 aerophoto(●: mineralization outcrops)

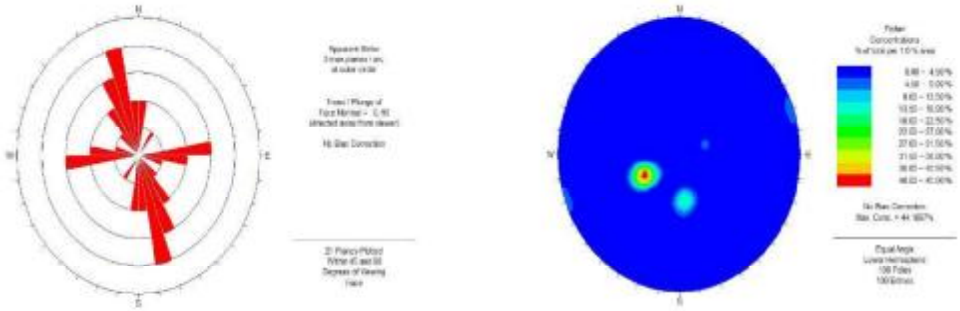

Fig-2: jointing systems of Kahar formation with vein content joints

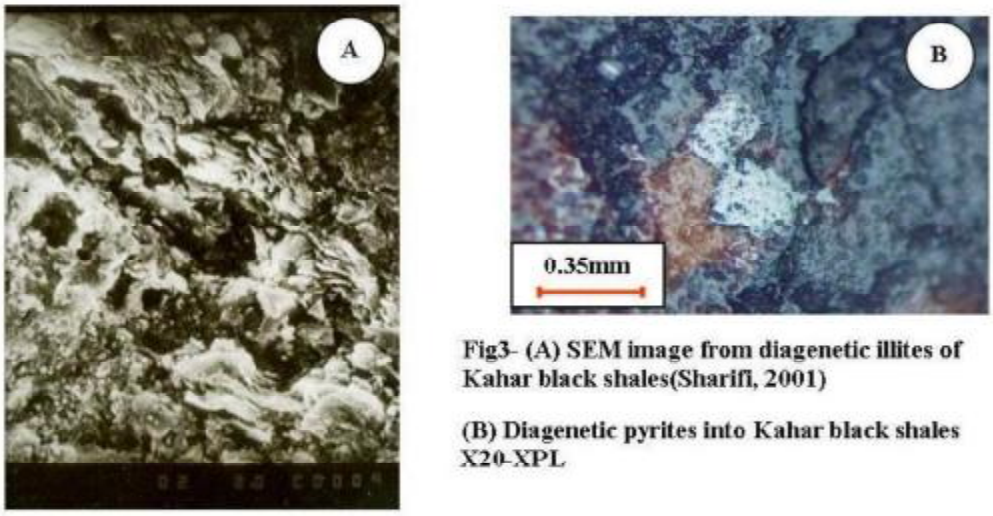

Fig3- (A) SEM image from diagenetic illites of Kahar black shales(Sharifi, 2001)

(B) Diagenetic pyrites into Kahar black shales X20-XPL

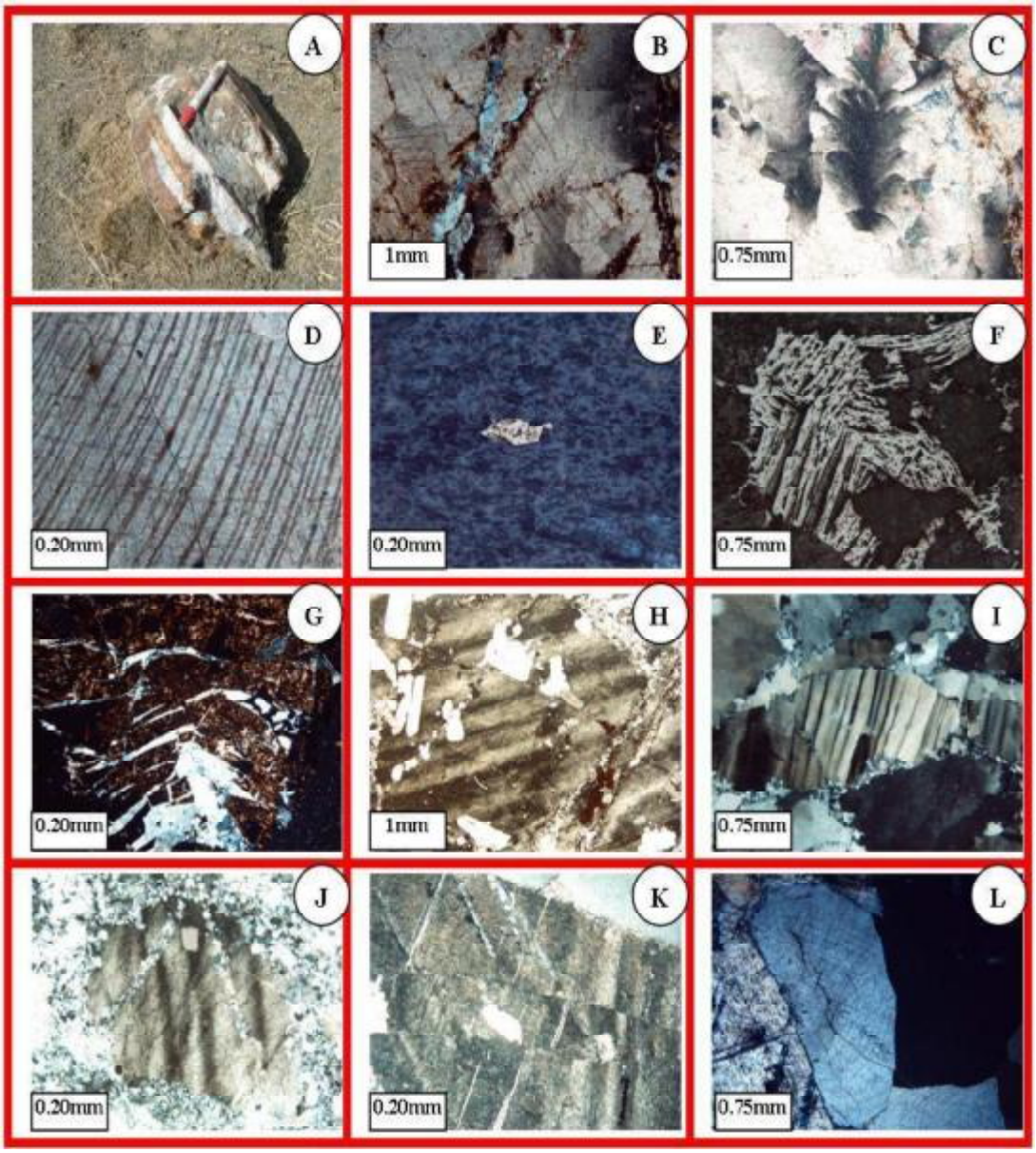

Figure: 4

(A) Paragenetic relation of ankerite minerals with barite
(B) Ankerite and its Polysynthetic twinning(X100-XPL)
(C) Dendritic silence of dolomites(X200-XPL)
(D) Polysynthetic I-type twinning in calcite(X200-XPL)
(E) Follwing of chalcopyrite from rupturing and foliation of barites(X200-PPL)
(F) Shearing deformation of galena and bayonet shape existence(X100-PPL)
(G) Linked host rock and barite lamella deformation(X200-XPL)
(H) Triple junction structure in barite mineral mass(X40-XPL)
(I) Polysynthetic twinning in barite(X100-XPL)
(J) Annealing processes in barite minerals into triple junction(X200-XPL)
(K) 3-Race deformation for barite crystals(X200-XPL)
(L) Zone barite crystal(X100-XPL)