



Small Industries on Chert Nodules and Geodes in Jabal Nefusah

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Abstract

Small industries are among the things that society needs to employ young people looking for work, especially new graduates from engineering institutes and colleges, and from these industries that do not need a large capital, it is polishing rocks with special natural characteristics as colour, lustre, hardness ... and other, especially these materials available locally

Emphasis was placed on the most important rocks with the required natural properties and their locations in the formations close to

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the surface or exposed on the ground, which can be exploited without high cost, Limestone and dolomite are the common rock types and usually occur in thick beds in the area of Jabil Nafusa

Several samples tested for nodules type of chert to determine general physical characteristics and their relative quantities. The results reveal that although the secondarily re-deposited nodules provide a usable and easily accessible source, the quality and quantity of the chert nodules varies greatly and the test design must be thoughtful to determine the quality and quantity.

As well as Geodes, which found in carbonates rock with different size, which generally occur in limestone, a calcium carbonate, or in dolomite, a calcium-magnesium carbonate. Emphasis was placed on the Nafusa Mountains (Jabal Nafusah) area (Nalut and Al Aziza Formations).

Keywords: chert nodule, Geodes. Nalut formation, Al Aziza formation

Introduction

The Nafusa mountain is one of the most important geological phenomena in north western Libya (NW-Libya), as it extends in an area from the city of Gabes to the city of Khums, reaching a length of about 500 km and its height ranges between (200-900 m), as the Nafusa mountain consists of sequences of carbonate rocks. (Limestone and dolomite rocks), which are the most combined in the areas of the Mesozoic and the third and fourth times (Al Aziziyah and Nalut Formations). (Fig 1)

Aesthetic characteristics are important when rocks used as construction materials. Among the entire surface finishes available. The polished finish is one of the best enhances of the rock attractiveness.

Colour (C), roughness (R) and gloss (G) are surface properties usually used to assess the rock polishing.



Fig 1-The study area is located in and around Ghryan area at the middle of Jabal Nafusah

The objective of this paper is to describe physical and graphically characterize document natural chert occurrence and geodes in Jabil Nafusa.

The study focused on two types of rocks with special specifications, namely the chert and the geodes, some of which are consider precious rocks due to their beauty and good looks.

Material and methodology

The samples taken and evaluation basis on measured profiles mentioned in the Explanatory Booklets edited in the Industrial Research Centre, Tripoli, and other field work [2,3,4&5] as well as

from individual work on Mesozoic—Paleogene samples selected in study area.



Fig 2 - Chert nodules with distinctive colour. (Al aziza Formtion)

a) Fieldwork:

The present study includes the analysis of chert nodules, and geodes, samples, which brought from the Al Aziza and Nalut Formations carbonate and dolomite rocks. First begin by analyzing nodules and geodes samples in the field, record the basic manual inspection approach for several samples, and record the physical-optical properties of rocks such as colour, shape, size, hardness, and other properties..

b) Laboratory work

A selection samples was analyzed using a polarized microscope for petrographic examination, took into account the visible physical properties of the chert nodules such as colour, shape, size, compactness and spacing, Also paid close attention to other properties like, texture, fragility and sample weight that were determined through simple observation. (Fig. 3)

The samples were washed (with H₂O₂) than taken thin section and evaluated for the purpose study, to providing and documenting some natural properties of the rocks.

c) Finally

Cleaning and polishing samples to show their true beauty in different shapes and sizes (Fig. 7)

Discussion and Results:-

Chert is a sedimentary rock composed of microcrystalline or cryptocrystalline quartz, it consist mostly or entirely form silicon dioxide (SiO₂), grows within soft sediments, as nodules, or large enough to merge with one another to form a nearly continuous layer (Fig 2, 6 & 7).

However, it occurs with distinctive colour, or in a wide variety of colours. Continuous colour gradients exist between white and black or between cream and brown. Green, yellow, orange, and red cherts are common.

Chert has diagnostic features as:

1. Distinctive colour,
2. A hardness of seven on the Mohs scale,
3. A conchoidal (shell-shaped) fracture of the silica mineral chalcedony that composes it,
4. A smooth (non-clastic) sedimentary texture,
5. The waxy luster

Geodes

The second rock that which focused on in this study was geodes. It is more or less spherical or egg-shaped rocks containing a hollow cavity, which are usually full and lined with crystals. It has a durable outer wall that is more weather resistant than surrounding rocks. The geodes could

filled with beautiful blue to pink silica, stunning opals, any bright colors or other rare materials (Fig. 4 & 5)

Various varieties of [quartz crystals](#) are the most common minerals found inside of geodes.

Many studies of the Nafusah Mountains region have proven its presence in different sizes [1, 7 &10], especially in the Nalut formation.

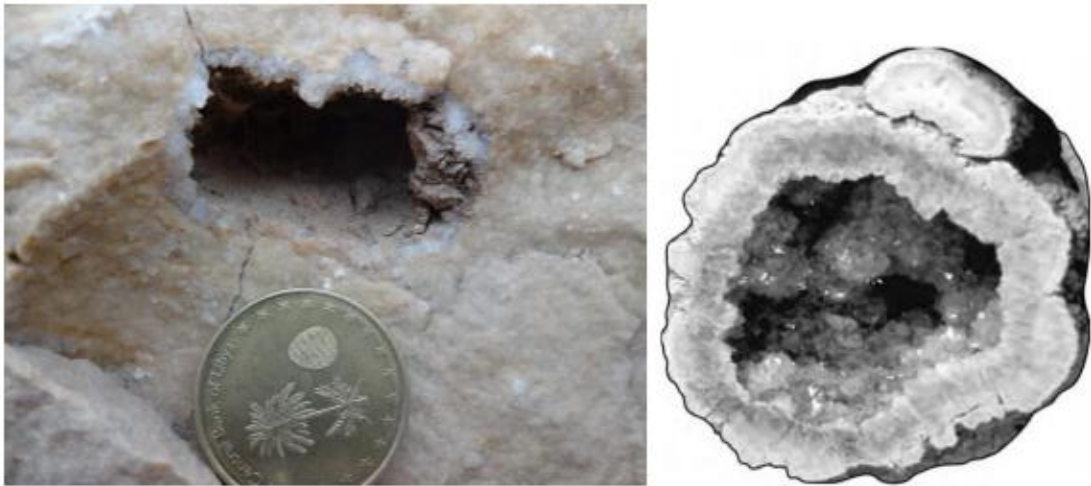


Fig 4- Minerals are deposited on the walls of the geode, duo to impact of groundwater or fluids with the presence of change of temperatures or chemical changes (Nalut Formation)

Al Aziziyah Formation

Al Aziziyah Formation (Middle to Upper Triassic age) that was deposited on a gently sloping carbonate ramp within the Jifarah Basin of Northwest Libya. The Al Aziziyah Formation consists of gray limestone, dolomite, and dolomitic limestone interbedded with shale. [2, 4, 5 & 6]. In general The Formation consists of gray limestone, dolomite, and dolomitic limestone interbedded (gray to dark gray dolomite and dolomitic limestone with gray chert nodules, or gray to dark gray chert

layers (within the Ghryan dome, Al Aziziyah Town, and Ras Lafal were field observations to identified the facies)

The Al Aziziyah Formation has an abundance of mud cracks and silicified evaporate nodules in its peritidal facies, suggesting an arid climate during its deposition (Preto et al., 2010, and other).

Many researchers to know its sedimentary, environmental history studied Al Aziza Formation and its distribution in western Libya, and most of them confirmed that that Al Aziziyah Formation (Middle to Upper Triassic age) deposited on a gently sloping carbonate ramp within the Jifarah Basin of Northwest Libya.

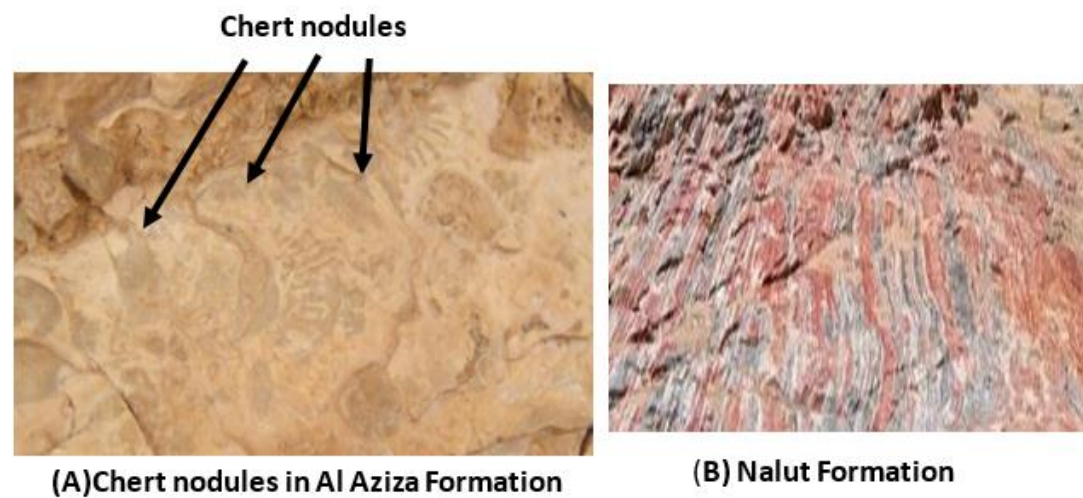


Fig- 6 Some type of chert distribution in the area

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Nalut Formation: (Cenomanian – Turonian)

The Nalut Formation consists of grey crystalline dolomitic limestone with chert bands. [2].

Nalut Formation represents the top formation in Grehan area, and consists mainly of massive bedded grey to light grey, reddish, and yellow dolomitic limestone and limestone with very thin clays gray limestone sequence with massive bedding, partly siliceous and occasionally dolomitic, fossiliferous recrystallized saccroidal dolomite, contains dissolution cavities filled with good to poorly developed geodes.

Makhlof, 2019 reported that the beds of Nalut formation in Ras` Quadah Area have geodes and bone fragments. [1]

Physical, petrographic (microscopic) analysis of chert nodules in Al Aziza and Nalut Formations indicated the concept that most of the chert deposition has been concentrated in the limestone and dolomitic limestone, by different temperatures and filtration percolation of silica-rich solution along microfractures or in porosity/permeability through formation.

In addition, differences in the values of porosity and permeability through the formation get chance to change in a size and shape voids of the nodules or geodes.



Fig 5- A micro-crystalline of quartz crystals in sedimentary geode (Nalut Formation)

A good field study and the correct evaluation of the area is the basis for us to have a good opportunity for excellent samples and models on a personal, commercial, and economic level.



Fig. 7- The first stage and final stage of clean and Polished of some samples

Conclusions

1. Chert nodules are widely developed in carbonate deposits of Al Aziza Formation, yet the mechanism responsible for their formation remains disputed.
2. The western region has natural resources for industrial materials that can be use locally at a simple level or at a higher level.
3. One of these natural possibilities is the polishing of rocks. In addition, if the process of polishing and butterfly rocks is an enjoyable hobby and produces great results, its will be the most powerful innovation for those with good geological knowledge and experience.
4. By using large equipment could obtain better and faster results of polishing a large number of rocks at the same time.
5. The polished rocks have many ways to use as display beautiful shiny rocks on a personal or public level (art decoration) or to make jewelry for sold.

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