Oxygen relative changes and sedimentary rate of the Shemshak formation in Binalood basin based on studies Palynology

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Abstract

the gradual zone Binalood geological unit between Centeral Iran and Alborz, real development of this zone between areas north of Sabzevar, Neyshabor, Mashhad .Shemshak formation is one of the late and middle Jurassic formation s series eastern Alborz basin in east of Iran and its consists shale and carbonaceous sandstone. The studied section is located in the 3 kilometers of Bar village east longitude and 36,28,49.5 north latitude and have thicknes about 255 meters and the mostly litho logy dark gray shale. In order to study amount oxygen relative changes and sedimentary rate mentioned formation in section the Bar village take on the number of 28 sample and proved to be 112 Palynological slides and according to Palynomorphic elements which exists in Palynologic slides and considering three main of group of palynological elements including; Palynomaseral, Palynomorphs and structures less organic matter(SOM) and SOM ecological factors such as; Lability, SOM(t)/SOM (op),SOM/marine Palynomorphs, SOM/Palynomaseral(b) and M.E/C.E, Oxygen amount and sedimentation rate have been studied during deposition this formation. Based on oxygen amount and sedimentary rate during the deposited of formation become changeable but in general rates obtained from study ecologic factors during formation and study of section Palynofacies can thus deduce that: In general, one can result in that the main part of Shemshak Formation in the section of Bar village has been formed in a relatively high oxygen condition and sedimentation low rate.

Key words: Shemshak, Palinology, Binalood, Palynomaseral, Palynomorph, SOM

Introduction

The general outcrop of Binalood ranges have north- western to south-eastern trends. These mountains which are placed between Tooran solid plate and Central Iran Micro-continent are geographically deemed as continuance of Alborz ranges. But despite of some facies similarities and folds effect, it causes Binalood ranges to be seemed as a gradual platform between Central Iran and Alborz. Together with other sedimentary- structural platforms of Central Iran and Alborz during Paleozoic era, this region form sedimentary basin unit which totally placed in Central Iran platform(Nabavi,1355).

Jurassic sediments constitute one of the thickest geological trends in Iran. Such sediments which are placed in Alborz and Central Iran areas, characterized as Shemshak Formation (Assereto,1966). Shemshak formation is extended throughout Iran, especially in Alborz ranges and Northern Iran(Fursich et al.,2005). The existing Biota in Shemshk formation sediments includes several types of and Palynomorphs, plant and animal fossils.

So far, Shemshak formation has been studies in terms of various views. In this article, Shemshak formation sediments have been examined based on palynomorphic elements. The studied section is located in the 3 kilometers of Bar village east longitude and 36,28,49.5 north latitude and have thicknes about 255 meters that consist of gray dark shales.

Discussion

In order the relative changes in sedimentation rate of oxygen and formation of these, the number of samples harvested 28 and 112 of them were prepared slides Palynology and were carefully reviewed and selected several random field of view, including 400 bit Palynological Dinocysts, Palynomaserals and structures less organic matter (Som),... Per slide were counted and the percentage of each element was Palynlogy. The presence of organic substances depends on two other reasons i.e. sedimentation speed and the existence of oxygen- poor waters which appropriate for their protection and maintenance other than the suitable conditions for their production.

In fact, what remain in palynology slides are resulted from organic materials selective safety (protection). Such factors are served as the most important factors for protection of organic materials. Organic materials protection factors have been examined based on how much ratio percent they have of three main palynomorphic elements, that are Lability Factor, transparent SOM ratio to dark one, Amorphous materials ratio (SOM) to marine Palynomorphs and som ratio to brown macerals in Shemshak formation to determine the way of sedimentation rate and oxygen relative variations.

Ratio of structures less organic matter(SOM)/marine Palynomorph(MP)

If the depositing environment of less- oxygen sediments as well as sedimentation speed are low, it leads to lack of Palynomorphs maintenance and their conversion into som; however, the case where this ratio is low for sedimentation with high level oxygen, marine Palynomorphs are changed into dark SOM(op). By and the highest maintenance level in Palynomorphs, particularly of dinoflagellates occurs in lack of oxygen and conditions of highly rhythm sedimentation. Thus, the rise of transparent SOM(t) to marine Palynomorphs represents the low rate to lack of oxygen and the condition of low sedimentation rate; while, the rise of dark SOM(op) to marine Palynomorphs indicates having adequate oxygen with low rate of sedimentation(Bombardier & Gorin,2000). Regarding to this fact in the section of this case study the ratio of transparent SOM to marine Palynomorphs is lesser than unit and dark som rate to marine Palynomorphs is greater than 1, this shows that it refers to adequate oxygen conditions with sedimentation low rate(fig.1,A).

Ratio of SOM(t)/ SOM(op)

The abiotic bacteria in oxygen-less ambience create transparent SOM(t) rate lesser than sedimentation level and due to reduction conditions, they decompose organic materials to nitrates and sulphates, then to create nitrogen, carbon dioxide, water and methane. Therefore, in the occasion of sedimentation highly rate, bacteria could not decompose and decay organic materials, so there will be more chance for organic materials maintenance.

By the oxygen which exists in water, biotic bacteria decompose organic materials. If decomposition rate is high, organic materials lose all their oxygen and hydrogen and little

carbon remains; and for this reason, SOM is darkened. With respect to the fact that the quantity of transparent SOM(t) shows the condition of lack of oxygen, and dark SOM(op) denotes the adequate oxygen in the given condition, measurement of their ratio may be served as an approximation about oxygen amount in the past. If such ration is greater than one, it indicates lack of oxygen and vice versa(Bombardier & Gorin,2000).

In all samples derived from the studied section, the ration of transparent SOM(t) to dark(op) ones is lesser than unit which represents the adequate oxygen during sedimentation time. In general, we observe a rising trend in ambient oxygen from Formation base toward its altitude (fig.1,B).

Lability factor

According to their transparency, Macerals are divided into two categories: Opoc (Op) and Brown (b). Brown macerals rely on land plants and show offshore environment. And Op Macerals which are dark and indicate a hemi- oxic, semi- calm environment while they are increased away beach. Lability factor is resulted from brown Palynomacerals ratio to Op Macerals, so that the greater ratio of brown Macerals to (Op)Macerals, the more variability factor, while it shows a good maintenance(Bombardier & Gorin,2000). However, it is possible Opoc Macerals enter to the basin from another path. They may be carried again and/ or be created due to temperature rise on the beach and entering to basin; therefore, by juxtaposition of Liability factor to other conditions and factors, they should be examined in order to increase certainty and accuracy of this factor.

Generally in the samples which derived from the studied section, brown Palynomacerals ratio to (Op)Palynomacerals is less than one, so this may shows oxygen low level in environment; however, by considering the mentioned issues as well as the evident existing in the slides, one could conclude that the rise of (Op)Macerals has been due to temperature on the beach (fig.1,C).

Ratio of Marine elements/Non marine elements(K factor)

Counting of marine Palynomorphs (ME) (especially Dinoflagellates) Non-marine Palynomorphs (CE) and determination of CE/ME ratio as K coefficient, is considered as Non marine to marine Palynomorphs rate, that is the greater K coefficient, the nearer environment to beach. Regarding to the diagram which exists at the beginning of Formation, the K coefficient rate is less than one so it means sedimentation environment is shallow where the environment is changed into very shallow to beach surface by increase in K coefficient from Formation middle part(fig.1,D).

Results

According to this study, one can generally infer so that with respect to Palynological elements and K factor and other mentioned factors, the Shemshak Formation sedimentation environment is too shallow to seashore, with adequate oxygen and low sedimentation rate in this section where the ambient oxygen volume is increased from the beginning part of Formation to the middle part. The presence of spore, pollen, and fungus body in the existing slides denotes existence of water, and warm weather during deposit of sediments. Similarly, the presence of foraminiferal test lining in some slides emphasizes in the existing oxygen in sedimentation environment.

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Text-Figure1. Stratigraphy Column in studied and area percentage ratio diagram organic matter; A, Ratio of structures less organic matter(SOM)/marine Palynomorph(MP); B. Ratio of SOM(t)/SOM(op); C, Lability factor; D, Ratio of Marine elements/Non marine elements.